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Styrenic Copolymers

Andreas Chrisochoou and Daniel Dufour

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Source of original article	→	<i>Item 1</i> Macromolecules 33, No.6, 21st March 2000, p.2171-83	
Title	→	EFFECT OF THERMAL HISTORY ON THE RHEOLOGICAL BEHAVIOR OF THERMOPLASTIC POLYURETHANES Pil Joong Yoon; Chang Dae Han	← Authors and affiliation Akron, University
		The effect of thermal history on the rheological behaviour of ester- and ether-based commercial thermoplastic PUs (Estane 5701, 5707 and 5714 from B.F.Goodrich) was investigated. It was found that the injection moulding temp. used for specimen preparation had a marked effect on the variations of dynamic storage and loss moduli of specimens with time observed during isothermal annealing. Analysis of FTIR spectra indicated that variations in hydrogen bonding with time during isothermal annealing very much resembled variations of dynamic storage modulus with time during isothermal annealing. Isochronal dynamic temp. sweep experiments indicated that the thermoplastic PUs exhibited a hysteresis effect in the heating and cooling processes. It was concluded that the microphase separation transition or order-disorder transition in thermoplastic PUs could not be determined from the isochronal dynamic temp. sweep experiment. The plots of log dynamic storage modulus versus log loss modulus varied with temp. over the entire range of temps. (110-190C) investigated. 57 refs.	← Abstract
Location	→	GOODRICH B.F. USA	← Companies or organisations mentioned
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Styrenic Copolymers

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(Bayer AG)

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1 Introduction

Styrenic copolymers (SCs) are engineering thermoplastics which contain at least one further monomer in the main polymer chain in addition to styrene (S). The most important styrenic copolymers are styrene-acrylonitrile copolymer (SAN) and acrylonitrile-butadiene-styrene terpolymer (ABS). Apart from speciality styrenic copolymers based on other comonomers, blends of styrenic copolymers with other thermoplastics (styrenic copolymer blends) have also established themselves in the market. Blends of ABS with polycarbonate (PC) or polyamide (PA) are most prominent.

Styrenic copolymers are amorphous melt-processable polymers with superior surface quality, high dimensional stability and effectively constant mechanical properties almost up to their softening temperature. The main fields of application for styrenic copolymers and their blends are in the automotive/transportation, electrical/electronics and information technology industries.

1.1 History and Current Trends

SAN was first synthesised in 1936 and showed superior mechanical, thermal and chemical properties compared with polystyrene (PS). This copolymer together with its rubber-modified, impact-resistant version, ABS, was only commercialised in the 1950s after World War II (a.1).

ABS was first prepared by compounding SAN with non-grafted rubber. These products showed poor morphological stability during processing and are nowadays of no importance. Graft polymerisation became established as the process for manufacturing impact-modified styrenic copolymers. Later on, new grades such as high-heat, clear and weather-resistant ABS types were introduced, based on additional comonomers.

At the end of the 1950s, the first investigations were carried out on blending PC with SAN or ABS. Compared with the individual polymers, the blends led to an improvement in mechanical properties and processability (a.2). The first PC+ABS blends were commercialised in 1967 (a.3). Since that time, additional styrenic copolymer blends have been developed and commercialised such as PA+ABS. The subsequent years were characterised by further improvements in the blend systems. The heat resistance, for example, was markedly increased by an α -methylstyrene-acrylonitrile (MSAN) copolymer matrix while the use of an acrylonitrile-styrene-acrylic ester

(ASA) graft rubber in place of ABS improved weathering resistance (a.4, a.5).

After nearly 50 years of market presence, styrenic copolymers are still on course for growth as ongoing refinement of formulations steadily opens the way for new applications. This is especially true for styrenic copolymer blends such as PC+ABS.

1.2 Types of Styrenic Copolymers

This review will describe both homogeneous matrix styrenic co- and ter-polymers such as SAN and two-phase rubber-modified styrenic copolymers such as ABS.

The following ‘SAN-like’ styrenic copolymers are included:

- styrene-acrylonitrile (SAN, rarely also referred to as AS)
- α -methylstyrene-acrylonitrile (MSAN) and styrene- α -methylstyrene-acrylonitrile (SMSAN); both are also referred to as α -SAN in practice
- styrene-maleimides (SMI) and styrene-acrylonitrile-maleimides (SAMI) where maleimide (MI) is mostly *N*-phenylmaleimide (NPMI)
- styrene-maleic anhydride copolymer (SMA) or styrene-acrylonitrile-maleic-anhydride terpolymer (SAMA). (The abbreviations SMA and SAMA are commonly used in practice instead of the designations SMAH and SAMAH cited in ISO/FDIS.)
- styrene-methylmethacrylate copolymer (SMMA) and styrene-methylmethacrylate-acrylonitrile terpolymer (SMMAN)

The ‘ABS-like’ styrenic copolymer group consists of:

- acrylonitrile-butadiene-styrene (ABS)
- ‘ABS’ based on the addition/substitution of comonomers of α -methylstyrene (MS), maleimide (MI) and maleic anhydride (MA) in the matrix, referred to as high-heat ABS
- ‘ABS’ based on addition/substitution of methylmethacrylate (MMA) in the matrix: methylmethacrylate-butadiene-styrene (MBS) or methylmethacrylate-acrylonitrile-butadiene-styrene (MABS), the latter is referred to as clear ABS

- ‘ABS’ based on ethylene-propylene-diene terpolymer (EPDM), or acrylic ester (AE) rubber: acrylonitrile-EPDM-styrene (AES) and acrylonitrile-styrene-acrylic ester (ASA), both are referred to as weatherable ABS. (The common abbreviation AES is used instead of AEPDS stipulated in ISO/FDIS.)

Finally, styrenic copolymer blends represent the last group discussed in this report:

- Blends with PC: PC+ABS, PC+ASA, PC+AES
- Blends with PA: PA+ABS, PA+AES

- Blends with polybutylene terephthalate (PBT), thermoplastic polyurethanes (TPU), polyvinyl chloride (PVC), etc.: PBT+ABS, PBT+ASA, TPU+ABS, PVC+ABS, PVC+ASA, etc.

Excluded from this review are styrenic block copolymers (SBC) such as styrene-butadiene (SB) or styrene-butadiene-styrene (SBS), as these were reviewed recently (114). Styrene acrylic ester copolymers used for coatings and styrene divinylbenzene ion exchange resins are also not discussed.

The types of styrenic copolymers covered in this review are summarised in **Table 1**.

Table 1 Types of styrenic copolymers			
Product		Matrix and/or graft phase (monomer basis)	Rubber phase (monomer basis)
Designation	Class		
<i>SAN</i>	<i>Standard</i>	<i>S/AN</i>	
MSAN	High-heat	MS/AN	–
SMSAN	High-heat	S/MS/AN	–
SMI	High-heat	S/MI	–
SAMI	High-heat	S/AN/MI	–
SMA	High-heat	MA	–
SAMA	High-heat	S/AN/MA	–
SMMA	Clear	S/MMA	–
SMMAN	Clear	S/MMA/AN	–
ABS	<i>Standard</i>	<i>S/AN</i>	B*
ABS	High-heat	MS/AN	B
ABS	High-heat	S/MS/AN	B
ABS	High-heat	S/MI	B
ABS	High-heat	S/AN/MI	B
ABS	High-heat	S/MA	B
ABS	High-heat	S/AN/MA	B
MBS	Clear	S/MMA	S/B
MABS	Clear	S/MMA/AN	S/B
AES	Weather-resistant	S/AN	EPDM
ASA	Weather-resistant	S/AN	AE**
* Instead of pure butadiene rubber (BR) in the rubber phase for the ABS grades styrene-butadiene rubber (SBR) or acrylonitrile-butadiene rubber (NBR) can also be used.			
** An acrylic ester (AE) often used is butyl acrylate.			
B = butadiene, AN = acrylonitrile, MA = maleic anhydride			

2 Market Situation

Global consumption of styrenic copolymers and their blends has grown steadily in the past. This trend is set to continue because of economic growth in key market segments, above all in the Far East, and as a result of innovative styrenic copolymer products replacing other materials.

2.1 Position Among Other Polymers

Styrenic copolymers and their blends are considered as engineering thermoplastics because the broad,

controllable property profile and diversity of processing methods permit the manufacture of durable, high quality components suitable for technically sophisticated applications. Among all thermoplastics, they rank between commodity polymers such as PS, polyethylene (PE), polypropylene (PP) and PVC, and high-performance polymers such as polysulfone (PSU), polyarylethersulfone (PESU), and polyphenylene sulfide (PPS) (see **Figure 1**). By volume, they are the most important group among engineering thermoplastics, representing about 43% of worldwide consumption of 11 million metric tonnes in 2001 (see **Figure 2**).

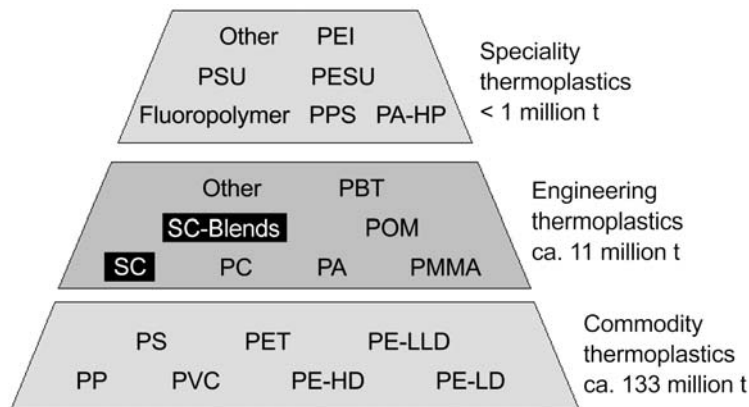


Figure 1

World market for thermoplastics in 2001 (ca. 145 million tonnes). Position of styrenic copolymers and their blends (*Source: Bayer*)

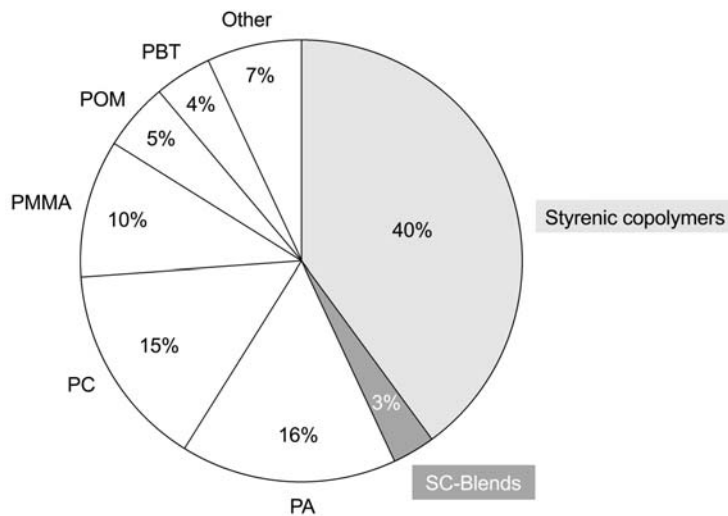


Figure 2

World market for engineering thermoplastics in 2001 (ca. 11 million tonnes) (*Source: Bayer*)

2.2 Production Capacities, Market Consumption and Commercial Products

The current total capacity for producing styrenic copolymers is around 6,500 kt, most of which is manufactured by the top five producers in each region (Table 2) (138, a.6). Many of them operate manufacturing plants in several countries and the few global players are present on different continents. As can be seen, the largest installed capacity is in the Far East (including Japan) and this is about double the size of the combined European and NAFTA capacity. Capacities for SC blends are not available separately. Their SC volume parts are included in the numbers given in Table 2.

The global capacity picture is reflected in the worldwide market consumption split of styrenic copolymers (Figure 3). Most of the demand is satisfied from local regional sources and with a global market figure for styrenic copolymers of about 4,700 kt in 2001, it is obvious that significant excess capacity exists worldwide. The picture is different for the Far East, in particular China, where there is still unsatisfied demand and a shortage of local capacity.

There has been a moderate and constant increase in the consumption of styrenic copolymers in the past (see Figure 3). Worldwide consumption in 1992 slightly exceeded 3,000 kt and has risen since then

Table 2 Regional capacities and main producers of ABS, ASA and SAN, 2001		
Region	Capacity (kt)	Main Producers
Europe	1,050	Bayer Polymers, BASF, GE Plastics, Dow Chemical, Polimeri Europa (EniChem)
NAFTA	1,150	GE Plastics, Bayer Polymers, Dow Chemical, BASF
Japan	800	Techno Polymer, UMG ABS, Nippon A&L, Asahi Chemical, Toray Industries
Other Far East	3,500	Chi Mei, LG Chem, Formosa Chemicals&Fibre, Cheil Industries (Samsung), Toray Industries
Total World	6,500	

Source: Bayer

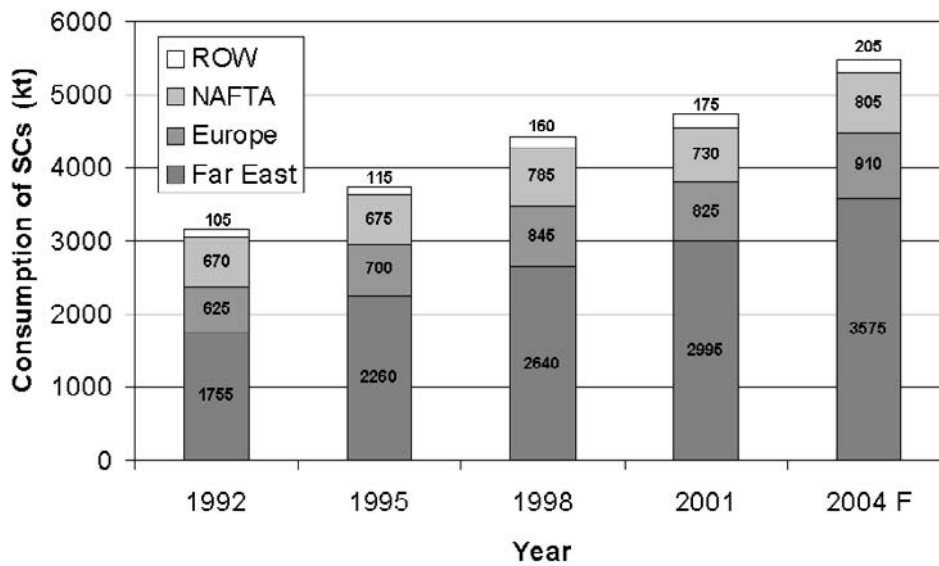


Figure 3

Market volume development of styrenic copolymers, 1992 to 2004 (ROW = rest of world, F = forecast)
(Source: Bayer)

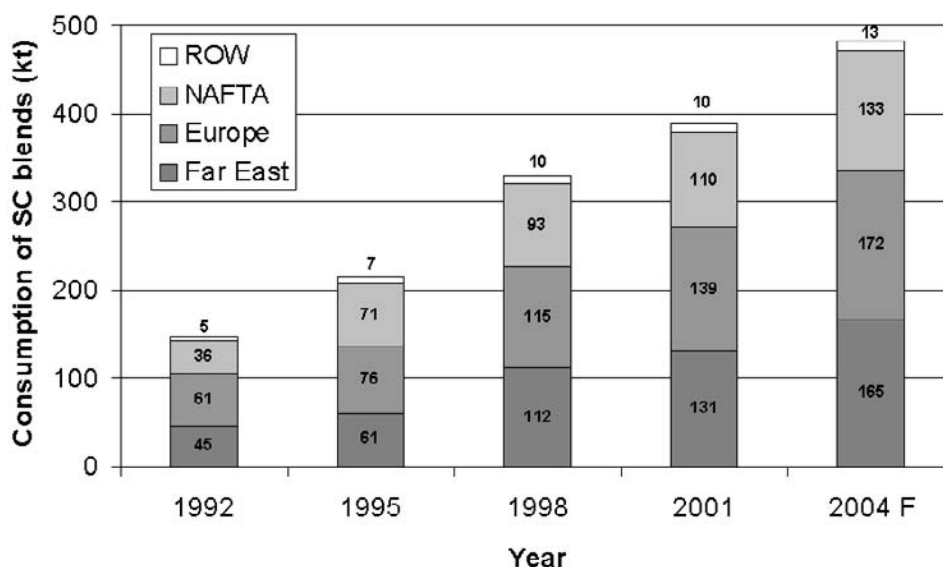


Figure 4

Market volume development of styrenic copolymer blends 1992 to 2002 (ROW = rest of world, F = forecast)
(Source: Bayer)

by an average of 5% p.a. An even brighter picture is presented by styrenic copolymer blends. Since 1992 they have shown annual growth of more than 10% (see Figure 4). Detailed information about capacities, market consumption and trends for styrenic copolymers and their blends in different regions as well as in single countries during the past decade can be found in numerous publications (e.g., 21, 36).

Slightly less dynamic growth is predicted for the mid-term, with the positive exception of the Far East (a.6). The total consumption of ABS in Europe and North America is forecast to grow by up to 3% annually until 2004. Up to 6% growth p.a. is forecast in the Far East, specifically generated in China with projections of up to 8% p.a. (see Figure 3). The outlook for styrenic copolymer blends is even more promising. In Europe and worldwide, annual increases in consumption of up to 8% are expected over the same period (see Figure 4).

Styrenic copolymers and their blends are marketed by producers themselves as well as distributors and compounders who manufacture their own products. Consequently, a huge variety of product designations can be found all over the world. As a sample of this diversity, Table 3 shows the main product designations (brand name, trade name or other) of the largest producing companies in the world, differentiated according to product categories (see also Table 1).

3 Chemical Structure, Morphology and Synthesis

SAN and ABS, the most prominent styrenic copolymers, are representative of the two categories of products which differ fundamentally in their morphological structure. SAN is a typical homogeneous, single-phase system while ABS is a heterogeneous two-phase system. Fundamental differences in the property profile of the two styrenic copolymers are closely related to this difference in structure.

3.1 Single Phase Systems

Single phase styrenic copolymers comprise amorphous co- or ter-polymers and their completely miscible blends. In their natural condition without pigments or other additives they are usually transparent and colourless or yellow-tinged.

SAN, the most important member of this group, is formed from the monomers S and AN which are statistically distributed along the polymer chain (479). SAN is formed by different methods of free radical copolymerisation (see Section 4). Usually SAN grades have an AN content between 15 and 40% w/w. As larger deviations in the S/AN ratio lead to phase separation and a cloudy appearance, high

Table 3 Main styrenic copolymers and styrenic copolymer blends products of the largest producing companies (2002)

Product	Brand name, trade name or other	Producer
SAN	Arbesan	Risjad Brasali
	Absolan	Bayer Polymers
	Cevian N	Daicel Chemical
	Gesan	GE Plastics
	GPCT SAN	Grand Pacific Petrochemical
	Kibisan	Chi Mei
	Kostil	Polimeri Europa ^c
	Kumho SAN	Kumho Petrochemical
	Litac-A	Nippon A & L
	LG SAN	LG Chem
	Luran	BASF
	Lustran SAN	Bayer Polymers
	Polidux SAN	Polidux ^d
	Porene	Thai ABS
	Sanrex	Techno Polymer
	Starex SAN	Cheil Industries ^e
	Stylac AS	Asahi Kasei
	Tairisan	Formosa Chemicals & Fibre
	Tyiril	Dow Chemical
	SMA	Dylark
SMMA	Atrate	Nippon A & L
	Cevian MAS	Daicel Chemical
	Denka TH	Denka
	NAS	Nova Chemicals
ABS	Absolac	Bayer Polymers
	Arbelac	Risjad Brasali
	Bulksam	UMG ABS
	Cevian	Daicel Chemical
	Claradex	Shinho Petrochemical
	Cycolac	GE Plastics
	Daqing ABS	Daqing Petrochemical ^f
	Denka ABS	Denka
	GPPC ABS	Grand Pacific Petrochemical
	Jilin ABS	Jilin Petrochemical ^f
	Kralastic	Nippon A & L

Table 3 Main styrenic copolymers and styrenic copolymer blends products of the largest producing companies (2002) continued

Product	Brand name, trade name or other	Producer
ABS	Kumho ABS	Kumho Petrochemical
	LG ABS	LG Chem
	Lanzhou ABS	Lanzhou Petrochemical ^f
	Lustran ABS	Bayer Polymers
	Malecca	Denka
	Magnum	Dow Chemical
	Novalloy E	Daicel Chemical
	Novodur	Bayer Polymers
	Panjin ABS	Panjin Ethylene Industry
	Polidux ABS	Poliduxe
	Polylac	Chi Mei
	Porene	Thai ABS
	Ronfalin	BASF
	Santac	Nippon A & L
	Sinkral	Polimeri Europa ^c
	Starex ABS	Cheil Industries ^e
	Stylac ABS	Asahi Kasei
	Tairilac	Formosa Chemicals & Fibre
	Taitalac	Taita Chemical
	Techno	Techno Polymer
Terluran	BASF	
Toyolac	Toray Industries	
MABS	Cycolac	GE Plastics
	Denka TE/TH	Denka
	Dialac M	UMG ABS
	Kralastic ST	Nippon A & L
	LG TR-ABS	LG Chem
	Lustran ABS	Bayer Polymers
	Novalloy E	Daicel Chemical
	Starex Transparent ABS	Cheil Industries ^e
	Techno ABS	Techno Polymer
	Terlux	BASF
	Toyolac	Toray Industries
	Zylar	Nova Chemicals

Table 3 Main styrenic copolymers and styrenic copolymer blends products of the largest producing companies (2002) *continued*

Product	Brand name, trade name or other	Producer
ASA ^a	Centrex	Bayer Polymers
	Dialac A	UMG ABS
	Geloy	GE Plastics
	LG ASA	LG Chem
	Luran S	BASF
	Vitax	Hitachi Chemical
AES ^b	Centrex	Bayer Polymers
	Dialac E	UMG ABS
	Techno AES	Techno Polymer
	Unibrite	Nippon A & L
PC+ABS	Bayblend	Bayer Polymers
	Cycoloy	GE Plastics
	Emerge	Dow Chemical
	Excelloy CK	Techno Polymer
	Iupilon	Mitsubishi Engineering-Plastics
	Lupoy	LG Chem
	Multilon	Teijin Chemicals
	Novalloy S	Daicel Chemical
	Pulse	Dow Chemical
	Stapron C	BASF
	Staroy	Cheil Industries ^e
	Tairilac	Formosa Chemicals & Fibre
	Techniace	Nippon A & L
	Toyolac PX	Toray Industries
	UMG Alloy	UMG ABS
	Wonderloy	Chi Mei
PC+ASA	Centrex	Bayer Polymers
	Geloy	GE Plastics
	Luran S	BASF
	Terblend S	BASF
	UMG Alloy	UMG ABS
PC+AES	Bayblend W	Bayer Polymers
	Excelloy CW	Techno Polymer
PA+ABS	Excelloy AK	Techno Polymer
	Novalloy A	Daicel Chemical

Table 3 Main styrenic copolymers and styrenic copolymer blends products of the largest producing companies (2002) *continued*

Product	Brand name, trade name or other	Producer
PA+ABS	Techniace TA	Nippon A & L
	Terblend N	BASF
	Toyolac SX	Toray Industries
	Triax	Bayer Polymers
PA+AES	Triax W	Bayer Polymers
PBT+ABS	Excelloy TK	Techno Polymer
	Cytra	GE Plastics
	Lumax	LG Chem
	Novalloy B	Daicel Chemical
	Techniace TB	Nippon A & L
	Toyolac VX	Toray Industries
	UMG Alloy	UMG ABS
PBT+ASA	Ultradur S	BASF
PVC+ASA	Geloy	GE Plastics
TPU+ABS	Prevail	Dow Chemical
Footnotes: All information was carefully compiled relying on publicly available sources. Most of the listed product designations are protected trade marks of the producers. Intermediate and modifier grades and products of distributors and compounders were not considered. The list is not claimed to be complete nor can any liability be taken for errors. ^a ASA products sometimes also include amounts of ABS or AES ^b AES products sometimes also include amounts of ABS or ASA ^c Member of EniChem group ^d Member of Repsol YPF group ^e Member of Samsung group ^f Member of PetroChina group		

chemical homogeneity is a fundamental necessity for producing items with high sparkle and minimum haze. The molecular weight generally lies in the range of 80,000 to 180,000 (a.7). SAN is partly used as an end product in its own right but its main use is as an intermediate (matrix component) in the manufacture of ABS. Other homogeneous systems include special copolymers such as MSAN, SMA, SMI or SMMA as well as the corresponding terpolymers with AN or S. These too are manufactured predominantly by free radical polymerisation (95, 371, 469, 575) and are used almost entirely as modifiers or compatibilisers in two-phase styrenic copolymer systems or other blends (251, 252).

3.2 Two Phase Systems

Two phase systems consist of a continuous outer phase known as the matrix, and a dispersed inner phase. Because of their composition of two phases with different refractive indices, these systems are, with a few exceptions, opaque.

The matrix phase is one of the polymer systems dealt with in Section 3.1. The dispersed phase usually consists of an elastomer (rubber) which functions as modifier to impart higher impact resistance to the matrix copolymer. The 'shell' grafted onto the 'soft core' of rubber particles produces optimum bonding between dispersed and continuous phases. It is synthesised from the same

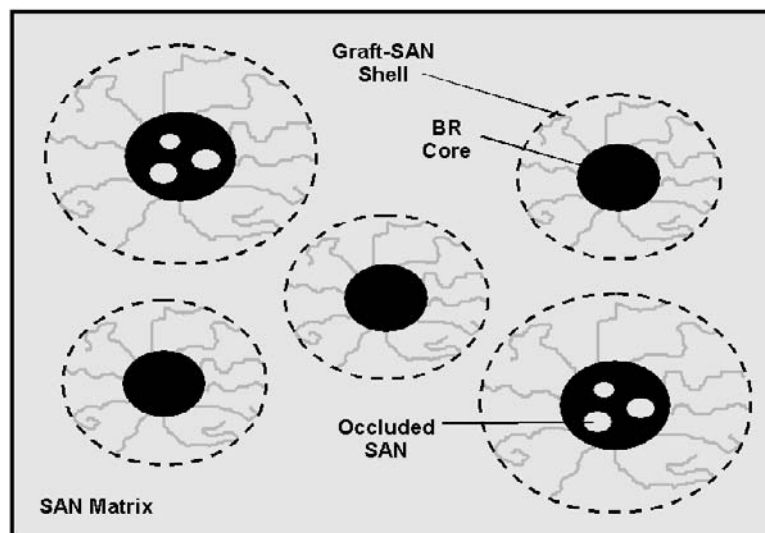


Figure 5

Schematic morphology of ABS (with SAN occlusions in the rubber phase)

monomers as are used for the matrix resin, or from monomers that produce a copolymer or terpolymer which is miscible with the matrix.

Figure 5 shows the schematic structure of the two-phase system ABS. This polymer can be labelled as impact modified SAN with butadiene rubber (BR) as the elastomer phase. The rubber core is grafted with a mixture of S and AN. ABS is also an amorphous copolymer and is commercially manufactured by various types of free radical polymerisation (see Section 4). Sometimes multiple dispersions are formed with SAN matrix material occluded in the rubber particles (especially in the case of mass polymerisation) (347).

Important morphological characteristics of the two-phase system are particle size, particle size distribution and proportion of the rubber-phase. The rubber particle size can have a monomodal or bi/trimodal distribution. Bimodal ABS systems have, for example, synergistically enhanced surface properties and toughness. The particle size of ABS emulsion grafted rubbers lies in the range of 50 to 600 nm, values of 100 to 400 nm being preferred.

Finally, the characteristics of the rubber material itself are decisive for the properties. The hardness and toughness of ABS polymers require controlled crosslinking of the rubber phase. If crosslinking is insufficient, the rubber particles dispersed in the SAN matrix can be destroyed by the action of shear forces during processing. If the degree of crosslinking is too high the rubber becomes brittle and impact behaviour is poor.

Other morphological analogues to ABS are obtained by incorporating other monomers either as additions or substitutions into the matrix, graft and/or rubber phases (436). Using MSAN, SMA or SMI for matrix and shell, with an unchanged rubber phase, high-heat grades are obtained. Substituting only BR in the dispersed phase by EPDM or AE rubber yields the weather-resistant grades ASA and AES. The only transparent two-phase products are MBS or MABS where the refractive indices of both phases are matched. To this effect, matrix, shell and core have to be modified with additional monomers. All these grades are considered in more detail in Section 6.

4 Manufacturing Processes

Industrial manufacturing processes for styrenic copolymers usually comprise polymerisation (including work-up) followed by compounding. Whereas polymerisation yields the (raw) polymer, compounding is mainly necessary for preparing the final product by mixing intermediate products and/or incorporating additives and pigments or colorants. Sometimes a separate compounding step can be omitted by including it during the work-up stage.

Various commercial processes are used in the manufacture of styrenic copolymers (131). In the case of ABS and other two-phase products there are two categories of production. In most cases, the grafted

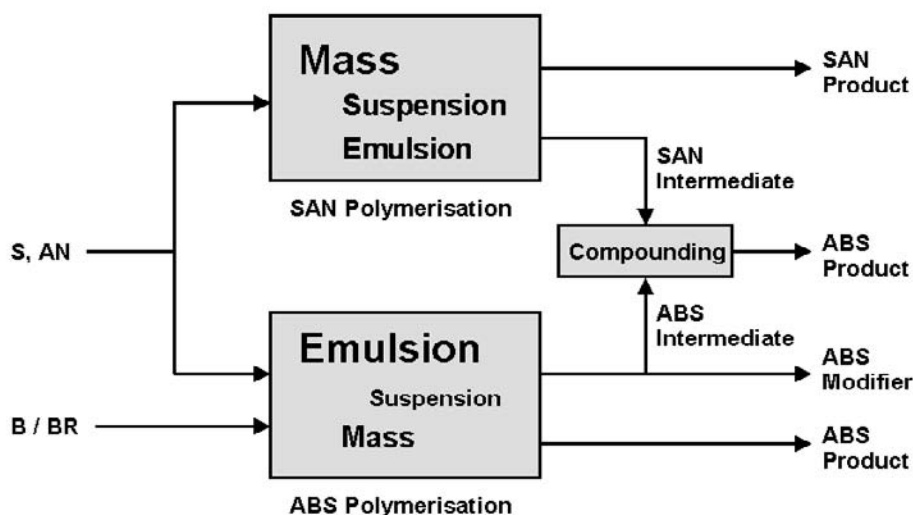


Figure 6

Overview of manufacturing processes for SAN and ABS. (For simplification, only compounding operations to mix intermediate products are shown, the incorporation of additives is disregarded)

polybutadiene phase and the SAN matrix phase are polymerised separately and then melt compounded along with additives. Sometimes S and AN are polymerised and grafted onto polybutadiene in a single process. The various polymerisation processes used to make ABS and SAN, as well as related base copolymers, can be summarised as follows (see **Figure 6**):

1. Emulsion polymerisation (batch or continuous)
2. Suspension polymerisation (batch)
3. Mass/bulk or solution polymerisation (continuous)
4. Process combinations and compounding

4.1 Emulsion Polymerisation

4.1.1 SAN

SAN emulsion latex can be produced either separately or *in situ* with ABS graft polymerisation (the so-called total emulsion process which is of no importance) (34, 40, 70, 85, 88, 103, 127, 156, 173, 397, 430, 468). The polymerisation is analogous to the graft process and is described in Section 4.1.2. The use of emulsion polymerisation for producing SAN has been in decline for many years.

4.1.2 ABS

The most common technique for producing the grafted polybutadiene phase is emulsion polymerisation (245,

259, 282, 296, 311, 395). This process represents about 90% of the grafted rubber used for ABS. Butadiene is charged into a pressure reactor along with water, emulsifier and catalyst. A comonomer such as S or AN can be added to B to impart specific properties to the rubber, yielding SBR or acrylonitrile-butadiene rubber (NBR) (226). The mixture is then polymerised to form rubbery particles of well-defined sizes. Generally an average rubber particle size greater than 300 nm is necessary to obtain the desired impact properties of the finished ABS product. The mixture of monomers can be polymerised either until the required rubber particle size is achieved or the growth can be stopped at a lower size and the particles then agglomerated by various techniques (154, 408). Depending on the final properties required and the economics, the average rubber particle size can have a monomodal or bi/trimodal distribution (324, 330).

S, AN and optionally other comonomers are then added along with more catalyst, chain transfer agents and other additives to the rubber latices. The monomers react with the surface of the rubber particles to form a grafted layer of SAN or derivatives (64, 181, 182, 174, 305, 358). Typical temperatures of the emulsion process are between 50 and 80 °C.

The trend has been to manufacture grafted rubber latices with the highest possible rubber content (>50% w/w rubber content is normal practice nowadays) and subsequently to dilute them with SAN produced by another process to achieve the final rubber content of 10 to 30% w/w.

The (high rubber content) grafted latex can be coagulated and dried to form an ABS powder (340). This ABS powder can then be melt compounded with intermediate SAN to form the finished product. The ABS powder can also be used as an impact modifier in blends with other polymers such as PC, PA, PBT or PVC.

4.2 Suspension Polymerisation

4.2.1 SAN

In SAN suspension polymerisation, S, AN and other comonomers, if needed, are charged into a reactor with water and suspending agent (534). Droplets of monomers form small beads of polymers with an average diameter of about 0.5 to 1 mm. The unreacted monomers are removed at the end of the polymerisation process and the distillate is recovered. The beads are then centrifuged and dried. Typical temperatures of the suspension polymerisation process are between 80 and 160 °C. This process allows the production of high molecular weight SAN. As is the case for emulsion polymerisation, the use of the suspension process for SAN is declining.

4.2.2 ABS

ABS can also be made by the suspension route. A BR is dissolved in S and AN monomers and partially mass polymerised before the solution is transferred to a suspension reactor (407). This process was never used on more than a relatively small scale, mainly for intermediate ABS, and is also declining.

4.3 Continuous Mass Process

4.3.1 SAN

The continuous mass or bulk process is the most popular method of making SAN. S and AN are fed continuously into one or several reactors with or without solvents, such as ethylbenzene or toluene (153, 264, 272, 273, 274, 281, 300, 327, 446, 491, 560). The monomers are reacted until a conversion level of between 60 and 80% is reached at a temperature between 90 and 170 °C.

The polymer solution is then continuously discharged from the reactor. In the subsequent step, the solvent

and the unconverted monomers are removed by heating and distillation under reduced pressure. Various types of equipment may be used for this step. The volatiles are then condensed and recycled into the polymerisation process. After the degassing step the polymer melt is either cooled and pelletised or transferred into a mixing unit to be blended with the grafted rubber. The mass SAN process results in a product with superior clarity and colour. Nowadays this is the dominant process for manufacturing commercial transparent grades of SAN.

4.3.2 ABS

ABS is also produced by some manufacturers by a continuous mass process. A commercially available rubber such as BR or SBR is dissolved in monomer and/or solvent. The solution is then transferred to a series of reactors together with S, AN and other comonomers as well as catalyst, additives and solvent (96, 318, 351, 499, 554).

Process equipment and conditions and the amount and type of additives determine the structure of the polymer and properties of the finished product. The number of reactors can vary between 2 and 5 with different types of design and agitation system (384). The reaction temperature varies generally between 90 and 170 °C. In the course of the reaction process a phase inversion of the two-phase polymer system usually occurs. This produces the typical morphology of matrix SAN occlusions in the rubber particles (432, 474).

As in the mass SAN process, the polymer solution is then discharged from the last reactor into the recovery equipment. The solvent and the unreacted monomers are removed by heating and distillation under reduced pressure and recycled into the polymerisation process. Various types of equipment are used to degas the polymer solution.

4.4 Process Combinations and Compounding

There are few examples of 'true' process combinations at the polymerisation stage, e.g., combining emulsion and suspension processes. None of them is of significant commercial importance (a.7).

In contrast, a commonly used method of quasi-combination is blending intermediate SAN and ABS products (mainly graft-ABS) derived from different processes. The most prominent example is the

compounding of emulsion graft-ABS with mass SAN as described above. Compounding is the only and indispensable step for producing blends of styrenic copolymers with other polymers such as PC, PA, PVC, etc. (390, 403). The requirements for compounding machines can be summarised as:

- High kneading and plasticising effect to produce highly homogeneous mixing with particles smaller than a certain maximum acceptable size in the dispersed phases
- Operation at the lowest temperature possible thus preventing any thermal damage to product quality
- Ability to vent small amounts of volatile components
- Ability to introduce stabilisers, lubricants, colorants, glass or carbon fibres and/or fillers such as talc, glass beads, etc.
- Exclusion of atmospheric oxygen.

Many different compounding devices are used for this operation (194). The trend is towards high-throughput twin-screw extruders replacing traditional kneaders and single-screw extruders (91, 106, 250, 284, 346). Many modern twin-screw extruders permit screw design to be modified thus granting flexibility to the producer (27, 137).

5 Material Properties of SAN and ABS

This section deals with the properties of the most important styrenic copolymers, SAN and ABS. For SAN, the properties of commercial grades for end applications are presented in Section 5.1. Intermediate grades for ABS compounding may be of different quality and are not mentioned here. The basic property profile of SAN and ABS is determined by the monomers (a.1, a.7) (see **Figure 7**).

Within the usual mixing ratio for homogeneous SAN, properties such as processability, stiffness and clarity improve with increasing content of S. With increasing AN content, however, the product is characterised by greater rigidity and toughness as well as heat and chemical resistance. A higher AN content also increases the yellowness.

ABS copolymers additionally contain B as an elastomeric second phase component which imparts significant impact resistance both at room temperature and especially at low temperatures. The chemical formation from the three starting components AN, B and S and various additives, provides a flexible, modular system to produce a spectrum of product grades which match various technical requirements.

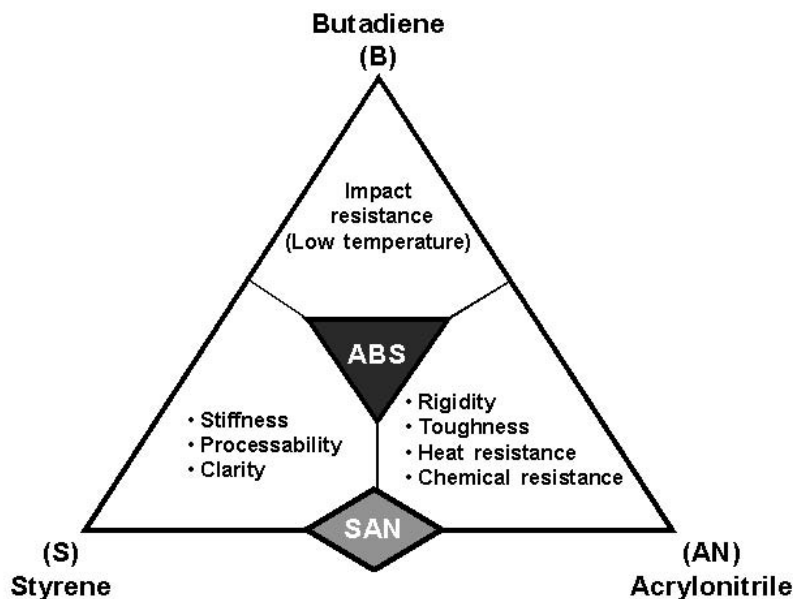


Figure 7

Property mix of SAN and ABS

5.1 SAN

SAN copolymers have excellent transparency (light transmission up to 92%), high tensile modulus, and surface qualities like gloss and reproduction of microtextures in moulding tools, good rigidity and good hardness. As is typical for hard amorphous plastics, SAN has high dimensional stability and accuracy. In addition to high rigidity and fair impact resistance (270) SAN is in general strong and scratch resistant and has good heat and excellent chemical resistance.

Commercial products differ mainly in molecular weight and AN content, which is usually between 15 and 40% w/w. Increasing the molecular weight or the AN content increases strength, stiffness, impact resistance, heat resistance and resistance to stress cracking.

In particular, the AN content has a strong influence on chemical resistance, strength, stiffness and heat resistance. If this content is enhanced the melt viscosity increases. The nitrile groups are strongly dipolar, and, as the AN level increases, the dipolar attraction between the AN groups increases the melt viscosity. To allow easier processing in such cases, flow promoters are used, these are mostly derivatives of fatty acids.

Increase in the molecular weight improves the dynamic load-bearing capacity and impact strength and has a strong influence on the flowability. The higher viscosity resulting from the higher molecular weight is of particular importance in extrusion.

The practical heat deflection temperature is above 90 °C and thus adequate for many applications. However, in many cases, care must be taken with the stability on exposure to alternating temperatures. With frequent and abrupt changes in temperature, tiny hairline cracks may appear which widen with time, rendering the article unusable. SAN is relatively resistant to such temperature changes with grades with a high AN content and high molecular weight showing particularly good resistance (342).

Excellent chemical resistance is a very important feature of SAN resins. They are resistant to aliphatic hydrocarbons, non-oxidising acids, alkalis, vegetable oils, foodstuffs, some alcohols, and detergents. However, concentrated mineral acids, aromatic hydrocarbons, chlorinated hydrocarbons, esters, ethers and ketones attack SAN.

In addition to chemical resistance, resistance to stress cracking is also important. A higher AN content and,

a higher molecular weight favour those properties. However, the effect of a substance on a plastic part is also markedly affected by the length of exposure, the temperature, the surrounding medium, and internal and external stresses, so that experimental investigations always need to be made under the relevant practical conditions.

Because of the presence of the S unit, the resistance of SAN to ultraviolet light (UV) is not exceptionally good, but the addition of UV stabilisers improves the UV resistance sufficiently for some SAN grades to be used for glazing and other outdoor applications.

SAN has a slight yellow colour in comparison with other clear plastics such as PS, acrylics (or polymethyl methacrylate (PMMA)), and PC. This colour arises from cyclic chromophores associated with the AN segments and becomes stronger as the AN content increases (586). As the yellowing partially involves reactions which are not of an oxidising nature, antioxidants are only of limited use and the preferable combination is of phosphite and phenolic antioxidant. Sterically hindered amines are particularly effective against yellowing of mouldings exposed to UV. The yellow tinge of products can be compensated for by adding blue colouring agents.

The polar nature of AN also results in slight deterioration of electrical properties compared with PS but SAN still has adequate properties as an insulation material. However the surface resistance leads to a build-up of static charge on the plastic and associated problems such as attracting dust or static discharges. Anionically active compounds such as sodium alkyl sulfonates are good antistatic agents to be added.

Diffusion resistance to gases or liquids is an important criterion for application of a material in the packaging sector or for the manufacture of cigarette lighters. SAN is impervious to water but allows water vapour and gases to diffuse to a certain extent. In general, the gas permeability decreases with increasing AN content but it is also affected by the manufacturing conditions of films and mouldings.

Other properties allowing the development of new products are achieved by variation of the additives. These include improvement of demouldability (especially with antistatic modifications) and raising the scratch resistance. Furthermore, standard SAN plastics are classified as flammable. Flame retardant (FR) grades do not exist.

Table 4 Characteristic properties of SAN, general purpose and high-impact ABS, and PC+ABS (Source: Bayer)

Property	Test conditions	Units	SAN (Lustran SAN 32)	ABS General purpose (Novodur P2H-AT)	ABS High-impact (Lustran ABS M405)	PC+ABS (Bayblend T65)
Mechanical:						
Tensile modulus	1 mm/min	MPa	3,700	2,500	1,800	2,200
Izod notched impact strength	23 °C	kJ/m ²	2.5	16	30	45
	-30 °C		2.5	7	20	41
Thermal:						
Vicat softening temperature	50N, 50 K/h	°C	103	96	95	118
Coefficient of linear thermal expansion (CLTE)	Parallel to flow, 23-55 °C	10 ⁻⁴ /K	0.62	0.9	1.1	0.85
Rheological and other:						
Melt viscosity	260 °C, 1000 1/s	Pas	115	92	147	243
Melt volume-flow rate (MVR)	220 °C, 10 kg	cm ³ /10min	18	37	9	-
	260 °C, 5 kg		-	-	-	12
Solid density		kg/m ³	1.08	1.05	1.02	1.13

Commercially available SAN products comprise mainly injection-moulding grades corresponding to the dominant processing method used for SAN end use applications (54, 76, 146, 276, 304). They are available in a variety of transparent, translucent or pigmented opaque colours. Certain grades are also permitted for contact with food. **Table 4** gives an overview of selected properties of an injection-moulding grade. The few extrusion grades available differ from moulding grades basically in a higher melt viscosity, i.e., lower melt-volume flow rate (MVR). Finally, SAN can be reinforced with glass fibre to give higher stiffness, breaking strength and notched impact strength.

5.2 ABS

The major drawback of SAN, as mentioned before, is its relatively low impact strength, preventing its use for many engineering applications. ABS, combining the advantages of SAN with the excellent impact resistance of an elastomer, is obtained by modifying SAN with an elastomer. Therefore, like SAN, ABS copolymers have high surface quality and high

dimensional stability. Because of the two phases, ABS is usually opaque, in exceptional cases translucent. Nowadays ABS polymers are among the most important engineering thermoplastic two-phase systems. They are preferred for casings and covers where good toughness, strength, stiffness, dimensional stability and chemical resistance are required together with very good surface quality (61, 354, 372, 549).

There are various ways of achieving the required mix of mechanical, rheological and thermal properties (75). AN content and variation of the molecular weight and molecular weight distribution in the matrix mainly affect flowability, heat resistance, surface hardness and chemical resistance. Usually the AN content of the resin matrix is in the range of 20 to 35% w/w. As with SAN, increasing the AN content improves chemical resistance and toughness but flow properties deteriorate. An increase in the molecular weight of the matrix resin results in an increase in toughness and chemical resistance but deterioration in the melt flow properties. Broadening of the molecular weight distribution results in analogous, but less strongly pronounced, behaviour.

The elastomer phase imparts impact resistance to the brittle thermoplastic matrix (231, 404, 458, 482). It markedly increases the energy absorbing capacity of the plastic. The SAN grafted onto the BR enables the indispensable phase interaction. Under impact stress, the impact energy is converted to heat by the reversible deformation of the rubber particles. With increasing deformation of a moulding, submicroscopic alterations, called crazing, lead to visible whitening of the overstrained regions. With increasing shear stress, such crazing is simultaneously initiated in many rubber particles (20). This means that the stress is distributed over a greater volume and avoids localised areas of force (258). Crack formation only occurs at higher strains. Another important consequence of the mechanism described is that ABS also resists impact in the case of notches (417). Good impact strength is retained even at low temperatures. This arises from the low glass transition temperature of BR ($-90\text{ }^{\circ}\text{C}$).

Furthermore, there are the properties of ABS polymers which are most strongly influenced by the characteristics of the dispersed rubber phase, namely particle size and particle size distribution. Toughness increases with particle diameter. Increasing particle size for a given rubber content leads to loss of surface gloss as a result of light scattering (409, 454). For combining both attractive surface appearance (like gloss) and excellent impact behaviour, bimodal or even trimodal particle size distribution systems are employed.

Toughness, hardness and stiffness are adjusted by changing the relative amounts of elastomer to matrix phase and by changing the interaction between the phases. The room-temperature toughness of ABS polymers, for example, generally passes through a maximum as the proportion of the rubber phase increases, the modulus of elasticity, heat resistance, and flow properties decrease in parallel.

Because BR contains double bonds, ABS mouldings are damaged by direct sunlight and the UV resistance is low. This results in yellowing and roughening of the surfaces. If this type of damaged article is mechanically loaded, the toughness is lowered (98, 531). UV-stabilised grades show a much improved weathering resistance especially when they are coloured black as is usual in the automobile industry (419). 'Really weather-resistant' grades can only be obtained by substituting the BR base (see Section 6).

The fire performance of plastics is tested by accelerated flammability tests, of which the most commonly used are the horizontal and vertical measurements specified by Underwriters Laboratories (UL), USA. The ratings of the

most important UL-94 standard are: HB, V-2, V-1, V-0, 5VB and 5VA in order of increasing flame retardancy. Standard ABS plastics are classified as class HB according to the UL-94 test. For certain applications addition of flame retardants is necessary to obtain the superior V-0 rating (102, 442). Most commonly, halogen compounds combined with antimony trioxide are used (176). The brominated diphenylethers used in the past as flame retardants have been replaced by other components such as brominated oligostyrenes and oligocarbonates (42, 141, 477, 526). Other additives used in ABS are similar to those used in SAN, such as antioxidants (238, 298, 315, 343, 465), lubricants or flow modifiers.

In addition to standard injection moulding and extrusion grades (81, 84, 99, 113, 121, 122, 124, 136, 146, 160, 211, 212, 214, 239, 241, 277, 294, 345, 431, 506, 520, 546, 562, 580), commercially available grades include glass fibre reinforced (256, 285, 317) and flame-retardant grades (295, 538, 539, 540, 566), as well as grades for galvanic metallisation (electroplating, 198, 253, 320). To shield against electromagnetic interference (EMI) conductive fillers such as steel or carbon fibres can be incorporated (89, 93, 289, 313, 314, 348, 355, 530, 551, 552). Other special grades offer reduced gloss (14) or are permitted for contact with food. The important high-heat, clear and weather-resistant speciality grades are discussed in Section 6.

Table 4 gives an overview of the characteristic properties of both a general purpose and a high-impact ABS injection-moulding grade. In comparison to SAN, the dramatically enhanced notched impact strength is most conspicuous. As for SAN, the main difference in extrusion grades is a higher molecular weight of the SAN matrix yielding a higher melt viscosity and thus a lower MVR.

6 Special Purpose Grades

The property profile of SAN or ABS can be decisively altered by selective substitution of the monomers S, AN and B by other comonomers. The most important properties obtained by this are high-heat resistance, transparency and weathering resistance.

6.1 High-Heat Grades

If a large increase in heat resistance over ABS is needed, other comonomers such as MS, MA or MI (**Table 1**) can be used in the matrix (a.7). These grades

are commercialised as high-heat or high-temperature ABS grades.

The copolymer of MS and AN (MSAN) has a higher heat resistance than SAN with the same AN content. The Vicat softening temperatures of the MSAN and SAN copolymers are 123 °C and 103 °C, respectively. Physical properties and chemical resistance of the modified grade are similar to those of SAN. The manufacturing methods used for SAN are also suitable for the MSAN copolymer. MS-based materials are somewhat yellower than their S counterparts. In practice, S is often only partially substituted by MS, yielding SMSAN terpolymers. The proportion of MS depends upon the required heat resistance. The MSAN copolymer is also miscible with PVC, and can therefore be used to make blends with both higher heat and impact resistance.

Another means of increasing the heat deflection temperature of ABS is by incorporating MA into the matrix. S reacts readily with MA to give a copolymer, SMA, with statistically distributed monomer units (310, 228). SMA shows a significantly increased heat resistance compared to that of SAN (Vicat softening point of up to 150 °C) (104). A disadvantage of SMA resins is that they are unstable at higher temperatures, liberating carbon dioxide. They must be adequately stabilised and processed at temperatures below 260 °C, otherwise splaying of parts may occur. The resin is stabilised by incorporating up to 1% w/w of hindered phenol antioxidant with a thioester synergist. Low maleic anhydride (<25% w/w), high molecular weight thermoplastic materials are produced for moulding or extrusion applications. Grades developed specifically for expandable foam applications and blends of SMA and PC for power tool housings are also available. Comparable results can also be achieved by the terpolymer SAMA.

For applications where heat resistance above that provided by SMA and MSAN resins is desirable, copolymers of S and MI can be used (418, 422, 440). These polymers can be produced by copolymerising S with an MI comonomer (mostly *N*-phenylmaleimide (NPMI)) using any of the methods used for SAN. Alternatively, imidising SMA with ammonia or an amine also yields SMI. SMI resins can also be rubber modified, glass reinforced or alloyed. Unlike SMA, they are thermally stable at high temperatures and are not subject to surface defects, such as splay, when moulded. SAMI terpolymers or blends of SAN and SMI are also used in practice besides SMI copolymers.

6.2 Clear Grades

MMA readily polymerises with S to form a SMMA copolymer with similar physical properties to SAN, but with superior optical properties, lower yellowness and lower chemical resistance. Commercial materials contain 20 to 60% w/w of MMA and are produced by methods similar to SAN.

MMA is also used to make clear ABS-type two-phase polymers. To achieve this effect, the refractive indices of the matrix, the grafted rubber shell and the rubber core must be the same. The rubber core particles then become 'invisible'. In addition, minimising particle size helps to achieve the best transparency.

The refractive indices of the matrix and graft phases are adjusted by partially replacing AN and S with MMA in the matrix and the graft phases. Usually the shell consists of only S and MMA whereas the matrix is either SMMA, SMMAN or a blend of SAN and PMMA. Furthermore, S has to be introduced in the core phase as a comonomer to B yielding SBR, thus adapting the refractive index of the rubber phase. The result is MABS, a two-phase system consisting of four monomers or MBS terpolymer containing no AN at all. Like ABS polymers, MBS and MABS polymers must be protected from attack by atmospheric oxygen by the addition of stabilisers.

It should be noted that the transparency of MBS and MABS is temperature dependent. Therefore, the copolymer composition has to be optimised for a certain temperature. Large temperature changes such as those occurring during processing result in the parts becoming cloudy because the temperature dependence of the refractive indices of the matrix and of the dispersed rubber phase are different. The cloudiness disappears completely on returning to the intended design temperature (a.8).

MBS is almost exclusively used as a modifier for other plastics improving the processing characteristics, notched impact strength and heat resistance of, e.g., rigid PVC. MABS on the other hand is also used as 'clear ABS' for end use applications (126, 134, 196, 204, 518).

6.3 Weather-Resistant Grades

ABS based exclusively on BR does not possess the level of weathering resistance required in many outdoor applications. The lack of resistance to UV and oxidation

are the primary factors which preclude the use of ABS polymers for such applications (a.1). Significantly better resistance to weathering compared with ABS is obtained by replacing susceptible BR with weather-resistant elastomers. The main reason for degradation is attack on the BR double bonds brought about by UV and atmospheric oxygen. The resistance of rubbers free of double bonds to such attack is greater and can be increased by the choice of dark colours.

There are two main 'weatherable ABS' products: Modification of SAN with AE elastomer (e.g., butyl acrylate) leads to ASA. The second type consists of AES polymers in which AN and S are grafted onto EPDM rubber. It is desirable that other features of ABS are retained as far as possible. The only disadvantage of AES and ASA polymers compared with ABS polymers is their inferior low-temperature toughness (a.7).

While ASA systems are usually manufactured by emulsion polymerisation (77) AES polymers are produced in most cases via a mass-solution process. As a result of these manufacturing conditions, the characteristics of ASA systems resemble those of the ABS emulsion grades while AES polymers are, with some exceptions, more like ABS mass polymerisation grades.

Compared with ABS copolymers, weathering and yellowing are delayed and less marked. The good weather-resistance of ASA (336, 337, 362) and AES has been confirmed by accelerated weathering tests. Those most commonly used are simulation tests like the Weather-O-meter and outdoor tests like the Florida test. Both tests confirm a low colour shift (measured as total colour difference ΔE) even after long-term exposure to sunlight, rain and wind (570).

The same is true for the related decrease in mechanical properties. The decrease in strength manifests itself primarily when the material is subjected to impact stress from the unlit side causing the side exposed to light to be subjected to tension. The microcracks in the external surface generated by the damage act as notches and cause the impact strength to fall to the level of the notched impact strength. This phenomenon is largely suppressed in ASA and AES.

Conversely, changes in gloss and colour play an important role in applications where mechanical stress can only be applied from the exposed side. The tendency to 'greying' of dark shades on exposure to UV and water is significantly lower when EPDM or AE rubber is used instead of BR.

The chemical resistance of weather-resistant AES and ASA grades is significantly better than that of ABS. At room temperature they are resistant to saturated hydrocarbons, low-aromatic carburetted fuels, mineral oils, vegetable and animal fats and oils, water, aqueous salt solutions and dilute acids and alkalis. However, concentrated mineral acids and aromatic hydrocarbons, chlorinated hydrocarbons, esters, ethers and ketones attack the material.

Resistance to stress cracking also frequently plays a major role. Here too the values are somewhat better because of the changed elastomer components. Nevertheless, the effect of the various media on the moulding depends on the temperature-dependent internal and external stresses, length of exposure and the presence of additives or contaminants in surrounding medium.

The weather-resistant materials are used especially for uncoated exterior applications. There are grades available for both moulding and extrusion. On co-extrusion with ABS, these grades can form a weather-resistant external layer (237).

7 Blends with Styrenic Copolymers

With styrenic copolymer blends the scope of the styrenic copolymer 'family' is expanded to include alloys containing a major proportion of another polymer. This is justified since, despite being the minority component, properties of styrenic copolymers usually dominate the resulting property profile of the blend. Consequently, the applications where styrenic copolymer blends are found are similar to those of the 'pure' styrenic copolymers. In practice, blends with PC dominate followed by those with PA and PBT.

7.1 Morphology

A polymer blend is a mixture of two or more base polymers, which are distributed at a molecular level, i.e., are fully miscible or microscopically dispersed. Most commercially available blends consist of two matrix resins whose compatibility with one another may vary greatly (139).

The first type comprises blends with full compatibility (miscibility) between the base polymers. They form a single-phase matrix like SMA+SAN if the amounts of AN and MA are almost equivalent. The second

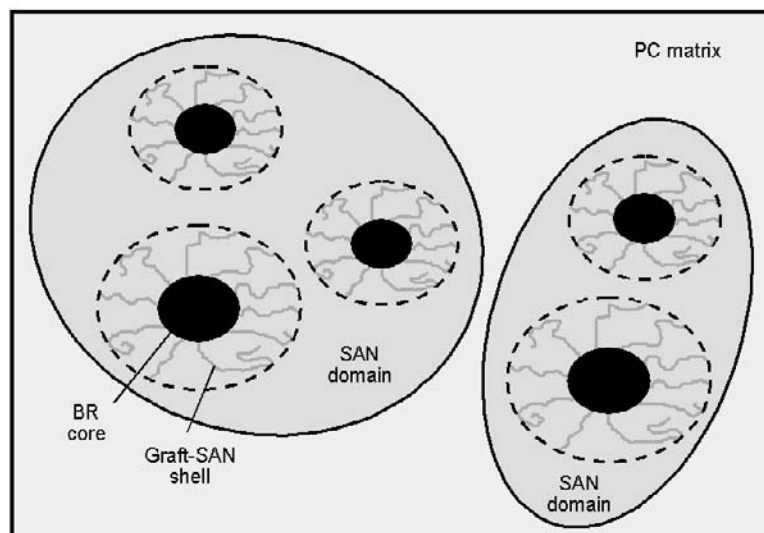


Figure 8

Schematic morphology of PC+ABS blend

category includes partly compatible blends. The different base polymers form a two-phase matrix, but with good physical interactions between the phases. One example is PC+SAN or PC+ABS (37, 366, 426). The third system includes blends in which the polymers are incompatible. They require phase compatibilisers, such as graft copolymers or block copolymers, to prevent delamination during subsequent processing. This group is numerous and includes PA+SAN, PA+ABS or PBT+ABS (133, 157, 240, 326).

An advantage of blend technology is that it is possible to combine the properties of the individual polymers to generate a mix of properties ‘between’ them. In rare cases, such as PC+ABS, even synergistic improvements in properties can be obtained so that the resulting material has properties superior to any of the base polymers. These advantages arise from the morphology of the system. PC forms the base matrix in which domains of SAN are incorporated and in which, in turn, grafted rubber particles are dispersed (**Figure 8**) (453, 504).

7.2 Manufacture

The manufacture of styrenic copolymer components used in blends is described in Section 4 and yields products in the form of granules or powder. The only step for producing blends is the compounding process (a.9), which can be performed in two different ways:

- Premixing of individual powder or granule components followed by melt compounding
- Direct melt compounding in which individual components are introduced either together or sequentially.

Twin-screw extruders are particularly suitable for blend manufacture.

7.3 Properties of Selected Styrenic Copolymer Blends

This section deals with the properties of the most important PC-based styrenic copolymer blends such as PC+ABS, PC+ASA and PC+AES. Blends with PA are also described in detail.

7.3.1 PC+ABS

PC+ABS blends combine an outstanding mix of mechanical, thermal and chemical properties (183, 398, 459, 475, 510, 511). Polycarbonate provides the blend with very high toughness at room temperature and superior heat resistance. ABS provides good stability against stress cracking, chemical resistance and processability. Under mechanical loading, the morphology described leads to deformation behaviour dominated by shear deformation, even at low temperatures, instead of crazing as is the case

for the individual components. The shear deformation mechanism in turn permits tough fracture behaviour (a.9).

The main synergistic property effect of PC+ABS is the low-temperature impact strength which is retained down to a temperature of $-30\text{ }^{\circ}\text{C}$ and cannot be approached by either PC or ABS individually. At a temperature of $-20\text{ }^{\circ}\text{C}$, the notched impact resistance of PC+ABS increases with increasing PC content passing through a maximum at about 75% w/w. This synergy can be explained by the fact that the brittle-tough transition of the PC phase is lower than this temperature (592) (a.10). The superior low-temperature impact properties of PC+ABS blends are of special importance in many automotive applications (see Section 9.1).

As in the case of ABS, the properties are not only a function of monomer ratios but especially of the morphology of the system such as particle size and degree of grafting of the rubber phase. Additionally, phase dispersion of the matrix components influences mechanical properties. This is why the compounding process is of great importance in determining phase dispersion (435, 569). **Table 4** shows the most important properties of a standard PC+ABS blend in comparison with SAN and ABS.

In addition, the basically very good flow characteristic of blends are affected by branching or end group modification of the PC component and by the molecular structure of the SAN component. Lubricants are added partly to avoid adhesion to the compounding equipment and partly to permit easy demoulding when injection moulding.

Thermooxidative decomposition occurs in the PC phase. Suitable stabilisers fall into three classes: sterically hindered phenols, organic compounds with sulfur in the form of sulfide linkages (thioethers) and organic compounds containing trivalent phosphorus. Stabilisation is also needed against hydrolytic decomposition of the PC matrix and the light-induced decomposition of both components of the blend.

Flame retarded PC+ABS-blends are widely used as housing materials in the IT industry, where the UL-94 V standards are the most important fire safety specifications (11, 44). Flame retarded systems used to be based on bromine or chlorine compounds with antimony oxide as a synergist (42, 116, 567). PC+ABS-blends today mostly use halogen-free phosphoric acid esters as effective flame retardants (73, 170, 199, 447, 490, 271) such as the following arylphosphates:

triphenyl phosphate (TPP), resorcinol bis-(diphenyl phosphate) (RDP) and bisphenol A bis-(diphenyl phosphate) (BDP) (331). New developments also include incorporating small amounts of polytetrafluoroethylene (PTFE; $<0.5\%$ w/w) as anti-dripping agents.

The amount of arylphosphate necessary to reach a specific UL rating at a certain wall thickness depends on the PC/ABS ratio. Due to the different inherent flame retardancies of polycarbonate and ABS, the PC/ABS ratio determines the amount of phosphate flame retardant necessary. The higher the PC/ABS ratio, the lower the phosphorus concentration required for, e.g., a V-0 rating (see Section 9.3).

Currently, TPP is the most commonly used flame retardant. Due to its high phosphorus content and its volatility it is highly effective. Because of its tendency to plate out under certain processing conditions (juicing problem) the less volatile but more expensive oligophosphates RDP and BDP are increasingly being utilised. BDP is especially suitable for applications where improved hydrolytic stability and heat resistance are required. For applications where hydrolytic stability is particularly important, materials based on BDP as flame retardant containing continuous-mass ABS have been developed. Mixtures of TPP and RDP or BDP are also commonly used as flame retardant systems (271).

Certain inorganic materials like talc or nanoscale particles can be added as synergists to improve the effectiveness of the phosphate flame retardants (197). Materials based on this technology with ratings of V-0 down to a wall thickness of 0.75 mm have recently become commercially available. Traditionally available as injection moulding grades, non-halogen PC+ABS flame retardant grades which are also suitable for extrusion, thermoforming and blow moulding only recently became commercially available (1). Use of non-Newtonian polycarbonates and less plasticising phosphorus-based flame retardants have resulted in significant increases in melt strength.

Many standard and flame retardant PC+ABS grades are commercially available (41, 55, 62, 140, 213, 235, 306, 514, 515, 542, 581, 572). Besides glass-fibre reinforced grades (215, 523), mineral filled PC+ABS blends are also becoming increasingly important (145, 480, 441, a.11). With suitable choice of filler, good flow characteristics can be obtained while rigidity is greatly increased. The increase in rigidity allows the wall thickness of injection mouldings to be reduced saving weight and material.

7.3.2 PC+ASA and PC+AES

Analogous to ABS, blends which have better UV-, light- and weather-resistance can be obtained by replacing the BR base of the ABS grafted rubber by a graft base which does not contain double bonds (a.4, a.5). Of particular industrial importance to date are PC+ASA and PC+AES blends (38, a.12, a.13). The same morphological criteria are valid for these blends as for PC+ABS systems.

Other advantages of PC+ASA and PC+AES concern primarily heat ageing and colour stability to heat ageing (a.9). As with PC+ABS, the property mix is determined by a complex interaction of composition and morphology parameters. Whereas most of the properties of PC+ABS can be retained, one exception is the reduced low-temperature toughness due to the higher glass temperature of EPDM and AE rubber. Deep colours are more difficult to obtain while still retaining good mechanical properties. As SAN and PC undergo oxidative degradation in the presence of air, which is independent of that of the grafted rubber, degradation can be delayed by adding light stabilisers but not stopped. The limit on these systems is set by the ageing behaviour of the PC matrix.

A new PC+AES blend (Bayblend W from Bayer) currently being commercialised exhibits excellent low temperature impact strength thus eliminating the usual drawback of these systems.

7.3.3 Blends with PA

PA+ABS blends are characterised by a favourable combination of high-heat resistance, high toughness, resistance to chemicals and stress cracking as well as ease of processing (265, 312, 424, 476). PA imparts high-heat properties, superior chemical resistance and low gloss, whereas ABS brings stress cracking resistance and processability. Compared with PA, these blends exhibit lower moisture absorption, warp and density. The compatibility resulting from amide and cyanide groups can be markedly increased by adding compatibilisers (159, 243, 283, 297, 512). These are substituted ABS/SAN terpolymers which have reactive groups such as epoxide or anhydride built into the chain. PA+ABS blends are usually also available with glass fibre reinforcement (188, 541).

If ASA or AES is incorporated instead of ABS, weather-resistant analogues are obtained.

7.3.4 Blends with Other Polymers

Styrenic copolymers are found in many additional blend formulations (48, 80, 129, 151, 167, 202, 249, 257, 262, 302, 325, 364, 369, 373, 374, 377, 379, 380, 385, 388, 399, 427, 438, 457, 487, 522, 545, 568, 516, 582). Usually ABS graft powder is used as a modifier. The main positive effects are improved impact resistance, hardness and easier processability as the following examples show:

- PBT+ABS: addition of ABS graft rubbers to PBT improves impact properties (191, 200, 299, 350, 507, 508).
- TPU+ABS: addition of ABS graft rubbers to TPU improves rigidity and low-temperature toughness (60, 172, 401). Addition of soft TPU types to ABS polymers allows wide variation of low-temperature toughness and processing characteristics.
- PVC+ABS: addition of 5-20% w/w of ABS graft rubbers to PVC increases toughness (47, 420, 464, 524, 589). This blend type is nevertheless declining in importance.

8 Processing

Styrenic copolymers and their blends can be processed by all the usual methods. The dominant techniques are injection moulding (15, 19, 22, 23, 66, 92, 94, 107, 118, 190, 193, 207, 218, 365, 400, 402, 455, 456, 517, 543, 544, 547), followed by extrusion (195, 310, 344, 363) and blow moulding (30, 184, 375, 425, 563). **Table 5** summarises the most important processing and fabrication techniques (39, 356). In the following sections, some selected techniques are described which have gained special importance in paving the way for innovative applications of styrenic copolymers and their blends (see Section 9).

8.1 Thin-Wall Technique

The thin-wall technique is an injection moulding method for producing parts with significantly reduced wall thickness (a.14). Parts are referred to as thin-walled if the ratio of their wall thickness to the flow lengths in the mould is small. Dimensions of thin-

Table 5 Suitable processing and fabrication techniques for styrenic copolymers and their blends

Moulding	Extrusion	Finishing	Machining, jointing and other
Injection moulding (standard)	Sheet extrusion	Painting	Sawing
Thin-wall technology	Profile extrusion	Laminating	Drilling, tapping
Sequential injection moulding	Film extrusion	Metallising (electroplating)	Turning
Multi-component injection moulding or co-injection moulding	Co-extrusion	Printing	Milling
Back moulding or in-mould decoration (IMD)	Extrusion blow moulding	Laser engraving	Die cutting
Gas-assist injection moulding (GAIM) or gas injection technology (GIT)		Embossing	Welding
Compression moulding			Gluing
Self-colouring			Screwing
			Snap fitting
	Thermoforming, e.g., vacuum forming		

walled parts are usually large in relation to their wall thickness. Typical values are about 2 mm for automotive instrument panels and 0.8 mm for mobile phone casings.

Conventional moulding processes are pushed to the limits (209). Usually, higher mould pressures are necessary and high-flow styrenic copolymer materials are required to fill the geometries in short cycle times. Particular attention has to be paid to a more rigid mould design and the moulding process itself. The application of rheological and other simulation programs in designing injection moulding processes is state-of-the art (15, 16, 17, 24, 67, 155, 292, 448, 521). For thin-wall technology, the support of computer aided engineering (CAE) tools is indispensable (280).

The primary benefit of the technique is to save material cost by reducing the wall thickness of a part and to shorten the cooling time and hence the total cycle time leading to a decrease in manufacturing costs. The secondary benefit is a reduction of the overall weight of the part. This is an advantage in many applications such as cars and IT equipment (288, 328, 416, 585).

8.2 Sequential Injection Moulding

Sequential injection moulding is a variant of low pressure injection moulding and is used, for example, for large mouldings with low wall thickness. The injection mould is filled via a special hot runner system through several time - or path - dependent controlled needle valve nozzles. With some control units, each nozzle can be controlled separately. After the mould is closed, it is filled via a nozzle. After the next section is flooded, the covered nozzles are opened. Depending on the pressure distribution and moulding requirements, the first nozzle can be closed again.

This procedure enables manufacture of large area mouldings without visible flow lines (421) using several injection points. For this reason sequential injection moulding is used for components where high surface quality is required. This is the case in applications such as car interiors or housings of electrical and electronic devices. As with thin-wall technology, styrenic copolymer grades with good flow properties are preferred. CAD and rheological programs are also commonly used in this area (10, 216).

8.3 Back Moulding

In the back moulding or in-mould decoration (IMD) processes, finished decorated parts are produced by inserting film or fabric products into the mould (4, a.15). In the case of films a decorated, shaped and trimmed piece is inserted into the mould and the preform is then back-moulded with the styrenic copolymer material. Where optimum surface quality is required, the clamping side of the machine may be operated under cleanroom conditions. Apart from decoration or lettering, surface texture and deep gloss can also be generated.

Good adhesion between the moulding and the flexible film is most important. Styrenic copolymers are especially suited because of their excellent adhesion to many other typical polymer film materials such as ABS or PC. Often materials of the styrenic copolymer family are used for both the moulded part and the decorative film, yielding the maximum adhesion. Although back moulding was initially limited to small mouldings, it is now possible to produce high quality large area parts (6).

Fabrics are fed into the mould as continuous textile sheets and have to be cut and trimmed in the mould or afterwards (fabric over-moulding). In order to avoid excessive strain and shear stress leading to pleats or other damage, low injection pressures have to be employed.

The main benefit of fabrics over-moulding is the integration of two formerly separate and sequential manufacturing steps into a single operation, saving on manufacturing costs. IMD using films enables the cost-effective realisation of sophisticated surfaces, such as multi-colour patterns, combined with complex part designs. Furthermore flexibility is gained as the decorative finish of the parts can be changed without interrupting production by using different films from one shot to the next (a.15). IMD is increasingly being used for visible styrenic copolymer components in cars or applications in the electrical/electronics sector (53, 63, 147).

8.4 Multi-Component Injection Moulding

Multi-component injection moulding or co-injection moulding are terms used to describe the process of feeding two or more melts (differing in colour or polymer for example) (71) into one mould during the injection moulding process (5, 65, 189). Between two

successive injection steps space is provided for the next component by various manipulations. The melts should make contact with each other but should not flow into one another. The resultant composites are usually permanent (hybrid technology), but in specific cases the individual components need to be moved separately (in-mould assembly).

When working with the co-injection moulding process, attention must be paid to the shrinkage of the individual components and the low shrinkage of certain styrenic copolymer grades is an advantage. Because of their good adhesion to different polymers, styrenic copolymers are also suitable for multi-component permanent joint mouldings (51, 339).

Co-injection moulding can yield both economic advantages and quality benefits. Only one mould and thus only one machine is needed to manufacture the mouldings. Furthermore, this method allows several functions to be integrated in one part. Examples of styrenic copolymer applications are phone housings or medical devices consisting of PC+ABS with TPU inserts (357) as well as multi-part toys.

8.5 Gas-Assist Injection Moulding

Gas-assist injection moulding (GAIM, also known as gas injection technology, GIT) is suitable for thick-walled, bar-shaped mouldings or flat mouldings with thick-walled areas (217, 291). In gas-assist injection moulding the material situated in the core of the mould is displaced by an inert gas (generally N₂) producing a hollow part. The most common way of injecting the gas is by feeding it into the mould. The standard gas-assist and melt blow-out processes differ in the type of gas feed (a.16):

- In the standard gas-assist technique, the gas is fed in via the gate or directly into the melt in the prefilled cavity. The moulding is then shaped by displacement of the polymer melt. Sufficient melt must be prefilled so that the cavity is precisely filled by feeding the gas.
- In the melt blow-out process, the cavity is first filled completely with melt. The melt is then either displaced with the help of the gas into a side cavity, which is opened at the end of the thermoplastic injection phase, or pushed back into the nozzle.

The main benefits of GAIM are shortened cycle times, compensation for shrinkage, and minimisation of warp.

Furthermore an improved surface quality is retained and material costs are reduced. The wall thickness of the gas channels depends primarily on the material and the channel geometry and is hardly influenced by processing parameters (a.17). Styrenic copolymers and their blends are especially favourable as they can achieve lower thicknesses than many other thermoplastics. After gas injection commences, the filling process cannot be influenced from outside. The design phase is thus particularly important. GAIM is used for producing styrenic copolymer components with high torsional rigidity and strength. Typical examples are frames for washing machines or very large housings of cleaner containers. Here too, computer aided design (CAD) programs and simulation-based optimisation of processing parameters are widely used (9).

8.6 Co-Extrusion

Besides the usual single-material structure used in classical sheet and profile extrusion, various layers can be brought together above each other using co-extrusion adapters. Any surface texture required can be obtained using embossing rollers. Very often the extruded sheet is formed afterwards into the required shape by, for example, thermoforming (13, 45, 72, 74, 177, 186, 187, 246, 278, 279). Progress in simultaneously controlling the film thicknesses of many layers has been decisive for new developments in co-extrusion of styrenic copolymers.

Important styrenic copolymer properties are good melt stability (i.e., usually a low MVR) which is exhibited by the extrusion grades. Furthermore, the compatibility or adhesion of the layers is of outstanding importance. Best results are obtained when only materials from the styrenic copolymer family are chosen for the layers, but the adhesion of styrenic copolymers to many other polymers is also very good (500).

A whole range of systems can thus be produced cost-effectively, consisting of functional layers such as hard-soft combinations, glossy-matt layers, UV protective layers and scratch-proof layers. Typical examples are two-layer systems consisting of ABS/ABS, ABS/ABS regrind, ABS/ASA, ABS/PC+ABS, ABS/PMMA or ABS/TPU (7). These systems may also comprise three or more layers. If the structure of layers is symmetrical it is referred to as a sandwich system.

Co-extruded (and thermoformed) parts made of styrenic copolymers or their blends are used, e.g., for

both interior and exterior parts in cars and especially in recreation vehicles, for sanitary applications and for window profiles.

Research has been done on co-extruded microlayer or nanolayer laminates made up of several hundred or thousands of film layers containing styrenic copolymers and other polymers (e.g., SAN and PC). They are of no practical importance and are used mainly for fundamental studies on properties such as adhesion, delamination and inter-diffusion (28, 79, 112, 227, 360, 437, 449, 558).

8.7 Self-Colouring

In self-colouring, also known as in-plant colouring of plastics, the processor (moulder) determines the colour of the finished product. To this effect, a natural styrenic copolymer material is mixed with a coloured masterbatch in the processing equipment (135, 220, 332, 335, 467).

The main argument in favour of self-colouring is that processors can respond very rapidly to urgent customer orders because they can store a large number of different colour masterbatches in a small space. Disadvantages include the absence of quality guarantees usually provided by the manufacturer of the plastic. Special attention has to be paid to the selection of the optimum masterbatches in order to avoid any impairment of the desired mix of properties of the coloured material. A further consideration is the greater expenditure on processing, resulting from the additional mixing step and the necessary quality assurance (376).

9 Market Segments and Applications

The main market segments in which styrenic copolymers and their blends are used have been fairly stable over recent years. The most important users are still the automotive/transportation (AT), electrical/electronics (EE) and information technology (IT) industries. Together these account for close to two-thirds of the 964 kt of styrenic copolymers and their blends used in Europe in 2001 (see **Figure 9**). The building/construction (BC) segment is of minor importance only in Europe. The remainder of almost one third of total consumption is made up of medical products, sports goods and toys, household and personal articles and miscellaneous applications.

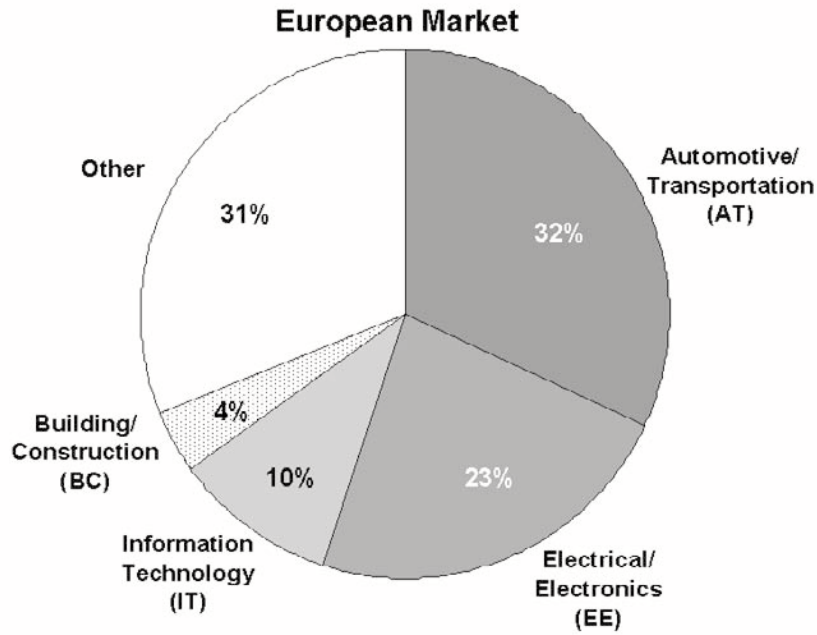


Figure 9

Market segmentation of styrenic copolymers and their blends in Europe (total of 964 kt in 2001)

NAFTA shows a similar segment split (see **Figure 10**) with a lower share of the AT segment. This is due to a higher consumption of speciality filled PP used for less visible parts in automotive interiors. The EE and IT segments are of the same importance in NAFTA and

Europe. With a 12% share of total consumption, the BC segment is highly developed in NAFTA because of the large amount of ABS used for pipes. The share of other uses is smaller than in Europe but comprises the same range of applications as in Europe.

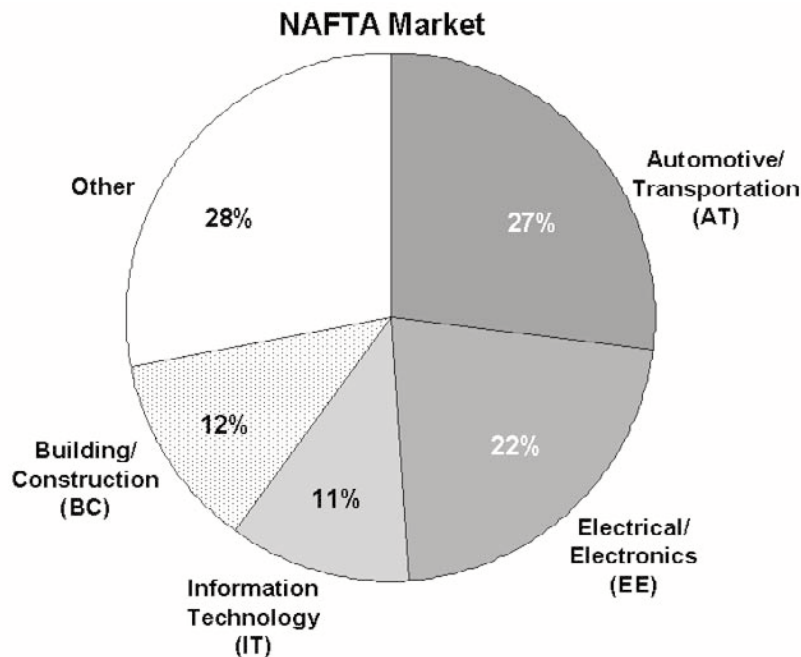


Figure 10

Market segmentation of styrenic copolymers and their blends in NAFTA (total of 840 kt in 2001)

Table 6 Global market segments and applications of the principal styrenic copolymers and their blends

Review section	Market segment	Abbr./ class.	Sub-segment	Application examples	Main styrenic copolymers and blends used
9.1	Automotive/ transportation	AT	Passenger car interiors	Instrument panels, interior trim	ABS, PC+ABS
			Passenger car exteriors	Body panels, side mirrors, grilles	ABS, ASA, AES, PC+ABS, PC+ASA, PC+AES, PA+ABS
			Lorry and bus interiors	Instrument panels, interior trim	ABS, PC+ABS
			Lorry and bus exteriors	Body panels, side mirrors, grilles	ABS, ASA, AES, PC+ABS, PC+ASA
			Recreation vehicles	Caravans, motorhomes, camping trailers	ASA, AES, ABS, PC+ASA
			Other	Agricultural vehicles, motorcycles, scooters, railways	ASA, AES, ABS
9.2	Electrical/ electronics	EE	Large appliances	Refrigerators, freezers, washing machines, vacuum cleaners	ABS, SAN
			Small appliances	Mixers, microwave ovens, coffee machines, food processors, electrical shavers, electrical toothbrushes	ABS, SAN, PA+ABS
			Consumer electronics	TVs, stereos, CD players, VCRs	ABS, PC+ABS
			Other	Garden appliances, lighting covers	ABS, ASA, SAN
9.3	Information technology	IT	Computer	Computers, monitors, printers, laptops, notebooks	ABS, PC+ABS
			Telecommunications	Stationary phones, mobile phones, fax machines	ABS, PC+ABS
			Other	Copiers, smart cards	ABS, PC+ABS
9.4	Building/ construction	BC	Pipe	Pipes, pipe fittings	ABS
			Exterior	Wall cladding, window profiles	ASA, AES, ABS, PVC+ASA
			Bathroom/sanitary	Water tanks, toilet seats, shower cabins, handles	ABS, ASA, SAN
			Interior	Cable ducts, light switches	PC+ABS, ABS
9.5	Medical	Other	Therapeutic equipment	Inhalers	ABS
			Diagnostic equipment	Test cells	ABS, MABS
			Labware	Containers, utensils	ABS, SAN

Table 6 Global market segments and applications of the principal styrenic copolymers and their blends *continued*

Review section	Market segment	Abbr./ class.	Sub-segment	Application examples	Main styrenic copolymers and blends used
9.6	Sports goods/toys	Other	Sports equipment	Skis, snowboards, boats, surfboards	ABS, ASA, AES, PC+ASA
			Toys	Building blocks, toy figures, electronic toys	ABS
9.7	Household/ personal articles	Other	Kitchenware	Dishes, boxes, camping articles	SAN, ABS, ASA
			Furniture	Laminates, Garden furniture	ABS, ASA
			Cosmetics and personal care	Lipsticks, compact cases	SAN, MABS
			Other	Lighters, writing utensils, shoes, suitcases	SAN, MABS, ABS
9.8	Miscellaneous	Other	Industrial power supply	Fixed batteries	SAN
			Material handling	Trays, boxes	ABS
			Compounding (non-styrenic copolymer)	Masterbatches, modifiers	SAN, ABS

In the Far East, the EE and IT segments account for a larger share because end-use production includes large quantities of exports to Europe and NAFTA. However, the AT segment is less developed in the Far East.

In the following sections, the market segments and applications of styrenic copolymers and their blends will be described. Special emphasis will be placed on innovative applications and market trends such as the substitution of other materials. **Table 6** summarises the global market segments and applications and indicates the main styrenic copolymers and blends used for them.

9.1 Automotive/Transportation

Because of their price/performance ratio, styrenic copolymers and their blends are firmly established in the automotive/transportation (AT) sector. Components made of ABS and PC+ABS are used both internally and externally (319). In contrast, there is almost no application for styrenic copolymers in the engine compartment due to the very high heat requirements.

Alongside quality and comfort, the main trends in development of new vehicles are increased safety, reduction in weight and minimisation of cost. These trends provide additional future potential for styrenic copolymers and especially for their blends.

9.1.1 Passenger Cars

Up to 20 kg of styrenic copolymers and blends are used in a modern car. The largest amounts are used in interiors but there is an increasing trend for external use. In general, the relationship between styrenic copolymer producers, automotive suppliers and original equipment manufacturers (OEMs) is very close. Rather than the plain material, producers deliver complete system solutions which encompass technical support and advice at all stages of development from conception to the start of series production. The use of CAD and CAE for designing complex geometries is standard.

9.1.1.1 Interior

The main styrenic copolymers and blends used in automotive interiors are ABS and PC+ABS. Instrument

panels, centre consoles, parts of knee protectors, fresh air vents, defrosting vents and A-, B- and C-pillar trim are frequently made from them (see **Figure 11**) (18, 32, 147, 163, 254, 260, 261, 263, 267, 308, 381, 393, 394, 425, 481, 519, 527, 529, 548, 557). Internal door panels and other door trim, map pockets and glove boxes are also often produced from ABS or PC+ABS (see **Figure 12**)

(132, 149, 168, 180, 370, 429). They do not break or splinter even under the most extreme deformation at low temperatures. This is very important for parts exposed to possible chest, head or bone impact (269, 301). Large panels almost free of flow lines can be produced by sequential injection moulding. Styrenic copolymer parts enable the distance between neighbouring items to be kept



Figure 11

Many automotive parts in the car interior are made of ABS or PC+ABS and offer increased safety, reduction in weight and minimisation of cost

(Source: Volkswagen/Bayer. Material: Novodur/Lustran ABS, Bayblend)



Figure 12

Glove boxes made of ABS do not break or splinter even under the most extreme deformation at low temperatures

(Source: Volkswagen/Bayer. Material: Novodur/Lustran ABS)

small because of the low thermal expansion. Even areas subjected to direct sunlight do not deform. Very lightweight parts with complex geometries can be produced using styrenic copolymers with high flowability and thin-wall technology.

The extreme load-bearing capacity of PC+ABS makes it ideal for ejected parts of airbags (e.g., airbag covers) (a.6). Polyurethane (PU) foam upholstered styrenic copolymer dashboards provide special protection for passengers. As styrenic copolymers adhere particularly well to PU, this combination is both easy to achieve and requires very high loading to delaminate it (410).

IMD of styrenic copolymer components with ABS foils is increasingly used, for example, for consoles and heating/ventilation grilles. This cost-effective technique makes possible decorative effects ranging from high-gloss wood or 'black piano finish' to matt aluminium finishes. The films adhere well to PC+ABS blends with which they are preferably back moulded.

Another, more recent trend for automobile interiors is the 'One-Material' concept in which the aim is to use only a single grade of each plastic, i.e., just one grade of ABS for all interior parts made of this styrenic copolymer. This requires an optimised property profile since a single product is expected to fulfil a number of quite different requirements. Newly developed ABS grades fulfil these demands (e.g., Lustran ABS H801). The concept offers system suppliers and car manufacturers advantages from design to logistics and also simplifies eventual mechanical recycling. Furthermore, the new styrenic copolymer materials also satisfy the rigorous emission regulations of many, particularly European, car manufacturers.

PA+ABS blends are also used for various interior applications (165). They are used especially for unpainted parts where a matt surface is required (478).

There is limited use of transparent SAN in interiors, e.g., for instrument panel lenses or small covers where no exceptional stresses will be applied.

9.1.1.2 Exterior

Weather-resistant styrenic copolymers or blends such as ASA, AES, PC+ASA and PC+AES are the main materials used uncoated in automotive exterior applications (386, 411, 574). If non weather-resistant styrenic copolymers are used they are usually painted or clear-coated (35, 115, 185). Styrenic copolymers are used as bodywork parts and for external mirror housings,

front grilles like cowl vents or air intake grilles, window surrounds, rear or other exterior trim (32, 143, 175, 179, 237, 247, 255, 268, 389, 439, 443, 466, 579). Other exterior parts include lamp bezels or housings, wheel caps and licence plate brackets (387, 550, 553).

The replacement of metallic body parts with styrenic copolymers offers significant potential (3, 359). In general, the increasing use of styrenic copolymers in automobile exteriors stems from the desire of OEMs to realise shapes which are difficult or impossible to manufacture from metal. At the same time there are demands for the lowest possible weight and improved low-speed impact protection, elimination of the coating process or substitution by cheaper methods such as IMD. Furthermore, reduced fuel consumption is achieved because of the lower overall weight.

A newly introduced PA+ABS blend (Triax DP 3155) has promising market prospects (3). The mineral filled blend can withstand temperatures up to 200 °C so that mouldings of this material can be fitted directly to untreated bodies and both can be coated together (online coating). This not only simplifies the coating process but also ensures perfect colour matching between metal and plastic parts. Thanks to the elasticity of the material, the risk of minor damage is lower than with the usual steel parts.

Further advantages stem from the high rigidity and very good flowability. The material is claimed to be almost twice as rigid as comparable PA+PPE blends. It can therefore be used to produce wings with thinner walls without additional reinforcement, making them lighter. Better flow means that complex designs can be realised using moulds with fewer gates yielding parts with lower internal stress and thus reduced tendency to warp. It is claimed that 30% lower shrinkage means greater dimensional accuracy. Thermal expansion, shrinkage and water absorption are lower than those of the usual PA+PPE grades.

At first intended for bodywork parts with Class-A surfaces, the material will soon be also available in a form which is inherently conducting. This grade will allow electrostatic coating without first applying a conducting primer thus further reducing the cost and simplifying the process.

9.1.2 Lorries and Buses

As in the case of cars, moulded items of ABS, ASA and their blends are used both internally and externally in lorries and buses. Between 5 and 20 kg of styrenic copolymers are used per vehicle depending on its size

and type. Compared with cars, external usage is more important. Up to 10 kg of the basic bodywork of a modern lorry may consist of styrenic copolymers or blend material.

Classic interior parts such as dashboards, centre consoles and door panels are also manufactured from ABS and suitable blends. A new application is interior bus panels and other trim extruded from PC+ABS flame retardant blends. Many exterior parts are analogous to cars, for example side mirrors, grilles and other trim. Another typical exterior application is bus window frames which can be readily manufactured from styrenic copolymers (590). The cabs of heavy lorries are made from thermoformed ABS/ASA sheets (303).

The attraction of further savings in weight and lowering of costs have resulted in marked progress in the substitution of large parts made of metal, fibre-reinforced polyester (FRP) or sheet moulding compound (SMC). Multi-layer sandwich systems made from ASA, glass-filled ABS and non-reinforced ABS have been tested successfully and are expected to replace the current composites and/or metal in buses and lorries in the near future.

9.1.3 Recreation Vehicles

Interior and exterior parts of recreation vehicles (RVs) similar to those in cars and lorries are made of styrenic

copolymers. The biggest volume and thus most important styrenic copolymer applications are clearly structural exterior parts. Nowadays, many of the large exterior bodywork parts, such as roofs, walls and panels of trailers, caravans and campers are also made from standard or weather-resistant styrenic copolymers such as ABS, ASA, AES or blends with PC (82, 148, 166, 237, 293, 307). In the USA alone, about 25 kt of styrenic copolymers are used in the RV sector annually.

The main points in favour of these polymers are low weight, good weather-resistance achieved without the need of protective coating, glossy, easy-to-clean surfaces and good thermoformability. Usually multilayer (sandwich) systems composed of different styrenic copolymers are applied. They are thermoformed, co-extruded sheets consisting of, for example, an ABS substrate with a weather-resistant ASA outer layer. In some cases layers are reinforced with glass fibres (110).

The newest developments in co-extrusion combine a more complex system with standard ABS as substrate, an intermediate layer of glass-filled ABS and a top layer of weather-resistant ASA. Sometimes an additional layer of PU foam is also included (178). These styrenic copolymer-based systems have many advantages. The styrenic copolymer systems are low-emission both in manufacturing and processing and



Figure 13

New styrenic copolymer systems replace metallic parts as well as FRP and SMC - here exterior parts of a recreation vehicle consist of ASA co-extruded with ABS
(Source: Jayco/Bayer. Material: Centrex, Lustran ABS)

relatively easy to recycle. They are also lighter in weight and have a better finish without additional costly coating. The new styrenic copolymer systems have already replaced FRP, SMC and metallic parts (see **Figure 13**) (220, 178) but there are still large areas which have potential for conversion in the future (101).

9.1.4 Others

Styrenic copolymers are also used in motor cycles, car trailers and railway wagons. Besides painted ABS parts, weather-resistant types such as ASA are also used for external unpainted applications such as covers for mopeds, motor scooters, motor cycles and related accessories (201, 233, 237, 322, 334, 460). As with RVs, there is an increasing trend to replace SMC, FRP or metal for similar reasons. Finally, styrenic copolymers and their blends are also used in agricultural and construction vehicles for both interior and exterior parts (164).

9.2 Electrical/Electronics Sector

ABS and PC+ABS blends are traditionally important and have developed into key structural materials for housings in the electrical/electronics (EE) sector (471). Their resistance to chemicals and their mechanical strength give these plastics an especially desirable property profile (361).

In some cases it is important for such housings to be made electrically conductive. This can be easily achieved by metallising the housing surface. Styrenic copolymers in general are very suitable as they can be metallised using standard industrial methods such as electroplating, aluminisation or painting with conductive varnish (333, 391, 428).

9.2.1 Large Appliances

Large appliances generally include refrigerators, freezers, washing machines, dishwashers and vacuum cleaners.

9.2.1.1 Refrigerators and Freezers

The internal cladding of refrigerators and freezers, the so-called lining, is frequently made of extruded and

thermoformed ABS sheet because of its impact resistance, dimensional accuracy, chemical resistance, adhesion to the PU foam and good appearance (244, 341, 349, 412, 413, 414, 444, 463, 472). Compared with high-impact polystyrene (PS-HI), it offers better resistance to chemicals (e.g., to foodstuffs or juices) and can be subjected to higher mechanical stresses such as knocks and blows (33). Because it has better mechanical properties than PS-HI, ABS liners can be thin-walled and therefore permit a saving in material of about 25% (33, 169, 503). ABS also has very good adhesion to PU foam. Grades resistant to newer blowing agent systems have also been developed (412, 413, 414, 444, 505, 573, 576, 584, 587).

Today, the strengths of ABS are put to good use in the large refrigeration devices used predominantly in the USA or the Far East. The use of ABS in smaller refrigerators, more common in Europe, has declined at the expense of cheaper PS-HI (463).

The good optical properties and chemical resistance make SAN the ideal material for all transparent internal parts of refrigerators such as food trays, shelving or compartment doors. Parts made from SAN are resistant to the usual household detergents and to fats and liquids found in foodstuffs (342). The polymer also complies with the appropriate regulations for articles which come into contact with food. The chemical and impact resistance of SAN are clearly superior to general purpose polystyrene (PS-GP).

9.2.1.2 Washing Machines and Dishwashers

ABS is utilised in frames and covers of washing machines and dishwashers (see **Figure 14**). Depending on use, covers for top loading washing machines have to withstand different stresses. They are manufactured from antistatic easy flow grades of ABS by injection moulding using the gas-assist process. The cover surfaces are high gloss and resistant to many chemicals including detergents.

9.2.1.3 Vacuum Cleaners

Antistatic ABS formulations are used for vacuum cleaner bodies (83, 171, 205). Usually the upper part of the body, where excellent surface properties such as gloss are important, is made from such styrenic copolymer grades (125). Among their most important advantages are rigidity without the use of fillers, impact strength, scratch resistance, high surface gloss, antistatic behaviour and good bondability.

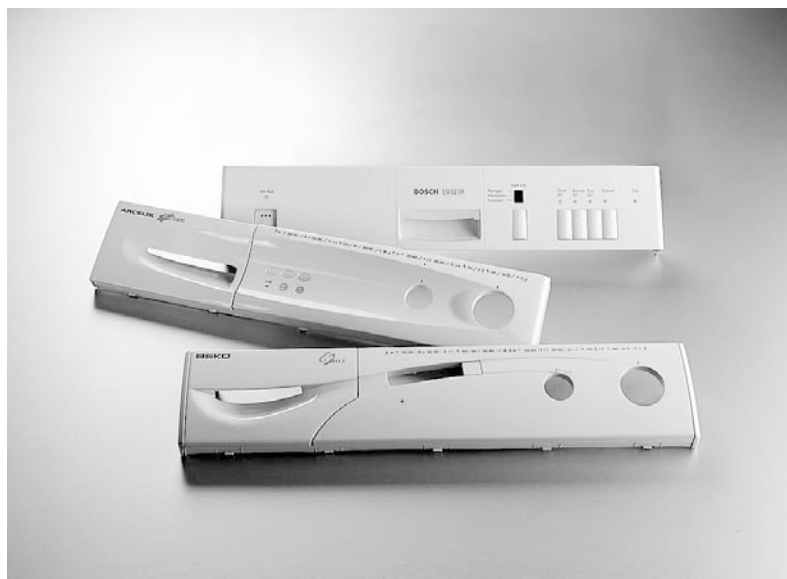


Figure 14

ABS has developed into a key structural material for frames and covers of washing machines and dishwashers
(Source: Bayer. Material: Novodur/Lustran ABS)

Using thin-wall technology suitable ABS grades allow wall thickness in the range of 2.3 to 2.6 mm. Outstanding surface finish without visible flowlines is possible using sequential injection moulding. Antistatic grades of PA+ABS blends are a suitable material for housings of steam cleaners.

maximum design freedom, functionality and optimum optical properties. In direct comparison with PS, SAN is significantly more resistant to common household chemicals, fats and liquids. SAN items are dishwasher-safe and hence easy to clean in daily use.

9.2.2 Small Appliances

Mixers, fruit presses, toasters, coffee machines, electric knives and toothbrushes are typical examples of small electrical appliances. Like large domestic appliances, they must be scratch and impact resistant, dimensionally stable, rigid, lightweight and of attractive appearance. Opaque housing parts of such small appliances are therefore often made of ABS (see **Figure 15**) (111, 123). They withstand daily exposure to chemicals such as washing and cleaning agents, fat and liquids, significantly better than PS-HI. The good flow properties enable ABS housings to be produced by the thin-wall technique. PBT+ABS or PA+ABS blends are used if higher heat resistance is required in combination with resistance to special chemicals. One example is electrical shavers requiring resistance to shaving lotions (see **Figure 16**) (32).

Transparent parts of these electrical appliances such as beaker stands, containers or bowls, often consist of SAN (342). The material offers good transparency,

9.2.3 Consumer Electronics

At present, ABS is the usual material for housings of television sets, radios, loudspeakers, music centres, video cassette recorders and CD/DVD players (69, 87, 248, 405). The polymer is distinguished by optically attractive and uniform textured surfaces and is available in various colours. This applies even if, as in the case of loudspeakers, greater wall thicknesses are required in certain parts of the object. The good rheological and mechanical properties of ABS permit economic production of thin-walled, large-area parts with complex shapes. The good impact and notched impact strengths are particularly important for portable equipment. Such equipment is usually subjected to harder everyday use, which ABS withstands without breaking. Due to new flame retardancy requirements television set housings in particular are expected to be made increasingly of PC+ABS flame retardant grades in the near future.

For remote control housings, the printability and good flow characteristics are of prime importance. Function



Figure 15

Housings of hand-held mixers made of ABS withstand daily exposure to chemicals such as washing and cleaning agents, fats and liquids

(Source: Bosch/Bayer. Material: Novodur/Lustran ABS)



Figure 16

Electrical shavers made of PA+ABS are scratch and impact resistant with a high chemical resistance to shaving lotions

(Source: Philips/Bayer. Material: Triax)

keys must be easily and permanently marked and for the sake of appearance, no flow lines should be visible despite the many apertures for these keys. The good flowability of ABS is just what is needed to meet these demands.

Transparent grades, such as SAN or MABS, are also used in this area, e.g., for dust covers (208).

9.2.4 Other

Transparent light diffusers and covers mainly for indoor use are made of SAN. Usually, UV stabilised grades are required. They are a cost-effective alternative to acrylics. For lighting housings or casings ABS or PC+ABS is used (161).

ABS is also found in power tool parts (287). Housings of garden appliances such as lawnmowers or trimmers are increasingly made of ABS or ASA (452). The weather-resistant material also offers protection from stone impact. Because of its advantages it is displacing aluminium and steel as a material for housings.

9.3 Information Technology

Most casings of computer and telecommunications equipment are made from flame retardant ABS and, preferably, PC+ABS grades (97, 501). Styrenic copolymers without flame retardant additives do not achieve the performance of at least UL-94 V-0 required for most applications in the information technology (IT) sector.

PC+ABS grades based on non-halogenated flame retardant additives are particularly good at meeting the stringent requirements of the most prominent ecolabels such as the Blue Angel (Germany), the Nordic Swan (Scandinavian countries) and of the TCO 99 standard (Sweden) for displays and personal computers.

As in consumer electronics applications, SAN and MABS are used for dust covers, lids, etc.

9.3.1 Computers

Casings for computers, servers, laptops, monitors and printers are usually made from flame retardant ABS and increasingly from PC+ABS blends which have almost completely replaced metal (86, 100, 152, 288, 290, 328, 383, 513). Various manufacturers now offer halogen-free flame retardant systems based on mono- or oligophosphates, which are most efficient and ecologically advantageous (see **Figure 17**).

Flame retardant grades which are heat resistant, impact resistant, light resistant and exhibit easy flow characteristics, can be used cost-effectively to manufacture high precision, highly serviceable parts. In contrast to domestic appliances, matt or textured, non-reflecting surfaces are preferred for business equipment. Because of the material's ability to reproduce detail accurately, this can easily be achieved with suitable design of the mould surface. Snap connectors can also be easily integrated to facilitate assembly.

Especially for notebooks the trend is to ever-lighter weight. Mineral-filled PC+ABS flame retardant grades



Figure 17

The preferred material for casings of computers and monitors is flame retardant PC+ABS

(Source: Hitachi/Bayer. Material: Bayblend FR)

are increasingly used as they possess both high rigidity and the particular ease of flow required for such casings produced by thin-wall technology (2).

9.3.2 Telecommunication

ABS and PC+ABS have established themselves for use in telephone housings, fax machines and related equipment (12, 78, 248, 378, 415, 559, 583). PC+ABS is mostly used for cordless and mobile phones because of additional demands for light weight and impact and shock resistance (see **Figure 18**). Besides the requirement for robust cases, short cycle times are a second criterion for selecting material.

Professional radio or telecommunications equipment must meet even higher specifications. The heavy equipment must be protected against dust and water spray and stand up to high mechanical stress in everyday use. Case components made of PC+ABS have proved themselves in such applications. Highly stressed components can be manufactured by two-component injection moulding. First, the case components are injection moulded from PC+ABS. It contributes strength and stiffness to prevent distortion where loads are applied. The highly stressed corners of the case are then filled with wear resistant TPU (a.18). It imparts springy and elastic properties to provide resilience and a cushioning effect as well as non-slip characteristics for good grip. The good adhesion between PC+ABS and TPU ensures a perfect bond and a particularly robust piece of equipment. For parts exposed to exterior conditions ASA is also used (221).



Figure 18

Cordless phones made of PC+ABS fulfil multiple requirements of daily use

(Source: Siemens/Bayer. Material: Bayblend)

The upper part of modern phone casings is often produced from PC+ABS blends by a combination of two-component injection moulding and thin-wall technique which permits wall thicknesses of less than 1 mm (416). This is only possible by using an extremely high injection pressure, which, because of the pronounced shear, results in high thermal stressing of the melt. At the same time, the colour stability, surface uniformity and mechanical properties, especially the strength of the flow lines, must meet the highest quality requirements (a.19). PC+ABS grades meet all of these requirements simultaneously.

9.3.3 Other

Other important IT applications of styrenic copolymers and their blends include housings for photocopiers, and Personal Digital Assistants (416). Another innovative application of ABS is in Smart Cards (203, 451, 577). ABS meets all the requirements for economic production in multi-cavity moulds, good printability for attractive decoration and good bonding to the adhesive used for the chip. It also passes the flexibility test with the chip in place (a test for mechanical

stability) according to ISO/IEC 7816, and the folding endurance and flexural fatigue tests (a.20). Manufacturing costs on suitable injection moulding machines are relatively low even for small runs with two-sided in-mould labelling and individual chips.

9.4 Building/Construction

The building/construction (BC) segment includes pipes, window profiles and frames, as well as bathroom and sanitary articles and different examples of interior applications such as cable ducting.

9.4.1 Pipe

The pipe market is of special importance for ABS in NAFTA with a consumption of about 90 kt p.a. In Europe, the volume is less important at about 10 kt p.a.

Pipes made of ABS are particularly suitable for drain, waste and vent installations because of their chemical resistance and mechanical performance over a large temperature range (68, 119, 120, 130, 210, 242, 368, 470, 483, 485, 486, 493, 498, 525). Other decisive criteria are cost-efficiency, versatility, strength, durability and simple handling because of the light weight. ABS pipes are produced nowadays by co-extrusion (496, 502). The result is a pipe consisting of several concentric layers of ABS materials bonded together (492). Various pipe fittings are also made from ABS (484, 494, 495, 497).

9.4.2 Exterior Building

Exterior building parts such as window profiles and window frames are increasingly being made from weather-resistant styrenic copolymers such as ASA or PC+ASA (222, 223, 353). They show significantly better impact, heat and ageing resistance than their PVC counterparts. A co-extruded two-layer system of ABS substrate and ASA top layer is usually used (56, 303). Since the frames do not have to be welded or painted they provide a cost-effective alternative to PVC or wood (528).

House cladding made of plastics is used primarily in the USA and has also become accepted in Europe because of its insulating and protective properties (90, 117, 488). In a special house cladding system the co-extruded and thermoformed moulds of ASA have been tooled with a random pattern to give an authentic

looking impression of hand-split cedar shakes (90). A cap-stock of acrylic polymer on top of standard ABS is sometimes used instead of ASA.

Hollow bricks are also manufactured from flame retardant ABS. These flame-retarded plastic bricks are intended for building houses in developing countries (303).

9.4.3 Bathroom/Sanitary

High-quality bathroom and sanitary articles, such as WC flush tanks, toilet seats, shower stalls, tap systems and fittings are also extensively made of ABS or ASA (52, 58, 158, 246, 329, 375). This is due to their high surface quality, chemical resistance, long-term colour stability and easy metallisation (see **Figure 19**).

Bathtubs, whirlpools and their accessories form another new and growing field of application, particularly in the USA (232). This application not only requires resistance to detergents and disinfectants but also to outdoor weathering, since these whirlpools are frequently set up on patios in the USA (237).

Apart from the aesthetics, its good mechanical properties and chemical resistance make SAN ideal for use in sidewall sheets for shower cubicles. In Europe this is a major extrusion application of SAN (26).



Figure 19

Wash basin fitting in electroplated ABS
(Source: Bayer. Material: Lustran ABS)

9.4.4 Interior Building

Cable ducting for electrical and telephone circuits has to be made of flame retardant material. Because of increasingly stringent fire regulations halogen-free flame retardant grades of PC+ABS are increasingly being used. They satisfy fire protection regulations in the electrical installation and building sectors to DIN EN 50085-1, VDE 0604 and UL-94, and are thus very suitable for use in cable ducting, busbars and optical wave guides (see **Figure 20**).

New halogen-free PC+ABS flame retardant blends are not only superior to flame retardant grades of ABS but also to traditional plastics such as PVC. In case of fire, smoke density is extremely low and, in particular, the emission of acid and toxic combustion gases is drastically reduced compared with conventional materials. Consequently, potential secondary fire damage through corrosion and contamination is reduced to a minimum. Because of their high melt stability PC+ABS flame retardant grades can be extruded at high speed, even at low wall thickness, thus reducing production costs significantly.

Other applications in the interior electro-installation sector include wall sockets and light switches which are also frequently made from PC+ABS, ASA or PC+ASA.

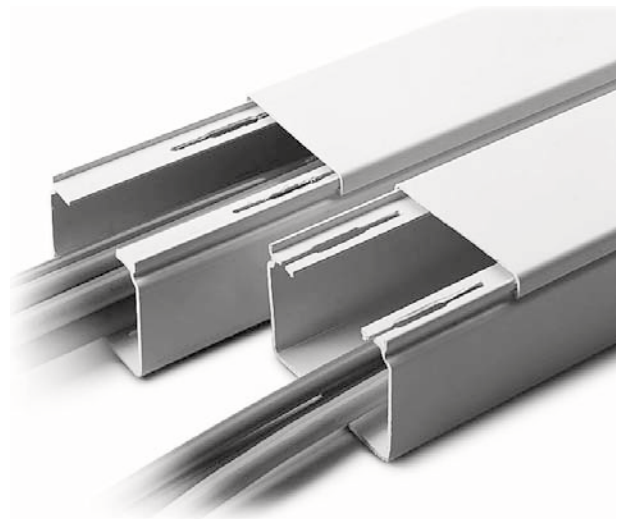


Figure 20

Halogen-free flame retardant grades of PC+ABS are used for modern cable ducting which meets more stringent fire regulations
(Source: Bayer. Material: Bayblend FR)

9.5 Medical

ABS is used in therapeutic and diagnostic equipment as well as for various labware articles like valves and tube connectors (31, 49, 59, 192, 105, 286, 309, 321, 357, 535, 565). Test kits and probe systems, feed pump housings, roller clamp and piercing pins are typical medical applications of ABS. Larger devices include modern birthing tubs, thermoformed from acrylic-coated ABS sheet and insulated with PU foam (25). The styrenic copolymer-based system replaces the FRP used formerly.

A new powder inhaler for long-term treatment of respiratory tract diseases uses ABS for the housing because of its impact resistance. The ABS thermoplastic used also satisfies guideline ISO 10993-1 and the standard USP (United States Pharmacopoeia) Class VI for biological compatibility of plastics (a.21).

If transparency is necessary, SAN or MABS are employed (142, 392, 450). They are used in clinical and diagnostic areas where it is vital that tissue, blood and other fluids are visible. For example, reaction chambers for automatic diagnostic equipment, ampoules, measuring glasses and connection parts are made of SAN (see **Figure 21**). Parts can be sterilised with ethylene oxide or gamma irradiation. The chemical resistance of styrenic copolymers is also an advantage since components of the equipment come into contact with diverse substances.

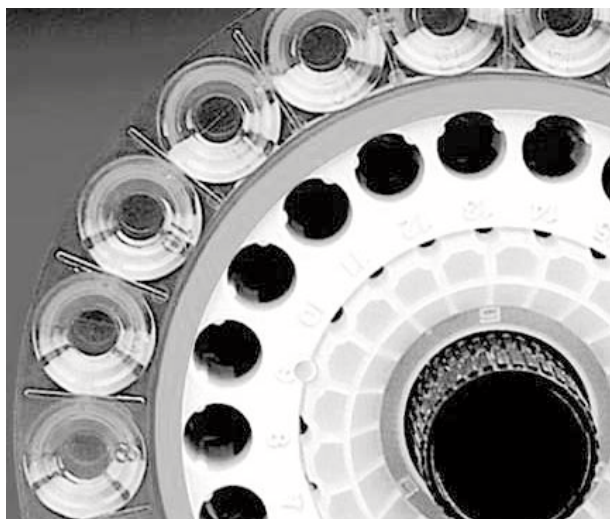


Figure 21

SAN is used in the clinical and diagnostic sectors - like these reaction chambers where it is vital that fluids are visible

(Source: Bayer. Material: Lustran SAN)

9.6 Sports Goods/Toys

Sports equipment requires materials which are particularly impact and weather-resistant. This is due to the physical stresses such equipment is intended to cope with, most often in outdoor usage. In boats, weather-resistant parts such as hulls and decks are made of co-extruded ABS/ASA systems (229, 303, 433). For many years, FRPs have been substituted by styrenic copolymer systems thus contributing to the environmental compatibility of such leisure equipment. Styrenic copolymers have the advantages that they do not release fumes during extrusion or moulding and can be recycled. Sometimes an additional PU layer is included. A similar situation applies to surfboards, water-skis, snow shoes and snowboards which are increasingly made from impact resistant and weather-resistant styrenic copolymers (46, 237, 338). ABS/ASA co-extruded sheet is frequently the material chosen for electric golf buggies.

In all countries worldwide, particularly strict regulations apply to materials used in children's toys. The use of ABS to manufacture toy building blocks is well established (32, 128) and other 'classical' items such as toy cars, motorbikes or planes and action figures are often made of styrenic copolymers (see **Figure 22**). In recent years, interactive electronic toys such as robotic pets and talking books with injection moulded ABS bodies or cases have entered the market.



Figure 22

Toy cars and related items made of ABS
(Source: Bayer. Material: Absolac)

Electronic toys are manufactured by processes analogous to those for other electronic equipment often incorporating electromagnetic interference (EMI) shielding (29, 57, 396, 509).

9.7 Household/Personal Articles

Non-electrical household articles are an important field of application for SAN. Tableware made of SAN is dishwasher-proof and is used in the catering industry and for camping (342). Mugs, bowls, dinnerware, cups or tumblers made of styrenic copolymers have significantly better chemical resistance and mechanical strength than PS and are re-usable (206). Containers for water filters made of SAN are found in many households nowadays. For non-transparent articles, coloured ABS is also used.

ABS and PBT+ABS blends are frequently used where high gloss, reflective finishes are required for kitchen and bathroom furniture. The injection moulded pieces of furniture exhibit a Class-A surface, are robust and can be easily cleaned. For garden furniture, weather-resistant styrenic copolymers such as ASA are often utilised.

Personal articles frequently made of SAN include packaging for cosmetics. Examples are bottles, jars, lipstick tubes, compact cases, nozzles, caps, vials and sprays (342). The chemical resistance and impermeability to gases of SAN are particularly important in ensuring an extended shelf life for perishable cosmetic products. Where higher breaking

strength and heat resistance are required, MABS can be used (275). Non-electrical toothbrushes, soap containers and brush handles are also made of SAN or MABS. Apart from the health considerations which apply to toothbrushes, the material should not break in use.

One of the largest single applications of SAN is cigarette lighter bodies (see **Figure 23**). These are traditionally made of gas-impervious SAN. SAN is also used for writing and drawing instruments. Finally, suitcases and parts of shoes are made from ABS.

9.8 Miscellaneous

The examples given above by no means exhaust the spectrum of applications for styrenic copolymers and their blends. Three additional applications are mentioned as examples.

The first is cases made of SAN for fixed batteries used as emergency standby power in factories, hospitals and in telecommunications (342). Here long-term durability and resistance to acids are important. A further advantage is that the readiness of the batteries can be checked through the transparent cases.

Material handling boxes and trays for industrial use are another ABS application replacing former wood constructions (323, 590).

Finally, significant quantities of styrenic copolymers are also used for compounding to yield other than styrenic copolymer products. In general, SAN is used as a carrier material in masterbatches and ABS is used as a modifier for various other polymers.



Figure 23

Lighter bodies are a large single application of SAN
(Source: Bayer. Material: Lustran SAN)

10 Recycling and Recovery

Suitability for recycling or recovery has been an important consideration for consumer goods for many years. This is due to rising public concern for resource savings, protection of the environment and health issues, as well as legislation in many countries or regions. Most heavily affected are the automotive, electrical/electronics and packaging sectors. Recent examples in Europe are the Directive on End-of-Life Vehicles (ELV) passed by the European Parliament in 2000 and the planned Directive on Waste Electrical and Electronic Equipment (WEEE) expected to be passed soon.

The prime goals of saving of resources, minimisation of waste and reduction of landfill can be achieved by different basic recycling or recovery options: mechanical recycling (material recycling), chemical recycling (feedstock recycling) or energy recovery. The options need to be assessed by ecological and economic criteria to find the most efficient methods. The tremendous contributions of styrenic copolymers and their blends during their use phase to savings in resources and energy must be mentioned. Because of their unique combination of tailor-made properties, they enable savings in weight and energy from the design and manufacture of a product until the end of its life.

Styrenic copolymers and their blends are well suited for all recovery options. Whereas energy recovery is an efficient option for most polymers, feedstock recycling is limited to base chemical processes. There are established processes for feedstock recycling of styrenic copolymer material and new processes are under development (219).

Mechanical recycling deserves specific attention as its suitability is related to the material type, potential contaminants and the possibility of collecting and/or separating materials from incompatible components, which often can be costly.

Styrenic copolymers and their blends exhibit favourable properties for mechanical recycling (8, 423, 462, 564, 571). They are highly stable in processing and are compatible with many other thermoplastics such as PC, PA, PBT or TPU. Hence, they do not necessarily have to be segregated prior to reprocessing (224, 236). For example, PC and ABS parts do not have to be separated but can be recycled together as PC+ABS (532, 533). Most major manufacturers offer recycled ABS and PC+ABS grades in their product portfolio (266, 352, 473, 489, 536).

To ensure constant mechanical properties, post consumer materials are compounded in varying amounts with raw materials and additives. However, because of the differing origin of such waste material, a wider range of tolerance in properties must be expected. Because there is a limited choice of colour and the surface finish of parts is variable, recyclates should preferably be used for applications where they are non-visible, coated or laminated.

The main sources and destinations for re-use of post consumer styrenic copolymer material include the automotive sector (50, 108, 109, 144, 150, 225, 406, 561, 578) as well as EE devices and IT equipment (43, 316, 461, 555, 556, 588, 591). Many examples of

mechanical recycling of styrenic copolymers and their blends can be found in practice (162, 230, 234, 382, 537). Closed-loop material recycling processes have been developed for specific applications (434). Examples are radiator grilles made from ABS containing up to 30% w/w recycled material from old radiator grilles (a.22), housings of printers produced from recycled material consisting of up to 25% w/w of used housing material (367, 445) and vacuum cleaner housing components made of styrenic copolymer blends containing 25% w/w of recycled material.

Dismantling is the cost-determining step in mechanical recycling. Special design solutions can greatly help to facilitate dismantling thus setting the basis for efficient later reuse. Styrenic copolymers and their blends are highly suitable for design solutions such as screw connections or snap joints and springs which support easy dismantling.

Past experience with styrenic copolymers and their blends has proved that they are highly suitable for different recycling or recovery methods. Thus, the favourable mix of properties of styrenic copolymers and their blends enables them to span the complete life of product applications, from their design and manufacture up to their reuse or recovery. This is only one of the reasons why styrenic copolymers and their blends are still on course for growth and are expected to have a bright future in the plastics market.

Abbreviations and Acronyms

ABS	acrylonitrile-butadiene-styrene
AE	acrylic ester
AES	acrylonitrile-EPDM-styrene
AN	acrylonitrile
ASA	acrylonitrile-styrene-acrylic ester
AT	automotive/transportation
B	butadiene
BC	building/construction
BDP	bisphenol A bis-(diphenyl phosphate)
BR	butadiene rubber
CAD	computer aided design
CAE	computer aided engineering
CLTE	coefficient of linear thermal expansion
ΔE	total colour difference

EE	electrical/electronics	PMMA	polymethyl methacrylate
EMI	electromagnetic interference	POM	polyoxymethylene
EPDM	ethylene-propylene-diene	PP	polypropylene
FDIS	Final Draft International Standard	PPS	polyphenylene sulfide
FR	flame retardant	PS	polystyrene
FRP	fibre reinforced polyester	PS-GP	polystyrene, general purpose
GAIM	gas-assist injection moulding	PS-HI	polystyrene, high-impact
GIT	gas injection technology	PSU	polysulfone
IMD	in-mould decoration	PTFE	polytetrafluoroethylene
IT	information technology	PU	polyurethane
kt	kilotonne (1,000 metric tonnes)	PVC	polyvinyl chloride
MA	maleic anhydride	RDP	resorcinol bis-(diphenyl phosphate)
MABS	methylmethacrylate-acrylonitrile-butadiene-styrene	ROW	rest of world
MBS	methylmethacrylate-butadiene-styrene	RV	recreation vehicle
MI	maleimide	S	styrene
MMA	methylmethacrylate	SAMA	styrene-acrylonitrile-maleic anhydride
MS	α -methylstyrene	SAMI	styrene-acrylonitrile-maleimide
MSAN	α -methylstyrene-acrylonitrile	SAN	styrene-acrylonitrile
MVR	melt volume flow rate	SB	styrene-butadiene
NAFTA	North American Free Trade Agreement	SBC	styrenic block copolymer
NBR	acrylonitrile-butadiene rubber	SBR	styrene-butadiene rubber
NPMI	<i>N</i> -phenylmaleimide	SBS	styrene-butadiene-styrene
OEM	original equipment manufacturer	SC	styrenic copolymer
PA	polyamide	SMA	styrene-maleic anhydride
PA-HP	polyamide, high-performance	SMC	sheet moulding compound
PBT	polybutylene terephthalate	SMI	styrene-maleimide
PC	polycarbonate	SMMA	styrene-methylmethacrylate
PE	polyethylene	SMMAN	styrene-methylmethacrylate-acrylonitrile
PE-HD	polyethylene, high density	SMSAN	styrene- α -methylstyrene-acrylonitrile
PEI	polyetherimide	t	metric tonne(s)
PE-LD	polyethylene, low density	TPP	triphenyl phosphate
PE-LLD	polyethylene, linear low density	TPU	thermoplastic polyurethane
PESU	polyarylethersulfone	UL	Underwriters Laboratories
PET	polyethylene terephthalate	USP	United States Pharmacopoeia
		UV	ultraviolet light

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Abstracts from the Polymer Library Database

Item 1

Kunststoffe Plast Europe

92, No.7, July 2002, p.36-8

SAFETY STANDARD INCREASED. HALOGEN-FREE, FLAMEPROOFED PC/ABS ALLOYS FOR EXTRUSION

Seidel A; Eckel T; Thurmer B

Bayer AG

Refer to *Kunststoffe*, 92, No.7, 2002, p.90-2 for graphs and tables. Brief details are given of the production of extruded profiles and thermoformable panels as well as blow moulded hollow articles from halogen-free, flameproofed alloys of polycarbonate and ABS. Potential applications in electrical and telecommunications installations are mentioned.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.862423

Item 2

Modern Plastics International

32, No.7, July 2002, p.38-9

PC/ABS SEES UPTURN IN DEMAND AND PERFORMANCE

Rosenzweig M

The market for polycarbonate/ABS blends slumped last year, but is now rebounding. The automotive market accounts for 40-45% of consumption, followed by business equipment with 30-35%. According to *Automotive Plastics Report 2002*, demand for PC/ABS in vehicle components in Nafta should increase from 66.5 million lb in 2002 to 168.7 million lb in 2012, an average annual growth of over 8%. The bulk of the consumption will go toward instrument panels. However, Dow Automotive says PC/ABS faces a battle in the IP market from lower-cost PP. GEP claims the business equipment market offers the best prospects. There is increasing interest in halogen-free flame retardants that satisfy eco-label requirements, and thinner part walls for material savings.

WORLD

Accession no.860715

Item 3

Modern Plastics International

32, No.7, July 2002, p.26-31

PLASTICS ARE PRIMED FOR BIG PUSH IN AUTO EXTERIORS

Mapleston P

European carmakers are the most enthusiastic about plastics. Last year, they used about 7000 tonnes of thermoplastics for body panels, and the volume is set to rise significantly. Last year, Peugeot launched the 307

with Noryl GTX PA/PPE front fenders. With production volumes of around 2000 per day, the 307 represents the biggest fender business to date for GE Plastics. Ford is near the end of validating high-heat Noryl GTX for the e-coat process. Bayer claims its Triax LP 3155 mineral-filled nylon/ABS blend has lower thermal expansion, shrinkage and water absorption than Noryl GTX. More critical, it reportedly has much higher heat resistance. GEP is targeting its SollX film for the complete car body. SollX is a thermoformable film with 400%-plus draw capability intended primarily for in-mould decorating. GEP is developing grades that can be used on all types of panelling thermoplastics and thermosets, as well as metals.

WORLD

Accession no.860712

Item 4

Shawbury, Rapra Technology Ltd., 2002, pp.122, 30 cm, 1/6/02. Rapra Review Report 146, Vol. 13, No.2, 2002. NALOAN

IN-MOULD DECORATION OF PLASTICS

Love J C; Goodship V

Warwick, University

Edited by: Humphreys S

(Rapra Technology Ltd.)

Rapra Review Report No. 146

Variations of in-mould decorating are reviewed, for the production of fully or partially decorated components straight from a variety of moulding processes. Such techniques can produce primers, labelling, graphics, natural patterns and automotive-style paint finishes, and are widely used in many packaging and automotive applications. Chosen techniques can involve the use of a film, powder, granules or liquid paint, and the lack of reliance of traditional paint shops is claimed to provide a selection of cost, space, processing time and environmental benefits. In-mould film technologies, injection in-mould paint, on-mould painting, and in-mould primer technologies are reviewed. 480 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK; WESTERN EUROPE

Accession no.858076

Item 5

Shawbury, Rapra Technology Ltd., 2002, pp.116, 30 cm, 1/6/02. Rapra Review Report 145, Vol. 13, No.1, 2002. NALOAN

MULTI-MATERIAL INJECTION MOULDING

Goodship V; Love J C

Warwick, University

Edited by: Humphreys S

(Rapra Technology Ltd.)

Rapra Review Report No. 145

A review is presented of multi-material injection moulding processes. Coinjection, bi-injection, and interval injection moulding techniques are discussed, followed by sections on multi-shot moulding(B1) and overmoulding. The selection of materials is discussed, with reference to material bonding properties and general material properties. 387 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.858075

Item 6

Kunststoffe Plast Europe

92, No.3, March 2002, p.10-4

"IT DEPENDS ON THE PART"

Potente H; Heim H-P; Ridder H; Kaiser E
Paderborn,Universitat

Special injection moulding techniques used in automotive engineering are discussed with the aid of case studies to demonstrate the importance of particular processes to the automotive industry. Processes considered include in-mould laminating, in-mould decorating, injection moulding of hybrid, multi-component and hollow parts and techniques involving the use of special materials, special process control, special mould technology and special plasticisation units. (Kunststoffe, 92, No.3, 2002, p.26-35)

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.851003

Item 7

Newbridge, 2001, pp.7. 30cms. 29/1/2002

ROYALITE ABS AND PVC ALLOY SHEET MATERIALS

VTS Royalite

Details are given of Royalite engineering thermoplastic sheeting, available in acrylic capped, flame retardant, high heat, and general purpose grades of ABS and in high performance PVC alloy grades. A variety of textured and tactile finishes are offered, together with high impact and high heat grades. For outdoor applications, weatherable grades with ASA or PMMA layers are available, while Royalite R81B sheet has been developed specifically for sanitaryware applications. A product selector guide provides performance and dimensional data for each grade.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.846357

Item 8

Macplas

26, No.227, April 2001, p.46-8

Italian

APPLICABILITY AND APPLICATIONS OF RECYCLED PLASTICS. II.

La Mantia F P

Palermo,University

Sources of post-consumer plastics for recycling, the effects of recycling processes on polymer properties, and applications of the recycled materials are discussed. Polymers examined include PETP, PVC, ABS and polyamides, and consideration is also given to problems associated with the recycling and reuse of mixed plastics waste. 5 refs. (Part I: *Ibid.*, 26, No.226, March 2001, p.46-8).

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY;
WESTERN EUROPE; WORLD

Accession no.846232

Item 9

ACS Polymeric Materials Science and Engineering Fall Meeting. Volume 85.

Chicago, IL, 26th-30th August 2001, p.504-5.012

GLOSSY DIFFERENCE ON THE SURFACE OF GAS ASSISTED INJECTION MOLDED PARTS

Shih-Jung Liu; I-Hsuan Lin

Chang Gung,University

(ACS,Div.of Polymeric Materials Science & Engng.)

The influences of melt and mould temperatures, filling speed, short-shot size, gas pressure and gas injection delay time on the gloss of gas-assisted injection moulded ABS and polypropylene plates were investigated. The filling was simulated using commercially-available software. It was concluded that differences in gloss were caused by the shear stress gradient which occurred during filling, and that surface roughness may also be a contributory factor. 5 refs.

TAIWAN

Accession no.845620

Item 10

Macplas

26, No.226, March 2001, p.78/81

Italian

SEQUENTIAL MOULDING APPLIED TO FAMILY MOULDS

Bertacchi G; Pipino A; Boero G

Plastics & Computer; Centro Ricerche Fiat

Results are presented of a computer simulation study of the sequential injection moulding process using family moulds, the findings of which were verified by injection moulding experiments. Materials examined included talc filled PP, a glass fibre-reinforced polyamide and a polycarbonate/ABS blend. 5 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY;
WESTERN EUROPE

Accession no.842584

Item 11

European Plastics News

29, No.1, Jan.2002, p.25

RESISTING THE FLAMES

It is briefly reported that GE Plastics has added Cycology C2951 to its portfolio for a variety of applications including household appliances. The new resin is said to deliver the optimum 5VA flame performance of any flame retardant PC/ABS in the GE Cycology portfolio. Cycology C2951 features an improved balance of flow, impact and heat resistance, coupled with better processability and colourability for enhanced performance.

GE PLASTICS

USA

Accession no.839226

Item 12

Plastics News International

Dec. 2001, p.20

SPARKLE EFFECT IN PC/ABS DELIVERS METALLIC LOOK PHONE

The design of the new Congruency i.Picasso IP business phone, which has a look aimed at catching the eye of style-conscious business consumers, is described. The phone housing is made from flame-retardant Cycology FXC630SK polycarbonate/ABS blend with a Sparkle effect from the Visualfx resin portfolio to give the phone the desired appearance.

GE PLASTICS; CONGRUENCY

USA

Accession no.837204

Item 13

Polymer Engineering and Science

41, No.10, Oct.2001, p.1830-44

INFLUENCE OF INITIAL SHEET TEMPERATURE ON ABS THERMOFORMING

Je Kyun Lee; Virkler T L; Scott C E

Massachusetts Institute of Technology; Bayer Corp.

The effect of initial temp. distribution over the ABS sheet on the part thickness distribution of a vacuum snap-back thermoforming process was investigated. The linear viscoelastic properties and the Wagner two-parameter non-linear viscoelastic constitutive model were used for numerical simulation of the thermoforming operation. Simulations of pre-stretched vacuum thermoforming with a relatively complex mould for a commercial refrigerator liner were conducted. The effects of temp. distribution over the sheet on the part thickness distribution were determined to examine process sensitivity and optimisation. The effects of the temp. distribution on the material rheology and polymer/mould friction coefficient were primarily responsible for the changes in the thickness distribution. It was found that even small temp. differences over the sheet greatly influenced bubble shape and pole position during the bubble growth stage and played a

crucial role in determining the part thickness distribution. The results are discussed in terms of rheological properties of polymers, such as elongational viscosity and strain hardening. 42 refs.

USA

Accession no.836366

Item 14

K2001: Product Information.

Messe Duesseldorf, 2001, p.40

NEW GRADES OF STYRENIC POLYMERS

EniChem SpA

European petrochemical producer EniChem SpA has made several developments in the styrenics sector: In the crystal clear PS field, Edistir PD N 2982 is a special grade for direct-gassing extrusion of heavy gauge insulating boards foamed by environmentally-improved expanding agents. The grade can also be used as a carrier for coloured masterbatches and as a modifier for thermoplastic elastomers and rubbers, for instance in shoe soles or cable coating. In the expandable polystyrene (EPS) product range, the new Extir PD D 2000 and PD D 3000 grades are aimed at the packaging sector in Eastern Europe. The fast-moulding types have high mechanical resistance, and good processability, fusion and surface finishing. Further applications lie in building insulation. In ABS, three continuous mass extrusion Sinkral grades are offered. The standard type, B 432/E, provides rigidity and thermal stability for the extrusion of heavy-gauge boards. PD B 532/E is recommended when high mechanical resistance is required, while the D 232/M3 grade, characterised by good flow and high matt, is particularly suitable for matt surface finishing. This abstract includes all the information contained in the original article.

EASTERN EUROPE-GENERAL; EUROPE-GENERAL; EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY; WESTERN EUROPE

Accession no.833661

Item 15

Injection Molding

9, No.10, Oct. 2001, p.92/5

TROUBLESHOOTER. PART 51: COPING WITH GATE JETTING

Hatch B

Prime Alliance

The problem of gate jetting (snake tracks) starting at the gate and continuing for 5 in. inside the gate in black ABS parts is addressed. This problem is identified as edge gating coming off the side of a trapezoidal runner, which results in a high shear gate. The remedy suggested is changing from the trapezoidal runner to a curved tunnel gate or tab gate and resizing the sprue O-diameter and nozzle orifice to increase flow. Information on good gate design is included.

USA

Accession no.833151

Item 16

Plast' 21

No.102, May 2001, p.24-6

Spanish

DEFORMATION OF AN INJECTION MOULDED PART DUE TO ASYMMETRIC COOLING

Legarreta J L

Maier S.,Coop.Ltda

Results are presented of a finite element study of the influence of asymmetric cooling on the deformation of injection moulded ABS components.

EUROPEAN COMMUNITY; EUROPEAN UNION; SPAIN; WESTERN EUROPE

Accession no.831350

Item 17

Antec 2001.Conference proceedings.

Dallas, Texas, 6th-10th May, 2001, paper 640

EFFECT OF PACK AND HOLD PARAMETERS ON PART COOLING IN INJECTION MOLDING

Saleski J; DeSousa J

Massachusetts,University

(SPE)

The influence of packing and holding conditions on the cooling of injection moulded polypropylene, a propylene copolymer and compounded acrylonitrile-butadiene-styrene terpolymer was studied using a fan-gated plaque mould. The packing, holding and cooling parameters were systematically varied, and for each part the surface temperature, thickness, cushion, transfer position, fill time and hydraulic pressure at transfer were recorded. The surface temperature and part thickness were measured immediately after ejection. Increased packing gave lower surface temperatures of the ejected parts, whilst the introduction of more melt increased the overall part temperature, so reducing the cooling rate. The surface temperature was less dependent upon packing pressure for amorphous polymers. From measurements of air gaps measured at ejection, it is proposed that the time of contact between the part and the mould wall was less than 5 s. 6 refs.

USA

Accession no.830072

Item 18

European Plastics News

28, No.8, Sept.2001, p.63

ALL-PLASTIC COCKPIT MODULE

It is briefly reported that Johnson Controls has launched what it claims is the first cockpit module to be entirely produced from an engineering plastic. The novel module, for DaimlerChrysler's 2002 Jeep Liberty, is an injection moulded, three-piece assembly that eliminates the need for metal cross members to support components such as airbags, HVAC systems, wire harnesses and pedals. The module is injection moulded

from a PC/ABS alloy supplied by Dow Automotive. Vibration welding enables users to create a bond across the entire IP assembly.

JOHNSON CONTROLS INC.

USA

Accession no.828579

Item 19

Antec 2001.Conference proceedings.

Dallas, Texas, 6th-10th May, 2001, paper 10

DEVELOPMENT OF A NOTEBOOK PC HOUSING BY USING MMSH (MOMENTARY MOLD SURFACE HEATING) PROCESS

Dong-Hak Kim; Myung-Ho Kang; Young Ho Chun

Soonchunhyang,University; NADA Innovation; Kumho Chemicals Inc.

(SPE)

In the momentary mould surface heating process the surface of a mould is heated to over 400 C in a few seconds using a gas flame, prior to polymer injection and cooling. The process was evaluated for the production of a notebook PC housing using 30% glass fibre-reinforced ABS and 20% glass fibre-reinforced polycarbonate. The necessary mechanical and thermal properties of the mould were obtained by using a beryllium/copper alloy, which was chromium plated to facilitate mould release. The moulded parts were evaluated by measurement of tensile strength, falling dart impact strength, softening point, thermal deformation, hardness, and gloss. An enhanced surface quality, including gloss, and improved mechanical properties and thermal resistance were obtained compared with conventional injection moulding. 5 refs.

KOREA

Accession no.825406

Item 20

Journal of Materials Science Letters

20, No.7, 1st April 2001, p.655-7

FRACTURE INITIATION IN EMULSION-POLYMERIZED POLY(ACRYLONITRILE-BUTADIENE-STYRENE)(ABS)

Jar P Y B; Berry A J; Konishi K; Shinmura T

Alberta,University; Australian National University;

Denki Kagaku Co.Ltd.

The causes of the observed tensile toughness variation in ABS were investigated and the effect of an intrinsic defect, 'large particles', was examined. Evidence was obtained for the origin of the large particles and their role as a fracture initiator in the deformation process. The batch dependence of toughness for the blended ABS was attributed to variation in the quantity and distribution of the large particles, though the total number of these particles was very small. 9 refs.

AUSTRALIA; CANADA; JAPAN

Accession no.825142

Item 21

Chemical Marketing Reporter

259, No.26, 25th June 2001, p.8

ABS MARKET HURT BY US SLOWDOWN AS DEMAND AND UTILIZATION RATES FALL

Brown R

The North American ABS market is discussed, which is reported to have been affected greatly by the current economic slowdown. A decline in demand from end-use industries such as automotive and construction has led to lower utilisation rates. Global demand, however, is reported to have shown consistent growth. However, despite a difficult demand situation and costly raw materials, the outlook for ABS is claimed to remain positive, with an increase in demand during the second half of the year anticipated. Producers are reported to be working on new products as well as new applications for their customers, including the coextrusion of ABS for the replacement of fibreglass. Details of capacity expansions are included.

NORTH AMERICA; WORLD

Accession no.824350

Item 22

Molecular Crystals & Liquid Crystals

Vol.354, 2001, p.319-30

INFLUENCE OF THE MELT BLENDER ON PROCESS PARAMETERS IN INJECTION MOULDING OF ABS

Korugic L; Cachia K

Malta, University

Details are given of the influence of melt blender on temperature homogenisation and colour distribution in the injection moulding of ABS. Barrel temperature, concentration of masterbatch, injection speed and cycle time were varied and the quality of products tested by spectrophotometric measurements of colour difference and mass measurements. 5 refs.

MALTA; WESTERN EUROPE

Accession no.823851

Item 23

Antec 2001. Conference proceedings.

Dallas, Texas, 6th-10th May, 2001, paper 186

SELECTION OF MOLD DESIGN VARIABLES IN DIRECT STEREOLITHOGRAPHY INJECTION MOLD TOOLING

Harris R A; Dickens P M

Leicester, De Montfort University
(SPE)

The failure of injection moulding tools produced by stereolithography, due to the stresses associated with part ejection, was investigated for the moulding of polypropylene (PP), acrylonitrile-butadiene-styrene terpolymer (ABS) and polyamide-6,6 (PA-66), to determine the influences of build layer thickness and draft

angles. The moulded part was a cylinder of 20 mm outside diameter, 2 mm wall thickness, and 40 mm in length. A small linear reduction in ejection force was observed with increasing draft angle. A more significant and nonlinear reduction in force was observed with reducing build layer thickness. The ejection force was also dependent upon the moulding material, the force reducing in the sequence PA-66, ABS and PP. 12 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.823398

Item 24

Antec 2001. Conference proceedings.

Dallas, Texas, 6th-10th May, 2001, paper 138

USE OF CAVITY PRESSURE SENSORS TO BUILD VISCOSITY DATA FOR FLOW SIMULATIONS

Van Huffel P; Groleau M

Hoff & Associates Inc.; RJG Inc.
(SPE)

The viscosity of ABS was determined experimentally using an injection moulding machine fitted with a rectangular cavity mould. Cavity pressures were determined for three shear rates at each of three temperatures, and commercial injection moulding modelling software used to calculate the viscosity using the measurements in conjunction with other material properties from the software database. Viscosities were calculated using several alternative models. This procedure differed from the use of a capillary rheometer in that the measurements were non-isothermal. Mould-filling simulations were then made using the alternative viscosity values and compared with experimental observations, to establish which model generated the most accurate simulation. 3 refs.

Accession no.822887

Item 25

Plastics in Building Construction

25, No.9, June 2001, p.2-3

THERMOFORMED BIRTHING TUB WINS AWARD

A thermoformed birthing tub is reported to have won the 2000 Multipart Award at the SPE's Thermoforming Conference last autumn. The development of this unique device is to be described at the SPE's 11th Annual Thermoforming Conference in September 2001 in Milwaukee, Wisconsin. In a preview of this talk, manufacturer Aqua-Eez has provided some details of the efforts which went into the conception and development of this product. The company was formed when a survey revealed that there was no application-specific birthing tub available for women who wished to exercise this delivery option. Rather there was a wide variation of sophistication in the products being used from hydrotherapy pools to

children's pools and even sow feeding trays filled with water. The original tub made by Aqua-Eez used GRP, but that process required much labour and the cost was felt to be too high. The company then succeeded in manufacturing the tub by thermoforming a heavy gauge plastic. The final choice of plastic sheet was an acrylic faced ABS sheet material. Details are given.

SPE; AQUA-EEZ, INC.
USA

Accession no.822693

Item 26

Plast' 21

No.98, Dec.2000, p.39

Spanish

THREE PLASTICS FOR SHOWERS: QUALITY AND DIVERSITY

An examination is made of the properties and applications in bathroom shower components of extruded PS, SAN and PETG sheets produced by Barlo Plastics.

BARLO PLASTICS
USA

Accession no.821717

Item 27

Antec 2001. Conference proceedings.

Dallas, Texas, 6th-10th May, 2001, paper 73

INFLUENCE OF SCREW DESIGN ON THE STABILITY OF A REACTIVE TWIN-SCREW EXTRUSION PROCESS

Bulters M J H; Elemans P H M
DSM Research
(SPE)

Pressure variations were investigated in a co-rotating twin screw extruder, with a reaction zone containing low pitch reverse screw elements, extruding styrene-maleic anhydride copolymer with ammonia. It is proposed that as the pressure drops in the reaction zone, the volatiles boil resulting in foaming of the mixture, and that the reverse (left-hand) screw elements control and stabilise this process. Alternative left-hand screw elements were evaluated in the reaction zone. It was established that the pressure fluctuations could be suppressed by closing the reaction zone with low-pitch, left-hand screw elements, and that the melt velocity in these elements was so high that destabilising effects associated with melt foaming only occurred after pressure reduction. The crucial factor controlling stability was the time interval between the pressure drop to boiling pressure and the end of the left-hand screw elements. 1 ref.

EUROPEAN COMMUNITY; EUROPEAN UNION;
NETHERLANDS; WESTERN EUROPE

Accession no.821573

Item 28

ACS Polymeric Materials Science & Engng. Volume 75. Conference Proceedings.

Orlando, Fl., Fall 1996, p.471-2

NOVEL MICROLAYERED STRUCTURE FOR ADHESION AND INTERDIFFUSION STUDIES

Hiltner A; Nazarenko S; Ebeling T; Schuman T; Baer E
Case Western Reserve University
(ACS, Div. of Polymeric Materials Science & Engng.)

There are many examples in the literature which illustrate how the coextrusion of film with three or more polymeric layers is cost-effectively used to achieve a desirable mix of end-use characteristics. Recent developments include layer multiplying devices which permit two polymers of widely dissimilar solid state structures and properties to be combined into unique microlayer and nanolayer laminates with hundreds or thousands of layers. The key properties of the constituents can combine synergistically if the polymer composite layers are sufficiently thin. As a research tool the microlayer structure is very effective. Because the microlayer and nanolayer laminates contain large specific interfacial areas they are ideal for fundamental studies of phenomenon such as adhesion and interdiffusion. Microlayer coextrusion technology and adhesion in polycarbonate/styrene-acrylonitrile microlayers is discussed. 6 refs.

USA

Accession no.820825

Item 29

Modern Plastics International

31, No.6, June 2001, p.32-4

INTERACTIVE TOYS SHOW HIGH-GROWTH POTENTIAL

Craig R

The use of plastics in interactive toys capable of responding to stimuli is discussed. Brief statistics on plastics consumption in the US toy industry and international sales trends for toys and computer games are given. A number of products are described in detail. Manley Toy Quest's Tekno Kitten and Tekno Parrot robotic pets use moulded ABS casings, and the same company's Stretch Screamers line of horror film merchandise are made largely from a styrene-ethylene-propylene-styrene thermoplastic elastomer. Tiger Electronic's Furby robotic pet also uses many parts moulded from ABS or Delrin polyacetal. LeapFrog's Leap-Pad and Creative Station interactive children's books also use ABS mouldings, and the use of thermoplastic elastomers in computer joystick grips is briefly discussed.

HASBRO INC.; TIGER TOYS; NPD GROUP
WORLDWIDE; MANLEY TOY QUEST; TOY
MANUFACTURERS OF AMERICA; LEAPFROG
TOY CO.; DUPONT; BAYER; GLS CORP.;
ADVANCED ELASTOMER SYSTEMS LP
ASIA; EUROPE-GENERAL; NORTH AMERICA; USA

Accession no.820145

Item 30

British Plastics and Rubber

June 2001, p.10

PC/ABS SPOILERS ARE BLOW MOULDED

Avtotaz, the largest Russian car producer, is to blow mould three types of spoiler for Lada vehicles on a new SIG Blowtec 2-61 machine. The spoilers will be moulded in Bayblend PC/ABS. SIG is supplying the machine, three moulds and a raw material dryer, metering and mixing unit, conveyor and granulator. Mould temperature controllers and a 14 bar air compressor will complete the set up. Plastik Sysran, a supplier of blow mouldings to Avtotaz, is to take delivery of a Blowtec 5-430 machine for the production of PP pressure containers used in car cooling water systems and PE air ducts.

SIG BLOWTEC; AVTOTAZ; PLASTIK SYSRAN
RUSSIA

Accession no.819150

Item 31

Machine Design

73, No.9, 3rd may 2001, p.112

ABS RESINS FREEZE OUT THE COMPETITION

Two types of ABS from Bayer Corp. are used in the First Option Uterine Cryoblation Therapy probe system from CryoGen Inc. The probe includes a handle made from Lustran 248 and a disposable unit made from Lustran 348.

BAYER CORP.; CRYOGEN INC.
USA

Accession no.818635

Item 32

Materie Plastiche ed Elastomeri

65, No.10, Oct.2000, p.734-40

Italian

ABS, THE SEVEN-LEAGUE POLYMER

Nazari G

Consideration is given to the properties, processing and applications of ABS and of GE Plastics' Geloy range of acrylonitrile-styrene-acrylate terpolymers, and developments by a number of companies in ABS and its blends with polycarbonate, polyamides and PBTP are reviewed. Trends in the world and West European markets for ABS are also briefly examined.

NOVALCA; DOW PLASTICS; ENICHEM SPA;
BAYER AG; GE PLASTICS
BELGIUM; EUROPEAN COMMUNITY; EUROPEAN UNION;
GERMANY; ITALY; USA; WESTERN EUROPE; WESTERN
EUROPE-GENERAL; WORLD

Accession no.818429

Item 33

Plast' 21

No.97, Nov.2000, p.40-1

Spanish

CONTRIBUTIONS OF THERMOFORMING TO THE DOMESTIC APPLIANCES INDUSTRY

Trends in thermoforming processes and machinery used in the manufacture of PS and ABS refrigerator components are examined.

WORLD

Accession no.818419

Item 34

Polymer Plastics Technology and Engineering

40, No.3, 2001, p.283-92

RHEOLOGICAL BEHAVIOR AND COMPATIBILITY WITH CHLORINATED POLYETHYLENE(CPE) OF POLY(AN-ST-ALPHA-MST)

Quanfu An; Jungang Gao; Deling Li; Liting Yang;
Guodong Liu; Zihua Yao
Hebei,University

The terpolymer of acrylonitrile, styrene and alpha-methylstyrene was prepared by emulsion polymerisation. The molec.wt. and MWD were determined by GPC. The copolymer compositions were analysed by FTIR spectroscopy and elemental analysis. The rheological behaviour was also investigated. The results showed that the apparent viscosity of terpolymer in the melt decreased as the content of alpha-methylstyrene increased and the behaviour was that of a pseudoplastic liquid. The flow index of the SAN copolymer was 0.174, but it increased to about 0.4 for the terpolymer. The compatibility of this terpolymer with chlorinated PE was investigated by torsional braid analysis and SEM. 18 refs.

CHINA

Accession no.817774

Item 35

Plastics News International

July 2001, p.14

RUSSIA'S LADA CAR TO HAVE BLOW MOULDED SPOILERS

Russia's largest car manufacturer, Avtovaz, is set to produce three different spoilers for the Lada from Bayer's Bayblend polycarbonate/ABS blend using a SIG Blowtec 2-6 blow moulding machine. The spoilers, with a weight range of from 1700 to 2200g, will have manually fed inserts and incorporate third stop lights. They are painted in the car colour without the intermediate steps such as filler application and surface grinding.

AVTOVAZ

RUSSIA

Accession no.816913

Item 36

Plastics News(USA)

13, No.11, 14th May 2001, p.5

ABS, NYLON, PC DIP WITH AUTO, CD MARKETS

Esposito F

Soft demand in the automotive and compact disc markets has led prices for ABS, nylon and polycarbonate resins to drop since late 2000. In nylon, average selling prices have dropped an average of 4 cents/lb. Sales in the automotive market, which accounts for 40% of North American nylon resin sales, were down 17% in Q1 2001. ABS has seen prices drop by about 4 cents in both commodity and engineering grades since late 2000. Again the automotive market played a role, since it is the single largest end market for ABS with a 25-30% share. For polycarbonate, prices are down an average of 10 cents/lb since late 2000. One supplier claims the market has never really recovered from a slow Christmas season.

NORTH AMERICA

Accession no.816778

Item 37

Macromolecular Symposia

Vol.168, March 2001, p.55-65

RAMAN SPECTROSCOPY OF POLYMERIC MATERIALS

Merino J C; Fernandez M R; Pastor J M

Valladolid,Universidad; Valladolid,CIDAUT

The technique of confocal Raman microspectroscopy was described. It can be used to determine the properties of polymers in very small areas, blends and composites. In this paper, it was used to study the conformational changes in injection moulded semi-crystalline PETP parts, the microdomains in two-phase blends of polycarbonate/SAN and the molecular orientation in transcrystalline structures of isotactic PP in isotactic PP/PETP fibre composites. 12 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; SPAIN; WESTERN EUROPE

Accession no.816035

Item 38

Materie Plastiche ed Elastomeri

65, No.9, Sept.2000, p.614/20

Italian

CHEMICALS AND THE WEB IN THE STRATEGY OF GE PLASTICS

Latorre C

Developments by GE Plastics in the use of the Internet for marketing and customer services purposes are examined. A review is also made of some engineering plastics produced by the Company, including new grades of polyphenylene oxide, ABS, PBTP, and ABS/PBTP and polycarbonate/ASA blends, and of polycarbonate sheeting and films and glass fibre-reinforced PP sheeting produced by GE Structured Products.

GE PLASTICS; GE PLASTICS EUROPE; POLYMERLAND; GE STRUCTURED PRODUCTS

EUROPEAN COMMUNITY; EUROPEAN UNION; NETHERLANDS; USA; WESTERN EUROPE

Accession no.814843

Item 39

British Plastics and Rubber

April 2001, p.16

VIBRATION WELDING MEETS CRITICAL AUTOMOTIVE LIGHTING REQUIREMENTS

A clear polycarbonate lens is joined to a polycarbonate/ABS housing by a Forward Technology Industries LVW 2046 vibration welder at Automotive Lighting UK. The machine is used with three sets of twin impression nests for various automotive left and right turn indicator body mouldings, it is briefly reported. The LVW 2046 incorporates a proprietary amplitude control system that ensures good weld control and overtravel protection.

FORWARD TECHNOLOGY INDUSTRIES; AUTOMOTIVE LIGHTING UK

EUROPEAN COMMUNITY; EUROPEAN UNION; UK; WESTERN EUROPE

Accession no.814512

Item 40

Journal of Thermal Analysis and Calorimetry

63, No.1, 2001, p.69-74

THERMAL ANALYSIS OF POLY(AN-CO-ST) AND POLY(AN-ST-MMA)

Li D; Gao J; An Q; Liu G; Yang L

Hebei,University

Acrylonitrile-styrene copolymer and acrylonitrile-styrene-methyl methacrylate copolymer were synthesised by emulsion polymerisation. The Tgs of the copolymers and the relationship between Tg and the components of the copolymers were investigated by DSC. The results showed that Tg for the acrylonitrile-styrene copolymers had a peak value in the range 115 to 118°C at a content of 50 mass % styrene. When methyl methacrylate was added, the Tg of the terpolymer was decreased by about 2 to 6°C. The thermal stability and the activation energy of degradation were determined by TGA. 13 refs.

CHINA

Accession no.810362

Item 41

Patent Number: US 6166133 A1 20001226

PC/ABS BLENDS POSSESSING HIGH MELT FLOW HAVING CONTROLLED LEVELS OF FRIES BRANCHING SPECIES

Catsman P

General Electric Co.

Polymer alloys comprising polycarbonate having a Fries branching controlled between 300 to 5,000 ppm and also comprising a rubber exhibit superior moulding and flow properties.

USA

Accession no.810245

Item 42

Plastics Additives & Compounding

3, No.4, April 2001, p.28-33

**NEW BROMINATED FLAME RETARDANTS
MEET REQUIREMENTS FOR TECHNICAL
PLASTICS**

Georlette P

Dead Sea Bromine Group

Brominated flame retardants continue to offer high performance and cost efficiency for plastic compounds meeting demanding applications. In this article, Dead Sea Bromine Group outlines some recent developments that the company has introduced. Tris(tribromophenyl) cyanurate is a melt blendable flame retardant that combines good impact properties and UV stability in styrenic copolymers and their blends. Brominated trimethylphenyl indan has been introduced as a cost efficient flame retardant for polyamides where it exhibits significant improvements in flame retardancy, as well as a processing aid effect that allows shorter moulding cycles and thinner wall parts in GRP. Property data are presented.

ISRAEL

Accession no.810106

Item 43

Japan Chemical Week

42, No.2118, 12th April 2001, p.2/12

**PS AND ABS TO BE RECLAIMED FROM HOME
ELECTRONICS**

Kansai Recycling Systems, established by Sharp, Mitsubishi Materials and others, is planning to include two new materials, PS and ABS, in its list of materials to be recycled from domestic appliances. Basic technology to crush and pelletise has been established and a project plan in which Sharp is to utilise them as a raw material for TV set production has emerged. Sorting of resin before crushing, important in obtaining high-purity pellets, is posing a problem to recycling operations. Kansai Recycling Systems has solved this by introducing sorted collection technology from Mitsubishi Materials.

KANSAI RECYCLING SYSTEMS

JAPAN

Accession no.810064

Item 44

Chinese Journal of Polymer Science

19, No.2, March 2001, p.183-7

**FLAME-RETARDANT PC/ABS MULTIPLE-
ELEMENT ALLOY**

Quan Y; Yang M-S; Yan Q

Chinese Academy of Sciences

Details are given of the preparation technology of flame-retardant polycarbonate-ABS alloys. Impact strength and flame retardant properties are discussed. 16 refs.

CHINA

Accession no.807664

Item 45

Polymer Engineering and Science

41, No.2, Feb.2001, p.240-61

**EFFECTS OF RHEOLOGICAL PROPERTIES
AND PROCESSING PARAMETERS ON ABS
THERMOFORMING**

Je Kyun Lee; Virkler T L; Scott C E

Massachusetts Institute of Technology; Bayer Corp.

Simulations of the vacuum snap-back thermoforming process of ABS were conducted using commercial software (T-SIM from T-SIM CZ Ltd.). By arbitrarily changing the parameters in the constitutive equation (alpha and beta parameters of Wagner model), variations in the rheological behaviour were constructed in terms of the non-linear viscoelastic regime, strain hardening and/or softening, and the temp. sensitivity of elongational behaviour. This allowed determination of which processing rheological features were most critical for the thermoforming operation. It was found that rheological and friction properties had a greater effect than other processing parameters for uniform thickness distribution. 49 refs.

T-SIM CZ LTD.

USA

Accession no.807511

Item 46

Plastics News(USA)

12, No.51, 19th Feb.2001, p.14

ZAPWORLD PROPELS ITSELF FORWARD

Renstrom R

Zapworld.com has exhibited the Swimmy water scooter, which has a housing of rotational moulded PE. The device can pull the user at speeds up to 2.5mph. The company has also introduced the Powerski, an electric-powered device that can pull inline skaters or skateboarders at speeds up to 17mph. The Powerski is housed in vacuum formed ABS.

ZAPWORLD.COM

USA

Accession no.807019

Item 47

Patent Number: US 6132846 A1 20001017

**METHOD FOR PRODUCING A PLASTIC TILE
AND THE PRODUCT THEREOF**

Wang C-H; Wang Y-C

The method involves preparing a moulding material consisting essentially of a resinous powder, diatom powder, barium sulphate and organotin and injection moulding the moulding material. The resinous powder contains, by weight, 60% of acrylonitrile butadiene styrene and 40% of polyvinyl chloride.

USA

Accession no.805747

Item 48

Polymer Composites

21, No.6, Dec.2000, p.941-52

IN-SITU REINFORCEMENT OF PBT/ABS BLENDS WITH LIQUID CRYSTALLINE POLYMER

Tjong S C; Wei Jiang
Hong Kong, City University

Ternary polybutylene terephthalate(PBT)/ABS/liquid crystalline polymer(LCP) blends were prepared by injection moulding. Epoxy resin and maleic anhydride-grafted PP were found to improve the compatibility between the blend components. Tensile tests showed that the TS of the blend in the longitudinal direction increased markedly with increasing LCP content. The TS of the transverse sample, however, appeared to decrease sharply with increasing LCP content up to 5 wt %, after which it decreased slowly with increasing LCP content. The modulus of this blend in the longitudinal direction tended to increase significantly with increasing LCP content, whereas the incorporation of LCP into PBT/ABS blends had little effect on the modulus in the transverse direction. Impact tests revealed that the Izod impact strength of the longitudinal and transverse samples decreased with the LCP additions up to 10 wt % LCP and then increased slowly with increasing LCP content. The heat resistance and heat stability of the blends tended to increase with increasing LCP content. Torque measurements indicated that the steady state torque value of PBT/ABS/LCP blends decreased with increasing LCP content. 44 refs.

HONG KONG

Accession no.804954

Item 49

Antec 2000.Conference proceedings.

Orlando, Fl., 7th-11th May, 2000, paper 540

EFFECT OF AN ACID SCAVENGER ON THE PERFORMANCE OF RAPID PREGNANCY TESTS

Eu B; Stalter N
Abbott Laboratories
(SPE)

Rapid pregnancy test kits were produced using ABS housings for the membrane strips, one containing magnesium oxide as the acid scavenger, and one without MgO. The kits were stored at 37 C for two months to evaluate the stability. The membrane strips in the housings containing MgO exhibited a premature pink colour around the "end of assay" (EOA) window. X-ray photoelectron spectroscopy showed that the colour was due to the diffusion of sulphuric acid from the membrane into the housing which contained MgO, although there was no physical contact between the two. Dye on the EOA area caused the pink colour. It was concluded that a thorough understanding of the thermoplastic chemistry, as well as the physical and processing properties, is

essential when selecting thermoplastics for medical device applications. 7 refs.

USA

Accession no.803387

Item 50

Antec 2000.Conference proceedings.

Orlando, Fl., 7th-11th May, 2000, paper 528

BLEND OF POST INDUSTRIAL ABS AND PMMA IMPROVES THERMAL AND IMPACT PROPERTIES

Mikulec M J; Brooks T
Visteon
(SPE)

Blends of post industrial waste ABS and poly(methyl methacrylate) (PMMA), containing 10-25% acrylic waste, were evaluated for the manufacture of black automotive rear lamp housings. Batch consistency was ensured by creating large blended batches of PMMA (2200-9100 kg) by mixing smaller batches prior to blending with for ABS. Each batch was assessed visually, and by Fourier transform infrared spectroscopy, and measurement of melt flow index, heat distortion temperature and impact strength. The addition of PMMA to ABS increased the heat distortion temperature and impact strength. Four blends, containing different amounts of multi-coloured acrylic waste, produced housings which complied with the product specifications. The process was economically feasible. 9 refs.

USA

Accession no.803375

Item 51

Antec 2000.Conference proceedings.

Orlando, Fl., 7th-11th May, 2000, paper 526

ANALYSIS OF ADHESIVE PROPERTIES OF DIFFERENT ENGINEERING THERMOPLASTICS TO ELASTOMERS BY A TWO-SHOT INJECTION MOLDING PROCESS

Patel S; Makadia C; Guan Q; Mehta S; McCarthy S P
Massachusetts, University
(SPE)

Adhesion between a hard core and the soft skin of materials intended for automotive interior applications, produced using the two-shot injection moulding process, was investigated. Filled polypropylene and two thermoplastic polyolefins (containing ethylene, propylene, and EPDM) were tested with two thermoplastic elastomers (TPE) (containing ethylene-propylene rubber, ethylene, propylene and EPDM). In addition, polycarbonate (PC), acrylonitrile butadiene styrene (ABS), and an alloy of PC and ABS were tested with thermoplastic polyurethane. Bond strengths were determined by shear and peel testing. In the first group the strongest bond was between polypropylene and a lower density TPE containing ethylene-propylene rubber, ethylene and propylene. The bond strength could be

increased by adding skin material to the core material and/or by adding core material to the skin material, resulting in increased compatibility. In the second group the materials could not be ranked as no adhesive failure was observed.

USA

Accession no.803373

Item 52

Composites International

No.42, Nov./Dec.2000, p.26

English; French

DESIGN CASING AND A STURDY CORE FOR WASHROOM TAP LEVERS

Friedrich Grohe has developed a new "sandwich" manufacturing process for top-of-the-line tap levers, it is briefly reported. The core material for the levers is Grivory GV-6H, a partially-aromatic modified polyamide from EMS-Chemie. The core is injection moulded and coated with ABS to form a continuous closed part. By combining Grivory and ABS, it is possible to produce a lever that complies with Grohe's quality criteria, i.e., faultless chromium plate and excellent flexural strength.

GROHE F.,AG

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.802196

Item 53

Plastics Technology

47, No.1, Jan.2001, p.45

NEW FILM INSERT MOULDING TECHNOLOGY DRESSES UP AUTO WHEEL COVERS

Sherman L M

New film insert moulding technology is being used to make auto wheel covers and centre caps. These products utilise a new polycarbonate film laminate structure that boasts chemical and UV resistance, along with specially developed high-temperature inks. This new technology reportedly makes a wide range of multicolour designs available at equal or lower cost than traditional decorating techniques. This patent-pending technology is a joint development of Bayer's Plastics Div., McKechnie Vehicle Components and Angell Manufacturing. The technique is trademarked InserClad by McKechnie. Angell screen prints the graphics onto a sheet of Bayer's Macrofol DPF-5003 polycarbonate multilayer film structure. Angell thermoforms and trims the printed film into the three-dimensional shape of the final part and ships the formed inserts to McKechnie. The moulder places the insert in a mould and injects Bayblend T 85 PC/ABS resin behind it.

BAYER CORP.; MCKECHNIE VEHICLE COMPONENTS; ANGELL MANUFACTURING CO. USA

Accession no.802153

Item 54

West Conshohocken, Pa. 2000, pp.8. NALOAN
ASTM D 4203-. SPECIFICATION FOR STYRENE-ACRYLONITRILE (SAN) INJECTION AND EXTRUSION MATERIALS

American Society for Testing & Materials
ASTM D 4203-

Version 2000. Photocopies and loans of this document are not available from Rapra.

USA

Accession no.801061

Item 55

Advanced Materials

12, No.23, 1st Dec.2000, p.1881-5

RHEOLOGY ENHANCEMENT IN PC/ABS BLENDS

Pham H T; Weckle C L; Ceraso J M

Dow Chemical Co.

Recent developments in both polycarbonate(PC) and ABS are shown to present an opportunity for improving the performance of PC/ABS blends with respect to flow and processability without sacrificing toughness and heat resistance. The development by Dow Chemical of a high-flow PC/ABS blend (Pulse 2000EZ) which exhibits up to a 20% improvement in injection-moulding cycle time while maintaining toughness, heat resistance and stiffness is described. 24 refs.

USA

Accession no.800716

Item 56

Plastics in Building Construction

24, No.11, 2000, p.6

ASA/ABS USED IN CUPOLAS

Neodesha Plastics Inc. has launched a line of lightweight cupolas for garages. These cupolas are thermoformed from a composite sheet made from Terluran ABS and an outer layer of Luran S (ASA) and are weather resistant and paintable.

NEODESHA PLASTICS INC.

USA

Accession no.800174

Item 57

Plastics News(USA)

12, No.41, 11th Dec.2000, p.13

MICROSOFT PLAYING GAMES WITH PLASTICS

Renstrom R

Microsoft has demonstrated two gaming devices, the SideWinder Strategic Commander and the SideWinder Game Voice. With the former, a player navigates with a right-hand mouse, while the other hand executes complex

commands on the Strategic Commander, augmenting most keyboard functions. The housing is moulded with ABS and the nine keys with clear polycarbonate. The keys are pad-printed with silver ink. The Game Voice is geared around Internet chat and consists of a controller and a headset. The housing is ABS with light-emitting elastomeric keys. The company has also developed two optical mice.

MICROSOFT CORP.
USA

Accession no.799107

Item 58

Plastics News International

Dec.2000, p.6

TAP LEVERS EMPLOY NYLON/ABS COMPOSITE

Friedrich Grohe has developed a new sandwich moulding process for the manufacture of operating levers for mixer taps. Through the combination of ABS and Grivory GV-6H, a modified, partially-aromatic polyamide from EMS Chemie, operating levers can be produced which meet Grohe's stringent demands regarding excellent chroming quality coupled with high flexural strength. This composite material bears the name Solitan. The core element of the new lever is made from Grivory polyamide, a material reinforced with 60% glass fibres, which serves as a mechanical support that takes up the stresses applied during use. The injection moulded core element is sheathed with ABS to give a smooth moulded part.

GROHE F.,AG; EMS-CHEMIE AG
SWITZERLAND; WESTERN EUROPE

Accession no.799010

Item 59

Injection Molding

8, No.11, Nov.2000, p.57

PC AND ABS PROVIDE HANDLING COMFORT

A new grafting device has been developed for use in treating abdominal aortic aneurysms. The Ancure Endograft System, a one-piece polyester graft, is inserted into a small incision in the groin area and is guided through the femoral artery in the upper leg and into the aorta. A second incision is made for an X-ray imaging device and catheter delivery system. Makrolon polycarbonate and Lustran ABS from Bayer were chosen for the catheter handle components.

BAYER CORP.
USA

Accession no.797201

Item 60

Plastics and Rubber Weekly

15th Dec.2000, p.5

IT AND APPLIANCES THE FOCUS OF EXPANDED PLASTICS PORTFOLIO

Amplify from Dow is a novel blend combining ABS with thermoplastic PU to provide a unique balance of toughness, strength, chemical resistance, dimensional stability and flow. Target markets lie in IT and communications. Emerge is a new blend also targeted at the world IT market. New Emerge blends to be launched in 2001 include two silicone-based polycarbonate resins on which the silicon component provides superior ignition resistance. Additions to the A-Tech stable of high impact PS include 1170, a resin for extruded and thermoformed fridge liners which combines environmental stress crack resistance to food and blowing agents with improved processing for thermoforming.

DOW CHEMICAL CO.
USA

Accession no.797142

Item 61

Antec 2000.Conference proceedings.

Orlando, Fl., 7th-11th May, 2000, paper 191

LINEAR SHRINKAGE DIFFERENCES IN PLASTIC INJECTION MOLDED PARTS

Velarde D A; Yeagley M J

Pennsylvania,State University
(SPE)

The shrinkage of injection moulded filled and unfilled polymers, including acrylic, polycarbonate, high density polyethylene, nylon, and ABS, was investigated using a modular mould with a cavity of 50.8 x 203.2 mm and adjustable wall thickness and gating, using high and low packing pressures. With the exception of glass-filled nylon, the semicrystalline polymers had shrinkages almost twice those of the amorphous materials, and higher shrinkage values were exhibited by semicrystalline materials with thicker wall sections. Flow had little influence on the shrinkage of the amorphous materials, whilst that of the semicrystalline materials varied with flow direction. 3 refs.

USA

Accession no.796510

Item 62

Modern Plastics International

30, No.10, Oct.2000, p.144

NEXT-GENERATION PC/ABS

This little article briefly points the spotlight on four new grades of "Bayblend" polycarbonate/ABS material from Bayer AG in Germany. Brief details are provided of their properties and target applications.

BAYER AG
EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.795354

Item 63

European Plastics News

27, No.11, Nov.2000, p.46

WHEEL'S ON FIRE

It is briefly reported that Bayer's Plastics Division has combined with Angell Manufacturing and McKechnie Vehicle Components to develop a patent-pending insert moulding technology called InserClad. This technique creates a limitless range of possible decorations for wheel covers or centre caps. Angell screen prints the graphics onto the second surface of a Makrofol DPF-5003 polycarbonate film, then thermoforms and trims the film into the 3D shape of the final part. The formed inserts are shipped to McKechnie, which puts them into a mould and injects Bayblend T 85 PC/ABS blend to form the finished product.

BAYER CORP.; ANGELL MANUFACTURING;
MCKECHNIE VEHICLE COMPONENTS
USA

Accession no. 795153

*Item 64***China Synthetic Rubber Industry**

23, No.6, 2000, p.348-51

Chinese

**PREPARATION OF THERMOPLASTIC
ELASTOMER USING SBR LATEX
INTERPENETRATING NETWORK
POLYMERIZATION**

Shuxian S; Yi K; Yuzheng X; Hanpeng D; Xiaoyu L
Beijing, University of Chemical Technology

A new kind of core-shell latex based on SBR with gradient distribution of hard polymer was synthesised via two-stage emulsion polymerisation in order to produce an interpenetrating polymer network. Styrene, methyl methacrylate and acrylonitrile were chosen as hard monomers and a redox polymerisation system was used. The effects of polymerisation of hard monomer and choice of crosslinking agent on the mechanical properties of the SBR/poly(styrene methyl methacrylate) interpenetrating polymer networks were studied. The morphology of the materials was determined by transmission electron microscopy which showed that the latex particles appeared as core-shell structure with hard polymer gradient distribution. 7 refs.

CHINA

Accession no. 794756

Item 65

Antec 2000. Conference proceedings.

Orlando, Fl., 7th-11th May, 2000, paper 94

**POLYMER MELT FLOW BEHAVIOR IN THE
COINJECTION MOLDING PROCESS**

Nguyen K T; Turcott E; Derdouri A; Ait Messaoud D;
Sanschagrín B; Salamon B A; Koppi K A
Canada, National Research Council; Quebec, Ecole
Polytechnique; Dow Chemical
(SPE)

Co-injection moulding was studied using skin/core combinations of: polycarbonate (PC)/ABS, high melt index polycarbonate (HMI PC)/PC and PC/HMI PC. Flow

visualisation was obtained by adding pigment to the core material. The mould was a central-gated rectangular cavity of variable thickness in the range 1-7 mm. A more stable interface was achieved when the skin material had the lower viscosity, and fingering was observed when the viscosity of the core material was much lower than that of the skin. 9 refs.

CANADA; USA

Accession no. 793825

Item 66

Antec 2000. Conference proceedings.

Orlando, Fl., 7th-11th May, 2000, paper 87

**INJECTION MOULDING CYCLE TIME
REDUCTION USING AN ADVANCED PC/ABS
BLEND**

Weckle C L; Lauer D P; Patty B S; Pham H T
Dow Plastics
(SPE)

A range of components was produced using two injection moulding machines and two commercial blends of polycarbonate and acrylic-butadiene-styrene terpolymer. The same components were then moulded from a blend developed using proprietary technology, with the same process parameters. A decrease in hydraulic injection pressure due to the lower blend viscosity was observed. The melt temperature of the new blend was then decreased to achieve a normal cavity pressure, and the moulding cycle time then decreased by reducing the cooling time. The low temperature impact strength and ductility of the components were determined to be comparable to those of the components produced using conventional blends, whilst employing lower moulding temperatures and achieving a 21-27% reduction in cooling time. 4 refs.

USA

Accession no. 793818

Item 67

Antec 2000. Conference proceedings.

Orlando, Fl., 7th-11th May, 2000, paper 83

**PROCESS AND TOOLING FACTORS
AFFECTING SINK MARKS FOR AMORPHOUS
AND CRYSTALLINE RESINS**

Tursi D; Bistany S P
Drexel, University; Montell Polyolefins
(SPE)

The influence of material, processing conditions and tooling on the formation of sink marks during injection moulding was studied using a steel tool with adjustable rib-to-wall thickness ratio, rib position and orientation, and rib-base radius, in conjunction with semi-crystalline polypropylene (PP) and amorphous ASA. Experimental design software was used to study the influence of melt temperature, mould temperature, injection rate, hold pressure, hold time, and cooling time. Ribs positioned perpendicular to the flow direction developed bumps

rather than sinks. The use of a beryllium copper mould insert and minimising the rib base radius reduced sink marks for PP. Sink marks were also reduced by positioning the ribs close to the gate, minimising the rib:wall thickness ratio, using lower barrel and mould temperatures, increasing the hold and cooling times, and increasing the hold pressure. The design software was used to produce an empirical model for the prediction of sink marks. 11 refs.

USA

Accession no.793814

Item 68

Polymer Engineering and Science

40, No.11, Nov.2000, p.2407-13

CREEP MODELLING OF ABS PIPES AT VARIABLE TEMPERATURES

Lu J P; Burn L S; Tiganis B E

Australia,CSIRO

An investigation was carried out into the creep behaviour of ABS pipes under constant loading at temperatures of 20, 40, 60 and 80C and the experimental data obtained compared with predictions made using several different mathematical models. These models included a power model, regression analysis and a generalised Kelvin model. Two ABS resins with differing tensile, flexural and impact properties, were tested. An analysis of the results obtained indicated that creep compliance, defined as the reciprocal of the creep modulus, served as a means for evaluating the long-term structural properties of resins used in the manufacture of pipes. 15 refs.

AUSTRALIA

Accession no.793604

Item 69

Plastics and Rubber Asia

15, No.98, Oct.2000, p.16

WIND-UP RADIO PLAYS BAYER'S TUNE

Bayer's moulding materials have been widely utilised in a new lightweight, wind-up radio developed by Freeplay Energy, it is briefly reported. The radio's housing, solar panel cover and frequency display are all moulded from transparent Makrolon polycarbonate. The spring is rewound via a hinged handle, which forms part of a rotating disc on the housing. Both parts, like the volume and tuning control, are made from Lustran ABS. Other parts in the radio include Desmopan TPU pinion gears and a Durethan glass reinforced nylon 6 storage bobbin.

BAYER AG; FREEPLAY ENERGY

SOUTH AFRICA

Accession no.792760

Item 70

Polymer International

49, No.11, Nov. 2000, p.1417-25

KINETICS AND MECHANISM OF STYRENE-ACRYLONITRILE COPOLYMERIZATION IN MICRO-EMULSION

Sanghvi P G; Pokhriyal N K; Hassan P A; Devi S Baroda,University; Bhabha Atomic Research Centre

Details are given of the preparation of SAN latexes by micro-emulsion polymerisation using sodium dodecyl sulphate as an anionic surfactant. Kinetics of copolymerisation was studied at different temperatures using different concentrations of potassium persulphate and hydrogen peroxide/ascorbic acid. The latexes were characterised for particle size and number of particles by dynamic light scattering and TEM. Products were examined using NMR and thermal analysis. 20 refs.

INDIA

Accession no.791556

Item 71

Plastics and Rubber Weekly

13th Oct.2000, p.30

TURNING A PROFIT

Smith C

Wilden Group has put a new two-component moulding technology for mobile phone casings into production that it believes will provide cost savings of up to 25% compared with existing manufacturing systems. The technology is based on a hot runner-fed rotating stack mould concept from Foboha and a two-component moulding machine manufactured by Ferromatik Milacron. The Siemens phone casing is being produced in two coloured grades of Cycology PC/ABS from GE Plastics. Foboha says its 4+4 cavity rotary stack system allows a production rate of 960 parts per hour to be achieved from a 100-tonne moulding machine.

WILDEN GMBH & CO.KG

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.791092

Item 72

Polymer Engineering and Science

40, No.10, Oct.2000, p.2232-40

THREE-DIMENSIONAL SIMULATION OF THERMOFORMING PROCESS AND ITS COMPARISON WITH EXPERIMENTS

Nam G J; Ahn K H; Lee J W

Sogang,University; Samsung Cheil Industries Inc.

Laboratory-scale thermoforming experiments were performed on ABS and the results obtained compared with the predictions of a hyperelastic material model. Material parameters of this model were obtained from unidirectional hot tensile tests and two simulation techniques were compared, namely a membrane approximated algorithm without a bending effect and a three-dimensional solid element analysis. Non-isothermal analysis, which allowed for the directly measured

temperature distribution of the sheet, was also carried out and found to improve the predictability of the numerical simulation. 27 refs.

KOREA

Accession no.790466

Item 73

Patent Number: US 6084054 A1 20000704

**FLAME RETARDANT POLYCARBONATE
RESIN/ABS GRAFT COPOLYMER BLENDS
HAVING LOW MELT VISCOSITY**

Barren J; Catsman P; Chen F-S; George E; Govaerts L
C; van der Wal R
General Electric Co.

A thermoplastic resin composition contains an aromatic carbonate resin, a rubber modified graft copolymer comprising a discontinuous rubber phase dispersed in a continuous rigid thermoplastic phase, wherein at least a portion of the rigid thermoplastic phase is chemically grafted to the rubber phase, wherein the rubber phase of the copolymer is made by an aqueous emulsion polymerisation in the presence of a (30-108C)polyacid surfactant, and a flame retarding amount of an organophosphorus flame retardant.

USA

Accession no.790415

Item 74

Plastics, Rubber and Composites

29, No.4, 2000, p.163-7

**SENSITIVITY OF OPERATING CONDITIONS
AND MATERIAL PROPERTIES FOR
THERMOFORMING PROCESS**

DiRaddo R W; Meddad A
Canada,National Research Council

The thermoforming process involves three stages: sheet reheat, forming and solidification. A polymeric sheet is heated in an oven to the desired forming temperature distribution. The sheet is then deformed to take the shape of the mould cavity and subsequently solidified. The deformation of the sheet is assisted by the application of a pressure differential and/or the use of a moving plug. The sensitivity of process and material parameters on the final part is studied. The two process parameters that most affect the final part thickness distribution are the heater settings (uniform and profiled) and the plug penetration depth. The effect of these operating conditions on the final part thickness distribution and on the material stretch distribution is determined. Two thermoforming grade materials with different material properties are studied: ABS and HDPE. The part considered is moulded in a box shape cavity mould. The effect of the level of uniform heater setting is found to be minimal for ABS, but more pronounced for HDPE. However, the ABS is found to be more sensitive to heater profiling than the HDPE. Increasing plug penetration is found to minimise the

variance of the part thickness distribution, when considering uniform heater settings. Coupling of the plug penetration with profiling causes minimal variation in the part thickness distribution to be obtained with an intermediate plug penetration. The effects of heater profiling are enhanced when a plug penetration is used. 10 refs.

CANADA

Accession no.789923

Item 75

Macromolecular Symposia

Vol.158, Aug.2000, p.15-27

**LONG-TIME RELAXATIONS IN RUBBER-
MODIFIED POLYMER SYSTEMS**

Aoki Y

Mitsubishi Chemical Corp.

Several acrylonitrile-butadiene-styrene terpolymers were synthesised by emulsion polymerisation and mixed with SAN to provide ABS having various rubber contents. The dynamic viscoelastic and shear stress relaxation properties of these polymers were measured in the molten state and their linear elastic functions separated into two parts, one of which is a relaxation associated with the entanglement of the SAN matrix chains and the other results from particle-particle interactions of neighbouring rubber particles. The effects of chemical composition and amount of grafted SAN on the viscoelastic properties were examined as was the influence of grafting degree on the state of dispersion of the ABS particles. (19th Discussion Conference of the Prague Meetings on Macromolecules Rheology of Polymer Systems, Prague, Czech Republic, 1999). 12 refs.

JAPAN

Accession no.789471

Item 76

Modern Plastics International

30, No.9, Sept.2000, p.121

LOW MOULD SHRINKAGE

It is briefly reported that Kostil B361R42 styrene-acrylonitrile copolymer is easy to process and provides extra toughness for injection moulded automotive interiors, bathroom furnishings, keyboards and cosmetic packaging. Property data are presented.

ENICHEM SPA

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY;
WESTERN EUROPE

Accession no.789178

Item 77

Patent Number: US 6054531 A1 20000425

**EMULSION POLYMERIZED POLYACRYLATE
RUBBER, IMPACT MODIFIERS AND BLENDS
OBTAINED THEREFROM, AND METHOD FOR
MAKING**

Craig D H
General Electric Co.

Disclosed are weatherable thermoplastic compositions, such as SAN, having improved impact strength containing a graft copolymer of an emulsion polymerised crosslinked polyacrylate rubber. The rubber is synthesised in the presence of an effective amount of an alpha-alkylstyrenic monomer, such as an alpha-methylstyrene dimer, and may be monomodal or bimodal.

USA

Accession no.786324

Item 78

Patent Number: US 6054512 A1 20000425

CORROSION INHIBITING THERMOPLASTIC ALLOYS

Nelson T; Bradley S; Kharshan M; Miksic B
Cortec Corp.

Disclosed are corrosion inhibiting thermoplastic alloys for use in fabricating moulded articles with long-term corrosion protection. Masterbatches of an ABS resin together with selected corrosion inhibitor formulations are extruded for use in moulding operations particularly adapted for preparing protective enclosures for delicate metals, such as are present in electronic media devices and apparatus. Moulded articles are prepared from acrylonitrile butadiene styrene resin and a solid phase corrosion inhibitor blended in situ. The corrosion inhibitor contains a blend of dicyclohexylammonium nitrite, sodium nitrite, benzotriazole, sodium molybdate and sodium sebacate.

USA

Accession no.786305

Item 79

Journal of Applied Polymer Science

77, No.7, 15th Aug.2000, p. 1545-57

COMPARISON OF IRREVERSIBLE DEFORMATION AND YIELDING IN MICROLAYERS OF POLYCARBONATE WITH POLY(METHYL METHACRYLATE) AND POLY(STYRENE-CO-ACRYLONITRILE)

Kerns J; Hsieh A; Hiltner A; Baer E

Case Western Reserve University; US,Army Research Laboratory

Using different layer thicknesses, microlayers of polycarbonate, poly(methyl methacrylate) and poly(styrene-co-acrylonitrile) were processed and the adhesion between the materials determined. The mode of adhesion breakdown was examined and the various mechanisms discussed. 31 refs.

USA

Accession no.786060

Item 80

Polymer

41, No.24, 2000, p.8721-4

MISCIBILITY OF FULLERENE-CONTAINING POLY(2,6-DIMETHYL-1,4-PHENYLENE OXIDE) WITH STYRENIC POLYMERS

Goh S H; Zheng J W; Lee S Y
Singapore,National University

Fullerene-containing poly(2,6-dimethyl-1,4-phenylene oxide) samples containing 6.9 and 19.5 wt% fullerene were found to be miscible with PS, poly(p-methylstyrene), poly(alpha-methylstyrene) and poly(styrene-co-p-methylstyrene). The two fullerene-containing poly(2,6-dimethyl-1,4-phenylene oxide) samples were miscible with poly(styrene-co-acrylonitrile) when the acrylonitrile content of the copolymer was 6.3 wt% or less. 29 refs.

SINGAPORE

Accession no.784936

Item 81

Modern Plastics International

30, No.7, July 2000, p.82

EXPANDED ABS RANGE

Properties are briefly indicated for grades in the expanded line of ABS products from EniChem. The Sinkral grades of continuous-mass-type ABS feature higher thermal stability than previous materials. They are easy to process, have low yellowing effect, and reduced residual volatile levels. Sinkral PD C442 has good flow and provides high impact properties for injection moulded products. It can be self-coloured for interior automotive parts due to its colour consistency. Grade C352 offers high heat resistance, tensile strength of 38 Mpa and flexural modulus of 2000 Mpa. This abstract includes all the information contained in the original article.

ENICHEM SPA

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY; WESTERN EUROPE

Accession no.784688

Item 82

European Plastics News

27, No.6, June 2000, p.36

CARAVAN GETS SLEEK STYLING

ABS has been selected as a key component of the rear panel of a new touring caravan, which has been developed jointly by Bailey of the UK and Thompson Plastics. Brief details are provided of the reasons for the choice.

BAILEY; THOMPSON PLASTICS

EUROPEAN COMMUNITY; EUROPEAN UNION; UK; WESTERN EUROPE

Accession no.783356

Item 83

European Plastics News

27, No.6, June 2000, p.36

GLOSS FINISH FOR SUCCESSFUL CLEANER

This short article explains the reasons why ABS was selected as a key material in the production of the Hoover

“Vortex” bag-less vacuum cleaner, which has been achieving great success since its launch in 1999.

HOOVER; MOLDFLOW; BAYER
EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.783355

Item 84

European Plastics News

27, No.6, June 2000, p.36

CONTINUOUS MASS RANGE IS EXPANDING

EniChem has introduced a range of new ABS grades which are produced using its continuous mass polymerisation technology, it is announced in this short article. Brief details are provided of Sinkral PD C442, Sinkral PD C352 and Sinkral PD C532.

ENICHEM
EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY;
WESTERN EUROPE

Accession no.783354

Item 85

ACS Polymeric Materials: Science & Engineering, Spring Meeting 2000, Volume 82, Conference proceedings.

San Francisco, Ca., 26th-30th March 2000, p.247-8

**CHARACTERISTICS OF EMULSION
INTERCALATED POLYMER-NA+
MONTMORILLONITE NANOCOMPOSITE**

Choi H J; Kim J W; Jhon M S
Inha, University; Carnegie-Mellon University
(ACS, Div. of Polymeric Materials Science & Engng.)

Poly(styrene-co-acrylonitrile)-clay and polyacrylonitrile-clay nanocomposites were prepared by emulsion polymerisation of the monomers in the presence of sodium montmorillonite. The nanocomposites were characterised by scanning electron microscopy, Fourier transform infrared spectroscopy, thermogravimetric analysis, X-ray diffraction and gel permeation chromatography, confirming insertion of the polymer into the clay layers. It was concluded that emulsion intercalation removed the need for organophilic treatment of the clay, and could also be used to enable polymers with high glass transition temperatures or poor solubilities to penetrate clay layers. 14 refs.

KOREA; USA

Accession no.783140

Item 86

Advanced Materials & Processes

158, No.1, July 2000, p.15

**POLYCARBONATE PROCESSES EASILY,
BOOSTS STRENGTH AND DURABILITY**

It is briefly reported that the housing of a digital inkjet Pitney Bowes Digital Mailing Solutions machine is made

of Bayblend FR-110 polycarbonate/ABS blend from Bayer. The blend provides the processability and durability required for the machine.

PITNEY BOWES INC.; BAYER CORP.
USA

Accession no.782624

Item 87

Plastics Engineering

56, No.5, May 2000, p.7

**PLASTICS REPLACE METAL IN TRUCK
SOUND SYSTEM**

This short article highlights the selection of an ABS resin from A. Schulman by GR Technical Services Inc. of the USA to replace metal in redesigned lorry music speaker grilles. Brief details of the reasons for the choice are provided.

GR TECHNICAL SERVICES INC.; SCHULMAN A.
USA

Accession no.779317

Item 88

Macromolecular Symposia

Vol.155, April 2000, p.229-37

**SYNTHESIS AND ELECTORRHEOLOGICAL
CHARACTERISATION OF EMULSION
POLYMERISED SAN-CLAY NANOCOMPOSITE
SUSPENSIONS**

Kim J W; Choi H J; Jhon M S
Inha, University; Carnegie-Mellon University

Styrene-acrylonitrile copolymer/clay nanocomposite particles were produced by emulsion copolymerisation and characterised using FTIR spectroscopy, X-ray diffraction, TGA and GPC. The existence of intercalated polymer was verified spectroscopically and by X-ray diffraction and the intercalated particles were then combined with silicone oil to produce electrorheological fluids. The yield stress and current density of the electrorheological suspensions were determined and the critical shear rate at which the suspensions exhibited pseudo-Newtonian behaviour established. 21 refs. (217th ACS National Meeting, Anaheim, Calif., 21-25 March, 1999)

KOREA; USA

Accession no.778726

Item 89

Journal of Thermoplastic Composite Materials

13, No.3, May 2000, p.226-40

**EFFECT OF ASPECT RATIO AND VOLUME
FRACTION ON PROPERTIES OF ABS + 20 WT
% PC/AL FLAKE COMPOSITES**

Lin C B; Chiang-Hsing Liu; Chi-Yuan Feng
Tamkang, University

Cross-winding equipment was designed to produce ABS + 20 wt % polycarbonate/Al flake metallised plastics

pellets with a high aspect ratio. Two aspect ratios, 150 and 200, were used for the pellets and each of them had three different weight percentages of Al flakes, 20, 27 and 33 wt %. Through injection moulding, specimens for tensile and impact strength tests and shielding effectiveness tests were produced from the metallised plastic pellets. The effects of Al flake content and aspect ratio on properties were also studied. The results obtained showed that a high aspect ratio gave better impact strength, shielding effectiveness, heat distortion temp. and volume resistivity but reduced tensile and impact strength. High Al flake content resulted in poorer tensile and impact strength but better shielding effectiveness, heat deflection temp. and volume resistivity. 12 refs.

CHINA

Accession no.778517

Item 90

Plastics in Building Construction

24, No.6, 2000, p.4

ABS USED TO MAKE CEDAR SHAKES

Norandex Inc. has recently introduced a new ABS siding system which is made from ABS with a topcoat of Lucite TufCoat acrylic polymer to provide weathering resistance. The ABS material is coextruded with a cap-stock of acrylic polymer and then in-line thermoformed at American Sheet Extrusion. The thermoforming moulds are tooled in a random pattern to give an authentic appearance of hand-split cedar shakes. The siding system is also available in Cedar Rounds for accent or full side applications. Although more expensive than PVC siding systems, the ABS versions are claimed to have better tensile strength, impact strength, flexibility and lighter weight for ease of installation.

NORANDEX INC.

USA

Accession no.776962

Item 91

Plastiques & Elastomeres Magazine

52, No.1, Jan./Feb.2000, p.34-7

French

SIMULTANEOUS COMPOUNDING AND RHEOLOGICAL CHARACTERISATION

Bouton J

Rheo SA

The characterisation of the rheological properties of polymers during compounding in single- and twin-screw extruders and internal mixers is discussed. Studies of the viscosity of blends of polycarbonate with SAN and ABS during extrusion compounding are reported.

HAAKE GMBH

EUROPEAN COMMUNITY; EUROPEAN UNION; FRANCE; GERMANY; WESTERN EUROPE

Accession no.776799

Item 92

Journal of Injection Molding Technology

4, No.2, June 2000, p.84-91

ANALYSIS OF STYRENE PLASTIC RESIDUES ON INJECTION MOULDING TOOLS

Makinen M; Astola J; Poutanen J; Alen R; Paakkonen E

Tampere,University of Technology;

Jyvaskyla,University

The contaminating substances formed during the injection moulding of ABS and PS parts were removed from the mould surface. The residues were characterised using FTIR, gas chromatography, pyrolysis gas chromatography, elemental analysis, detection reaction test of bromine, and different dissolving tests. The chemical composition of the contamination was clarified and suitable solvents for dissolving these products were selected. 6 refs.

EUROPEAN UNION; FINLAND; SCANDINAVIA; WESTERN EUROPE

Accession no.776471

Item 93

Journal of Applied Polymer Science

76, No.13, 24th June 2000, p.1902-9

EFFECT OF MELTING TEMPERATURES, COUPLING AGENT AND WIDTH ON PROPERTIES OF ABS+20%PC/AL FLAKE-METALLISED PLASTICS

Lin C B; Chen C-Y; Feng C-Y

Tamkang,University

Effects of different melting temperatures (270 and 210 deg.C), Al flake widths (0.5 and 0.8 mm), and coupling agents (gamma aminopropyl triethoxy silane A1100 and gamma glycidoxy propyl trimethoxy silane A-187) on the properties of ABS + 20% PC/Al flake-metallised plastics are discussed. It is found that the aspect ratio is larger with the 270 deg.C melting temperature and 0.8 mm Al flake, but declines with the A-187 coupling agent. The 0.5 mm Al flakes treated with the A-1100 coupling agent at 270 deg.C melting temperature has better distribution in the matrix and EMI shielding effectiveness, but has a lower volume resistance. With 0.8 mm Al flakes at 210 deg.C melting temperature, and treatment with the A-1100 coupling agent, increased ultimate tensile strength and impact strength are obtained. There is no relation between HDT and melting temperatures, Al flake widths or coupling agents. 20 refs.

TAIWAN

Accession no.776011

Item 94

Injection Molding

8, No.6, June 2000, p.128/30

TROUBLESHOOTER PART 40: TAPERING DROPS FOR GOOD FLOW

Hatch B

Prime Alliance Inc.

ABS parts fed by a three-plate runner system exhibited unacceptable blush at the gate. The mould core had multiple levels, staggered in thickness, all of which is fed by a single gate. The problem was eliminated with minor changes in sprue diameter, gate modifications and process improvements.

USA

Accession no.775818

Item 95

Macromolecular Symposia

149, Jan.2000, p.53-62

PHASE BEHAVIOUR OF SMA/PMMA BLENDS: THE INFLUENCE OF PROCESSING AT LOW AND HIGH DEFORMATION RATES

Aelmans N J J; Reid V M C; Higgins J S
DSM Research; Imperial College of
Science, Technology & Medicine

The influence of processing parameters, particularly deformations which occur in the injection moulding process, on the phase behaviour of blends of poly(styrene-co-maleic anhydride) and poly(methyl methacrylate) were investigated. Capillary flow caused a complex change of blend phase behaviour, with both deformation-induced mixing and redemixing being observed. Short capillaries caused only uniaxial elongation, resulting in no change to the blend phase behaviour. This was attributed to the relatively short time for which the material was subjected to deformation, and it is proposed that the main parameter causing changes in the blend phase behaviour was elongation. Parallel plate rheometer experiments, which involved only shear, resulted in complex changes of phase behaviour with both shear-induced mixing and redemixing being observed. 8 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION;
NETHERLANDS; UK; WESTERN EUROPE

Accession no.775680

Item 96

Patent Number: US 5981644 A 19991109

METHOD OF PRODUCING ABS MOULDING COMPOSITIONS

Ostarek R; Eichenauer H; Piejko K-E; Wingler F; Wulff C
Bayer AG

A method of producing ABS moulding compositions is disclosed wherein a solution of polymers in group (A) solvents is gradually supplied to a polymerising mixture of previously-formed soluble rubber, aromatic mono-alkenyl compounds, ethylenically unsaturated nitrites, optional other copolymerisable compounds and optionally a group (B) solvent or a mixture of group (A) and group (B) solvents, the gradual addition of the polymer solution to the polymerising mixture being started before the beginning of phase inversion and at a monomer conversion rate of 5 to 15% and a viscosity of the

polymerising mixture of less than 20 Pa.sec with simultaneous continuation of polymerisation. The group (A) solvent is an aliphatic (C1-C8) or cycloaliphatic alcohol, ketone, ether, ester and/or nitrile, and the group (B) solvent is an aliphatic (C4-C10), cycloaliphatic and/or aromatic hydrocarbon.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.774538

Item 97

Patent Number: US 5981640 A 19991109

LASER MARKABLE ACRYLONITRILE-BUTADIENE-STYRENE POLYMER FOR TELECOMMUNICATIONS TERMINALS AND KEYPADS

Jae Hong Choi
Lucent Technologies Inc.

A laser markable acrylonitrile-butadiene-styrene terpolymer (ABS) formulation suitable for a number of applications and, in particular, telecommunications terminals and keypads, is disclosed. The ABS terpolymer comprises acrylonitrile (20-24%), butadiene (14-17%), styrene (59-63%), medium colour furnace black (0.008-0.015 PPH), iron oxide red (0.003-0.005 PPH), titanium dioxide (0.6-3.50 PPH), silicon dioxide (0.07-0.2 PPH), zinc carbonate (0.05-0.70 PPH) and aluminium hydroxide (0.05-0.25 PPH). The ABS so produced is characterised by desirable performance characteristics, e.g. mechanical strength, impact resistance, gloss, stain resistance, moulding processing properties and colour, as defined in a 3D colour system of the colour value (L-star (=67.53)), hue (a-star (=1.15)), chroma (b-star (=3.46)).

USA

Accession no.774534

Item 98

Polimeros: Ciencia e Tecnologia

9, No.4, Oct./Dec.1999, p.116-22

Portuguese

THERMAL DEGRADATION AND PHOTOOXIDATION OF ABS USED FOR AUTOMOTIVE APPLICATIONS

Sanchez E M S; Ferreira M M C; Felisberti M I
UNICAMP

Changes in ABS during photooxidative and thermal degradation at 80C were investigated by measurements of mechanical properties, melt flow index, carbonyl index and yellowing index and by macrophotography of impact fractures. Degradation conditions were selected to simulate the interior of a car and the weathering of the ABS over its lifetime. 5 refs.

BRAZIL; EUROPEAN COMMUNITY; EUROPEAN UNION;
SPAIN; WESTERN EUROPE

Accession no.774204

Item 99

Modern Plastics International

30, No.4, April 2000, p.77-8

NEW STYRENICS

EniChem has extended its ABS range, which includes continuous-mass grades intended for extrusion and injection moulding, it is briefly reported. Sinkral grades are for automotive parts, such as grilles, rear-view mirrors and rear lamp housings, and bathroom furnishings. Edistir RR 745E is a new HIPS with high stress crack resistance for extrusion/thermoforming into such items as refrigerator liners and food containers. Extir PD P 1212 is a recently developed expandable PS grade designed for high-speed production of thin-section mouldings with good surface finish.

ENICHEM SPA

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY;
WESTERN EUROPE

Accession no.772704

Item 100

Modern Plastics International

30, No.4, April 2000, p.37-8

**INNOVATIONS SPEED LAPTOP
WORKSTATION TO MARKETPLACE**

Toensmeier P A

Intrigo has developed a portable laptop computer workstation that is as easy to use as a breakfast tray, which it resembles. Shipments of the Lapstation began in March and production is projected to be 5000 units/month in the first year and up to 20,000/month by the end of the second year. The Lapstation went through 10 design generations. Folded up it is 16 x 12.6 x 3.8in and finished weight is 5.9lb. The product uses 4.75lb of plastics, either HIPS in the basic model or PC/ABS in two more expensive versions. The design features ribbing that reinforces the underside of the work surface and a hybrid hinge design which permits the Lapstation to fold.

INTRIGO INC.

USA

Accession no.772696

Item 101

Modern Plastics International

30, No.4, April 2000, p.26-8

**ADVANCES IN PIGMENTS AND PUR LEAD
BAYER'S LINEUP FOR NPE**

Toensmeier P A

Bayer is gearing up for NPE with an array of new products, technologies and applications. These include: Bayplast organic microgranular pigments with high flow, good dispersibility and low dusting; natural fibre-based structural composite prepregs, called NafpurTec, that replace GRP in auto applications; BaseLine high-pressure PU metering units; continuing development of

weatherable ABS coextrusions for transportation markets such as trailers; and in-mould decorating advances.

BAYER CORP.

USA

Accession no.772691

Item 102

Italian Technology

No.1, May 2000, p.98

**HIGH QUALITY COMPOUNDING AND
COLOURING**

Plastigreen's main products are coloured, filled and flame retardant polyamides, it is briefly reported. For example, Greenamid 66 GF2S V0 is a filled and flame retardant nylon 66, and Greenlac V0 is a flame retardant ABS. The company also offers filled polyester, polycarbonate, acetal resin, ABS/PC blend and thermoplastic elastomers.

PLASTIGREEN

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY;
WESTERN EUROPE

Accession no.772663

Item 103

Colloid & Polymer Science

278, No.3, March 2000, p.245-9

**PREPARATION OF STYRENE/
ACRYLONITRILE COPOLYMER
MICROSPHERES AND THEIR COMPOSITES
WITH METAL PARTICLES**

Wang P H; Pan C Y

China, University of Science & Technology

Monodispersed SAN microspheres were prepared by emulsifier-free emulsion copolymerisation. FTIR spectroscopy and elemental analysis were used to measure the content of acrylonitrile in the SAN microspheres. X-ray photoelectron spectroscopy(XPS) measurements indicated the presence of an acrylonitrile unit on the surface of the microspheres. The combined results of the elemental analysis and the XPS measurements showed that the copolymer on the surface of the SAN particles was rich in acrylonitrile compared with that in the interior of the particles. SAN-metal composite particles were prepared by chemical metal deposition. The addition of nickel could improve the distribution of cobalt on the surface of the polymer microspheres. The preparation of polymer-bimetal composite particles was attempted. TEM and X-ray diffraction were used to study the distribution and structure of the deposited metal particles. 21 refs.

CHINA

Accession no.772543

Item 104

West Conshohocken, PA, 1999, pp.5. NALOAN.

**ASTM D 4634-. SPECIFICATION FOR STYRENE
MALEIC ANHYDRIDE MATERIALS(S/MA)I**

American Society for Testing & Materials
ASTM D 4634-

Version 99. Photocopies and loans of this document are not available from Rapra.

USA

Accession no.772356

Item 105

European Medical Device Manufacturer

11, No.2, March/April 2000, p.60

LATEX-FREE CHECK VALVES

Latex-free in-line check valves are available in a variety of designs including luer slip and luer lock connections. The valves, made of ABS, feature a normally open fluid path that prevents backflow. The components are suited for use in IV lines, extension sets, syringes and other fluid management systems where an absence of backflow is desirable. This abstract includes all the information contained in the original article.

BRAUN B.,MEDICAL

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.770465

Item 106

Polymer Engineering and Science

39, No.12, Dec.1999, p.2461-74

INVESTIGATION OF SHEAR-INDUCED MIXING IN THE SAN/PMMA BLEND

Papathanasiou Y D; Higgins J S; Soontaranun W
London,Imperial College of Science, Technol.& Med.

The effect of steady-state simple shear flow on the blend of a 60-40 SAN with PMMA (SAN/PMMA) blend is investigated experimentally. Thin disks, containing 60% w/w SAN, are thermoformed pellets made by mixing SAN and PMMA granules in a co-rotating, intermeshing twin-screw extruder. These disks are sheared at constant shear cone-and-plate mechanical spectrometer at fixed temperatures within the quiescent phase region. At the end of each shearing experiment the sample is quenched and its morphology investigated, first visually for optical transparency (cloudiness being an indicator of a phase-separated blend) and then using transmission electron microscopy (TEM). Results indicate that upon imposition of a shear rate as low as 0.1 s⁻¹ the 60-40 blend remains miscible even at temperatures up to 7 K within the (quiescent) two-phase region. These observations are in agreement with theoretical predictions of the phase diagram under shear, based on the modified Gibbs free energy of mixing. The TEM results concerning the morphology of the phase-separated blends are also discussed. 30 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK; WESTERN EUROPE

Accession no.769333

Item 107

Revista de Plasticos Modernos

78, No.520, Oct.1999, p.420/5

Spanish

INJECTION MOULDING RECYCLABLE MATERIALS: A STATIC MELT MIXER IMPROVES PROCESSING SAFETY

Cavic M

Molex Elektronik

Results are presented of studies of the use of an SML static melt mixer (Sulzer Chemtech) in the injection moulding of PP and ABS. Effects on the thermal and rheological properties of the melts were examined, and the mechanical properties of moulded parts were investigated as a function of the proportion of recycled material used in their manufacture. 4 refs.

SULZER CHEMTECH AG

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; SWITZERLAND; WESTERN EUROPE

Accession no.768727

Item 108

ARC '99. Conference proceedings.

Detroit, Mi., 9th-11th Nov.1999, p.427-35

RECYCLING OF POST INDUSTRIAL ABS AND ACRYLICS FOR LAMP HOUSINGS

Mikulec M J; Brooks A J; Sutton J; Sholtz S; Podolak J Visteon; Michigan,State University
(SPE,Plastics Recycling Div.)

An economical way to reuse the waste stream in a US manufacturing plant is described. For a recycling project to be successful the following objectives should be accomplished: provide financial reward to the material reprocessor and the part manufacturer; reduce waste streams in the plant; and prove the performance of the re-processed material and part to the required specifications. A material compound consisting of 100% post industrial (PI) recycled ABS and multicoloured acrylic (PMMA) scrap from the Sandusky manufacturing plant is blended and evaluated, and the test results are correlated to virgin material. The injection moulded rear lamp housings are analysed for material and part performance, and mouldability. The test results and economics are promising and are discussed. 4 refs.

USA

Accession no.768708

Item 109

ARC '99. Conference proceedings.

Detroit, Mi., 9th-11th Nov.1999, p.285-98

UPGRADING ABS AND POLYPROPYLENE FROM END-OF-LIFE VEHICLES

Brown T A

Midland Compounding & Consulting
(SPE,Plastics Recycling Div.)

USCAR's Vehicle (VRP), with technical assistance from the American Plastics Council (APC), initiated a pilot project to develop cost-effective processes for collection and recycling of plastics and rubber from end-of-life vehicles. ABS and PP parts are collected, with assistance of the Automotive Recyclers Association. The parts are shipped to Recycling Separation Technologies, for size reduction, separation and cleaning. Separated ABS and PP plastic flake are sent to Destiny Plastics. The purpose of this study is to evaluate the physical properties of the two potential streams and to assess the potential for converting the materials into useful moulding materials.

USA

Accession no.768698

Item 110

Plastics News(USA)

12, No.1, 6th March 2000, p.15

LIGHTWEIGHT TRAILER TRANSPORTS GEAR IN STYLE

Miel R

Information is presented in some detail on the production of the "Herman" Sport Performance Trailer, reported to be available from Colorado-based Let's Go Aero Co. The trailer is said to be designed to transport bicycles and camping gear behind small/medium-sized vehicles, and is constructed using Lustran ABS 752 resin and Centrex polymer from Bayer Corp.'s Plastics Division.

LET'S GO AERO CO.; BAYER CORP.;
MEDALLION PLASTICS; SPARTECH INC.
USA

Accession no.768612

Item 111

Plastics News International

April 2000, p.16

ELECTRIC KNIFE COMBINES TPE WITH ENGINEERING PLASTICS

Household Products has manufactured a new Black & Decker electric knife by overmoulding Tekbond TPE from Teknor Apex to rigid ABS and polycarbonate components. The TPE provides the soft touch grip. ABS was used for the housing top and polycarbonate for the blade guide, the latter in a matching cool green colour to the TPE grip.

HOUSEHOLD PRODUCTS INC. TEKNOR APEX
CO.
USA

Accession no.768472

Item 112

Macromolecular Symposia

Vol. 147, Dec.1999 p.15-25

MECHANICAL BEHAVIOR OF POLYMER MICROLAYERS

Kerns J; Hsieh A; Hiltner A; Baer E

Case Western Reserve University, Dept. of
Macromolecular Science; US, Army Research
Laboratory

In connection with its ballistic properties, the adhesion of polycarbonate/poly(methyl methacrylate) (PC/PMMA) extruded as microlayers was compared to the adhesion of polycarbonate/poly(styrene-co-acrylonitrile) (PC/SAN). Partial miscibility of the PC and PMMA is given as the reason for the increased T-peel strength of this material, and was similarly indicated in micro-deformation tests where the PMMA constrained the yielding of the PC in comparison to the PC/SAN. The thickness of the microlayers was considered. Optical microscopy studies were made of the deformations occurring in the microtensile tests. 12 refs.

USA

Accession no.768022

Item 113

Bergen op Zoom, 1998, pp.34. 30 cms. 6/4/00

CYCOLAC PROFILE

General Electric Plastics BV

Detailed product information and property data are presented for grades of Cyclocac acrylonitrile butadiene styrene. Characteristics of the material are described, and processing and secondary operations are discussed.

EUROPEAN COMMUNITY; EUROPEAN UNION;
NETHERLANDS; WESTERN EUROPE

Accession no.767390

Item 114

Shawbury, Rapra Technology Ltd., 2000, pp.170. 30
cms. 27/3/00. Rapra Review Rept. Vol.10, No.4, 2000.
NALOAN

POLYSTYRENE. SYNTHESIS, PRODUCTION AND APPLICATIONS

Wunsch J R

BASF AG

Edited by: Dolbey R

(Rapra Technology Ltd.)

Rapra.Review Rept.No.112

Following a brief economic overview and some historical background, the production, properties and applications of polystyrene are discussed. Production of polystyrene by radical polymerisation and ionic polymerisation is described, and syndiotactic polystyrene production is also discussed. Industrial polymerisation processes are reviewed, and cover production of standard polystyrene by thermal polymerisation and free-radical polymerisation, the production of high impact polystyrene with reference to grafting and crosslinking, particle size and particle size distribution, and the commercial processes of bulk and solution polymerisation and bulk suspension are also examined. Mechanical, electrical and flammability properties are detailed, and applications in packaging, energy technology, communications,

refrigeration and in styrene-butadiene block copolymers are considered. Analysis techniques and the recycling of polystyrene are also investigated. 738 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.766271

Item 115

Advanced Materials & Processes

157, No.1, Jan.2000, p.6

PLASTIC PARTS JAZZ UP VW'S NEW BEETLE

It is briefly reported that a Speedster ground effects kit is now available for the Volkswagen New Beetle. Included in the package are front and rear bumper wraps, lower rockers, a cowl to hide the windshield wipers and a rear wing. The parts are fabricated by thermoforming and trimming extruded sheets of ABS 1152 from Bayer.

BAYER CORP.

USA

Accession no.764456

Item 116

Journal of Applied Polymer Science

75, No.3, 18th Jan.2000, p.417-23

EFFECT OF ACRYLONITRILE CONTENT ON POLYCARBONATE/ABS ALLOY SYSTEMS WITH FLAME RETARDANT

Choi H J; Park S H; Kim J K; Jun J I

Inha,University; Gyeongsang,National University;

Cheil Industries

Reactive-type brominated epoxy resin of molecular weight 40000 and bromine content 53-54% was used at 15 phr as flame retardant in polycarbonate/ABS blends. Antimony trioxide was added also at 5 phr as a flame retarding additive together with 0.3 phr of antioxidant. The blends ranged from 10%/90% to 90%/10% polycarbonate/ABS ratio. Three types of ABS were used with acrylonitrile contents of 22%, 24% and 27%. Melt blending was done in a twin-screw extruder and test bars were injection moulded. Samples were assessed for rheology (capillary rheometer), morphology (SEM of fracture surfaces), tensile yield strength, Izod impact strength, and heat distortion temperature. It was concluded that, for commercial use, ABS with 22% acrylonitrile content is the most suitable because it has low shear viscosity and high impact strength. 20 refs.

SOUTH KOREA

Accession no.763986

Item 117

Plastics News(USA)

11, No.50, 31st Jan.2000, p.21

ABS COMPOSITE SIDING PRICEY, BUT DURABLE

This article highlights a new ABS composite siding from Reynolds Building Products of Dallas, USA. While the

material is thicker than traditional PVC sidings, it is more flexible, making it easier to use in cold climates, it is reported. Full details are given.

REYNOLDS BUILDING PRODUCTS; NORANDEX/REYNOLDS DISTRIBUTION CO.; OWENS CORNING; TOLEDO

USA

Accession no.762963

Item 118

International Polymer Processing

14, No.4, Dec.1999, p.365-9

WELD LINE STRENGTH IN PC/ABS INJECTION MOLDINGS

Semba T; Hamada H

Kyoto,Municipal Research Institute for Industry;

Kyoto,Institute of Technology

The properties of weld lines generated in injection mouldings of polycarbonate/ABS blend materials were investigated. It was confirmed that the fountain flow made a skin layer where dispersion of the ABS was very fine. In mechanical properties, failure displacements of weld specimens in blended materials were much smaller than those in the virgin materials and this led to lower weld strength of blended materials. Observations of fractured specimens showed that the interface between the weld part and the area behind the weld part was the weakest point. 12 refs.

JAPAN

Accession no.761987

Item 119

West Conshohocken, PA, 1999, pp.7. NALOAN.

ASTM D 2282-. SPECIFICATION FOR ACRYLONITRILE BUTADIENE STYRENE (ABS) PLASTIC PIPE (SDR-PR)

American Society for Testing & Materials

ASTM D 2282-

Version 99. Photocopies and loans of this document are not available from Rapra.

USA

Accession no.760793

Item 120

West Conshohocken, PA, 1999, pp.8. NALOAN.

ASTM D 1527-. STANDARD SPECIFICATION FOR ACRYLONITRILE-BUTADIENE-STYRENE (ABS) PLASTIC PIPE, SCHEDULES 40 AND 80

American Society for Testing & Materials

ASTM D 1527-

Version 99. Photocopies and loans of this document are not available from Rapra.

USA

Accession no.760785

Item 121

Plastics Engineering

56, No.1, Jan.2000, p.7

THIN-WALL TECHNOLOGY GETS THINNER

A high-flow material from Dow Automotive, Magnum 347 EZ ABS resin, is being used to mould a thin-wall ABS interior door substrate for the 1999 GMC Safari and Chevy Astro vans. The 1.6mm substrate represents a 36% reduction in thin-wall thickness compared with a standard 2.5mm ABS substrate. Magnum 347 EZ is said to be the highest-flowing grade of ABS currently available to the automotive industry, with a melt flow rate of 15g/10min.

DOW AUTOMOTIVE

USA

Accession no.760593

Item 122

European Plastics News

26, No.6, June 1999, p.46

ENICHEM TARGETS AUTO PARTS

Very brief details are provided in this small article of a new range of ABS resins from EniChem, which the company is mainly targeting at the automotive sector. The range is said to combine easy processability with improved thermal and mechanical properties.

ENICHEM

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY;
WESTERN EUROPE

Accession no.760112

Item 123

European Plastics News

26, No.6, June 1999, p.46

DEHUMIDIFIER STYLING BENEFITS FROM USING ABS

This very small article reports on the selection of ABS for the manufacture of portable dehumidifiers by Ebac. Brief details are given on the reasons for the choice.

EBAC; BCM; HELLYAR PLASTICS

EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.760110

Item 124

European Plastics News

26, No.6, June 1999, p.46

HIGH GLOSS RESIN FOR INJECTION MOULDING

This small article focuses on the new "Magnum" series of ABS resins from Dow, which are high-gloss and ideal for injection moulding applications. Very brief details are provided.

DOW

Accession no.760109

Item 125

European Plastics News

26, No.6, June 1999, p.45

ABS: CAUGHT IN THE MIDDLE?

Warmingtton A

This article considers current market trends for ABS. It reports that the polymer remains in a unique and uneasy position between commodity and engineering polymers, and states that there is an obvious trend towards standardisation of natural, general purpose grades - which is becoming more pronounced at this time of extreme price pressure and low growth.

BASF; DOW; DSM; BAYER AG; MONSANTO
EUROPE-GENERAL; EUROPEAN COMMUNITY; EUROPEAN
UNION; GERMANY; RUSSIA; SPAIN; USA; WESTERN
EUROPE

Accession no.760108

Item 126

Modern Plastics International

29, No.6, June 1999, p.111

CLEAR ABS ALLOY PROVIDES PERMANENT ANTISTATIC PROPERTIES FOR ELECTRONICS

LNP Engineering Plastics has developed a new transparent ABS alloy known as "Stat-Loy A-E Clear". This alloy can be injection moulded or extruded, has permanent anti-static properties, and maintains its electrical conductivity in low-humidity environments. Brief details are given in this short item of its key applications.

LNP ENGINEERING PLASTICS; BASF; TORAY
EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
JAPAN; NETHERLANDS; WESTERN EUROPE

Accession no.760076

Item 127

Journal of Applied Polymer Science

74, No.12, 13th Dec.1999, p.2811-9

COMPARISON OF CHARACTERISTICS OF SAN-MMT NANOCOMPOSITES PREPARED BY EMULSION AND SOLUTION POLYMERIZATION

Myung Hwan Noh; Dong Choo Lee
Inha,University

Non-extractable SAN-montmorillonite(MMT) nanocomposites were prepared by two different intercalation processes, i.e. the usual one-step emulsion copolymerisation process in the presence of Na⁺-MMT and a solution copolymerisation with MMT modified by dimethyl dihydrogenated tallow ammonium. The weight-average molec.wts. were 530,000 g/mol for emulsion products and 48,000 g/mol for solution products. The hybrid from the emulsion polymerisation exhibited higher stress at maximum load over the solution products. The dispersibility of MMT particles in the polymer matrix was investigated by using optical microscopy and SEM for the unextracted samples. It

was found that almost complete hybrids were obtained when the styrene-acrylonitrile comonomer was emulsion polymerised in the presence of Na⁺-MMT, yielding both better miscibility and intercalation capability. 14 refs.

SOUTH KOREA

Accession no.759729

Item 128

Plastics News(USA)

11, No.48, 17th Jan.2000, p.9

MINIVAN FEATURES LEGO, WARNER BROS.

Pryweller J

General Motors' Warner Bros. Edition Chevrolet Venture minivan incorporates plastic PlaySeats, moulded by Johnson Controls Inc., with inserts provided by Lego Systems Inc. The activity centres fold down from the centre seat-back in the rear of the minivan, and include a built-in toy box with plastic Lego blocks, writing surfaces, cup holders and a storage compartment. The move is said to be part of Lego's strategy to launch new products such as video software and games, puzzles, luggage, children's clothing and outdoor gear. The activity centres are made from ABS.

GENERAL MOTORS CORP.; JOHNSON CONTROLS INC.; LEGO SYSTEMS INC.

Accession no.759625

Item 129

International Polymer Processing

14, No.3, Sept.1999, p.228-33

EFFECT OF MISCIBILITY ON RHEOLOGICAL AND MECHANICAL PROPERTIES OF POLYCAPROLACTONE/SAN BLENDS

Keyzlarova L; Saha P

Brno, Technical University

Poly-epsilon-caprolactone (PCL-767E from Union Carbide Corp.) was blended with SAN-25 (Luran 358N containing 25 wt.% acrylonitrile from BASF, Germany) or SAN-35 (Luran 378P containing 35 wt.% acrylonitrile from BASF, Germany) using a Brabender PL2000/6 laboratory internal mixer. Previously, SAN containing from 8-28 wt.% acrylonitrile had been found to be miscible on a molecular level with poly-epsilon-caprolactone. The blends were examined by DSC, capillary rheometry, SEM and tensile testing. Poly-epsilon-caprolactone with a minor amount of miscible SAN-25 provided a better balance of rheological and mechanical properties than those of pure poly-epsilon-caprolactone. The immiscible blend showed properties inferior to the miscible one. Immiscible SAN-35 increased viscosity, shear thinning and extrudate swell of poly-epsilon-caprolactone more than the miscible type. In contrast to the miscible blends containing SAN-25, which were without any form for unstable flow at shear rates of 10 to 10000/s, melt fracture occurred in the immiscible blends with SAN-35. Positive synergism in TS and EB

were seen for 90/10 poly-epsilon-caprolactone/SAN blend processed at 130C. The addition of up to 30 wt.% of SAN-25 miscible with poly-epsilon-caprolactone increased EB. Data include melting point depression, shear viscosity, TS, EB and extrudate morphology. 15 refs.

CZECH REPUBLIC

Accession no.758485

Item 130

Joining and Repair of Plastics and Composites. Conference Proceedings.

London, 16th-17th March 1999, p.185-92

PLASTICS PIPELINE JOINTING METHODS IN THE UTILITIES

Hill D J

Durapipe Ltd.

(Institution of Mechanical Engineers)

Techniques used by the gas and water industries to join and repair pipelines are discussed. The main jointing methods for PE, PP, rigid PVC, ABS and GRP are listed. Listed too are the main techniques for welding and mechanical joints. Detailed descriptions and evaluations are given of butt fusion, electrofusion socket welding, spigot and socket jointing (with elastomeric O-rings or lip seals as sealing means) and flange adaptors. It is pointed out that techniques used at installation are not always suitable for repairing pipes. 4 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK; WESTERN EUROPE

Accession no.758456

Item 131

Polimeri

20, No.3, 1999, p.99-112

Croatian

STYRENE PLASTOMERS

Janovic Z; Jurjasevic S

Zagreb, Sveuciliste

The polymerisation of styrene, mostly by free radical reaction mechanisms, but also by anionic, cationic and coordination mechanisms is reviewed. Processes considered are bulk polymerisation, heterogeneous solution polymerisation and suspension polymerisation. Sections are devoted also to special types of styrenic polymer, i.e. expandable polystyrene, high impact PS (grafted BR), SAN and ABS. 20 refs.

CROATIA

Accession no.758414

Item 132

European Plastics News

27, No.1, Jan.2000, p.42

DOW WINS GOLF COMPETITION

It is briefly reported that Dow Automotive's Magnum 3416 SC ABS is being used in the interior door trim panels of the current Volkswagen Golf. The material permits a

nominal wall thickness of 2mm, which can result in substantial material savings, shorter injection cycle times and a simplified subsequent surface treatment.

DOW AUTOMOTIVE; SOMMER ALLIBERT
EUROPEAN COMMUNITY; EUROPEAN UNION; FRANCE;
WESTERN EUROPE

Accession no.758130

Item 133

Polymer

41, No.1, 2000, p.239-58

**PROPERTIES OF COMPATIBILIZED NYLON 6/
ABS BLENDS. PART II. EFFECTS OF
COMPATIBILIZER TYPE AND PROCESSING
HISTORY**

Kudva R A; Keskkula H; Paul D R
Texas, University at Austin

An imidised acrylic (IA) polymer and poly(styrene-co-acrylonitrile-co-maleic anhydride) (PSANMA) were evaluated as compatibilisers for blends of polyamide-6 and acrylonitrile-butadiene-styrene (ABS) terpolymers. Both compatibilisers gave blends which were tough at room temperature, but had different effects on the ductile-to-brittle transition temperature. Blends of equal proportions of polyamide-6 and ABS, containing the IA polymer were adversely affected by multiple extrusions (to simulate recycling), the ductile-to-brittle transition temperature increasing more rapidly with increasing IA content. Some ABS domains increased in size, which gave poor dispersion of rubber particles. The morphology and low-temperature toughness of blends compatibilised using PSANMA were unaffected by the number of extrusion passes. Blends containing the IA polymer, particularly at higher concentrations, developed higher melt viscosities than blends containing PSANMA, which was attributed to the polyamide-6/IA reaction continuing with increasing processing time, whereas the polyamide-6/PSANMA reaction did not. The differences in blend rheology are discussed in terms of the reactive functionality of the two compatibilisers. 29 refs.

USA

Accession no.757130

Item 134

Medical Design & Manufacturing West 1999.
Conference proceedings.

Anaheim, Ca., 27th Jan.1999, paper 1

**TRANSPARENT ABS: HIGH CLARITY AND
IMPACT STRENGTH**

Marcoulier B; Howery M
BASF Plastics
(Canon Communications LLC)

Optical clarity, impact strength and chemical resistance are often important requirements for many diagnostic and medical devices. Transparent ABS combines the high transparency of acrylic with the high impact strength of

ABS and good environmental stress crack resistance. The key properties of Terluc ABS are described and these capabilities are compared with those of other transparent plastics generally considered for moulding medical components. Also discussed are the chemical resistance and thermal properties of Terluc ABS, as well as suitable sterilisation methods for the material. Several application studies are presented to demonstrate the use of Terluc MAB in medical devices. 3 refs.

USA

Accession no.756814

Item 135

Modern Plastics International

29, No.12, Dec.1999, p.38-9

**SELF-COLOURING OF ABS YIELDS COST
SAVINGS, LESS DOWNTIME**

Colvin R

The number of injection moulders doing their own ABS colouring at the machine, rather than buying precoloured compounds, is on the increase as processors seek ways to cut costs and improve plant efficiency. Dow offers its ProMatch service for unpigmented Magnum ABS and colour concentrates. Key Tronic, a moulder of computer keyboards, says the conversion to self-colouring netted a 28% boost in productivity through improved quality and fewer rejects.

WESTERN EUROPE-GENERAL

Accession no.756532

Item 136

Patent Number: US 5969041 A 19991019

**HIGH-IMPACT ABS MOULDING
COMPOSITIONS**

Eichenauer H; Schmidt A; Alberts H
Bayer AG

Disclosed are ABS graft copolymers, which are produced in emulsion, and thermoplastic moulding compositions exhibiting improved notched bar impact strength compared with known ABS moulding compounds and high hardness or modulus values and good thermoplastic processability.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.756493

Item 137

Polymer Engineering and Science

39, No.9, Sept.1999, p.1667-77

**EFFECTS OF VISCOSITY RATIO AND
COMPATIBILISERS ON THE MORPHOLOGY
AND MECHANICAL PROPERTIES OF
POLYCARBONATE/ACRYLONITRILE
BUTADIENE STYRENE BLENDS**

Yang K; Lee S-H; Oh J-M
LG Chemical Ltd.

A comprehensive experimental study is carried out to investigate the effects of viscosity ratio, temperature on the viscosity ratio, extruder screw location and compatibilisers on the morphology of bisphenol A-polycarbonate/ABS (PC/ABS). Blends are prepared by utilising a co-rotating twin screw extruder and in-situ morphology obtained via the screw pullout technique. A plot of the PC/ABS viscosity ratio, n_{PC}/n_{ABS} , versus the shear rate shows a gradual rise in the curve up to a critical shear rate and thereafter displays asymptotic character. Contrary to premise, n_{PC}/n_{ABS} decreases with increasing temperature. This is elucidated by the melt viscosity of PC being thermally more sensitive than ABS over the temperature range investigated. As expected, the plot of the average domain size versus the viscosity ratio gives a concave up curve with a minimum when the viscosity ratio is close to unity. The morphology evolution along the screw of a twin-screw extruder is examined. When sections of the kneading block are examined, the minor phase domains gradually show reduction in size toward the extruder die, and the smallest domain is realised at the end of the block, namely, the flow impeding left-handed screw element. PMMA exhibits the greatest ABS domain size reduction, and annealed samples show that it suppresses coalescence. 25 refs.

KOREA

Accession no.755461

*Item 138***Kunststoffe Plast Europe**

89, No.10, Oct.1999, p.27-9

STYRENE COPOLYMERS (ABS, ASA, SAN)

Lasche H; Van Roessel R

Bayer AG

The market situation for the supply and demand of styrene copolymers is discussed, together with details of trends in end-use applications. Properties and characteristics of the materials are described. Due to the versatile nature of the product and its processing characteristics, ABS, SAN and ASA have been able to establish themselves worldwide in competition with other engineering thermoplastics and commodities. The increased competitiveness of recent years is based mainly on a significantly improved price/performance ratio, and as such, the European automotive industry is using ABS again or in blends instead of PP. Details are given of growth rates, market sizes, consumption and market shares. Manufacturing and processing techniques are examined, and applications in automotive manufacturing, medical technology, and other applications are reviewed. (Translated from *Kunststoffe*, 89, (1999), 10, pp.89-94).

WORLD

Accession no.755395

*Item 139***Kunststoffe Plast Europe**

89, No.10, Oct.1999, p.39-40.

POLYMER BLENDS

Warth H; Wittmann D

Bayer AG

The development of blends has grown steadily since the 1960s as an economical method of improving the performance of existing polymers, and allowing for the tailored development of defined property profiles. The market situation is examined, with reference to market size and growth rates. Advantages of blend technology are examined, and the main end use markets of automotive and electrical applications are described. Developments in blend components and compatibilisers, as well as compounding conditions are noted, and examples of special applications are given. (Translated from *Kunststoffe*, 89, (1999), 10, pp.124-128).

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.755313

*Item 140***Materie Plastiche ed Elastomeri**

64, No.9, Sept.1999, p.524/30

Italian

POLYCARBONATE BLENDS FOR TECHNICAL APPLICATIONS

Modini G

An examination is made of the properties of polycarbonate (PC) and their modification by blending with ABS and PBTP, and properties and applications of a number of commercially available blends are reviewed. These include Bayblend, Cycology and Pulse PC/ABS blends produced respectively by Bayer, GE Plastics and Dow Plastics, and Bayer's Pocan and GE Plastics' Xenoy PC/PBTP blends.

BAYER AG; GE PLASTICS; DOW PLASTICS

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; USA; WESTERN EUROPE

Accession no.754677

*Item 141***Plastverarbeiter**

49, No.9, p.132

German

PROJECT DEVELOPMENTS

One of Westensee's key themes is adding epoxy-oligomers to ABS to produce flame-, UV- and heat-resistant injection mouldable parts and semi-finished products. Westensee is also producing electrically conductive polypropylenes for heating elements and compounds with high stiffness and scratch resistance. This abstract contains all the information in the original article.

WESTENSEE

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.754356

Item 142

Plastverarbeiter

49, No.9, p.132

German

GLOBAL TRADE

The international trader GKG Goldmann Kunststoffe has broadened its product range and now offers clear ABS for medicines and cosmetics, ABS in very clear natural colour tone, ABS with very high Vicat temperatures for the automotive industry, clear SAN and types with increased acrylonitrile content for cosmetics and drinking cups, ASA for UV-resistant automotive applications, as well as flame-resistant and halogen-free PBTP for the electronics industry. This abstract contains all the information in the original article.

GKG GOLDMANN KUNSTSTOFFE

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.754355

Item 143

Asian Plastics News

Nov.1999, p.5

**JAPANESE CAR MAKERS ADOPT PLASTICS
PANELS FOR NEW MODELS**

It is briefly reported that Honda is close to commercialising its vehicle, the Insight two-seat coupe, which uses a hybrid petrol-electric drive system. The design features front wings and rear wheel skirts moulded from an ABS/PA blend. Mitsubishi's new vehicle is just a concept design at this stage. The SUW Advance features aluminium bonnet and doors, while the bumpers, wings and other exterior panels are made from a durable lightweight resin.

HONDA MOTOR CO.; MITSUBISHI MOTOR CO.
JAPAN

Accession no.754193

Item 144

Plastics Reborn in 21st Century Vehicles. Conference proceedings.

Nuneaton, 17th May 1999, paper 1

**DISCUSSION OF THE OPPORTUNITIES FOR
RECLAIMED AUTOMOTIVE PLASTICS**

Edwards G

MIRA

(Rapra Technology Ltd.)

Automotive vehicles have traditionally been one of the most recycled products available. 75% of the material from end of life vehicles is regularly reclaimed and reused, the remaining 25% generally sent for landfill. However, increasing pressure from government legislation and public opinion is encouraging the automotive industry to improve this figure. One way of doing this is by reclaiming and reusing greater amounts of plastic components, which make up the bulk of the materials sent for landfill.

Advances in processes and techniques for the recovery of automotive plastics are enabling more cost effective returns. However, the problem of what to do with the increasing level of many of these reclaimed plastics remains unanswered. There is also a number of issues associated with reclaimed automotive plastics, ranging from public perception to reliability of grade, which need to be addressed before real progress can be made. In response to these issues and as part of sensible forward planning, the automotive industry has set up working groups to identify the needs for future designs and to look at the opportunities for recycling and reuse. MIRA has been involved in many of these groups and has been able to contribute to several successful programmes. Two examples, PVB and ABS, are described, illustrating some of the opportunities and some of the problems encountered, with reference to the restraints of legislation and the needs of the industry itself. 12 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.753927

Item 145

Patent Number: US 5965655 A 19991012

**MINERAL FILLED MOULDABLE
THERMOPLASTIC COMPOSITION**

Mordecai W D; Yates J B; Liu N-I

General Electric Co.

This contains an admixture of a thermoplastic polymer or blend thereof and a mineral additive having needle-like particles and a high aspect ratio of length to diameter, preferably wollastonite. Moulded articles made therefrom exhibit improved surface characteristics, even a Class A surface, a lower thermal expansion coefficient and improved impact properties, as determined by Dynatup testing. The polymer may be a copolyetherimide ester, copolyether ester, aromatic polycarbonate, rubber-modified homopolymer or copolymer of a vinyl aromatic monomer, polyphenylene ether, polyamide or blends thereof.

USA

Accession no.753498

Item 146

Italian Technology

No.3, Oct.1999, p.134

**HIGH PERFORMANCE GRADES FOR
HOUSEHOLD, ELECTRIC AND TECHNICAL
ITEMS**

Some new grades of HIPS, ABS and SAN, with unique features and therefore finding their use in specific applications, have been recently developed by EniChem's Styrenics and Engineering Plastics Division. Details are given.

ENICHEM SPA

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY;
WESTERN EUROPE

Accession no.753277

Item 147

Kunststoffe Plast Europe

89, No.8, Aug.1999, p.42-3

COCKPIT TO SATISFY STRINGENT DEMANDS

Schulten S; Seesing J

Bayer AG

In the development of the instrument panel for the new 'S' class from Mercedes-Benz it was not simply a matter of bringing down the production costs, the weight and the development times. Attention was also focused on achieving a bigger range of functions, while meeting particularly stringent aesthetic requirements. The basic structure of the instrument panel comprises a single-piece support, produced by injection moulding in a modified, glass-fibre reinforced polycarbonate/ABS blend (Bayblend T 88-2N) which forms a composite structure with a thermoformed, two-colour welded and in-mould decorated ASA film. (Translated from *Kunststoffe* p.108-110).

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.753251

Item 148

Plastics Engineering

55, 45, No.10, Oct.1999, p.7

ABS HEIGHTENS DESIGN IMPACT, REDUCES WEIGHT OF TRAILER

The extensive use of ABS in the new Futura 2000 travel trailer from the Coachmen Recreational Vehicle Co. is described. It is claimed to contain more ABS than ever before used on such a vehicle, providing an aesthetically pleasing curved design and a 45% reduction in component weight in comparison with the material previously used in this application.

COACHMEN RECREATIONAL VEHICLE CO.; BAYER CORP.
USA

Accession no.753024

Item 149

Injection Molding

7, No.11, Nov.1999, p.37

THIN WALLS MIGRATE TO THE INTERIOR

Maniscalco M

Magnum 347 EZ high flow ABS from Dow Chemical has been used in the manufacture of thin-walled injection moulded interior door panels, moulded by Versatrim on the 1999 GMC Safari and Chevy Astro vans. This fast flowing grade has made it possible to use an innovative mould design, in which left and right hand parts are filled at the same time to reduce tooling costs and optimise machine capacity. Thin-walled parts allow faster cycle time, which helps offset the higher material costs.

DOW AUTOMOTIVE; VERSATRIM
USA

Accession no.752963

Item 150

Journal of Applied Polymer Science

74, No.3, 17th Oct.1999, p.510-5

RECYCLING OF ABS AND ABS/PC BLENDS

Liu X; Bertilsson H

Chalmers University of Technology

The aim of this work within the framework of mechanical recycling of polymers is upgrading recycled engineering plastics by means of a blending technique. Four different plastics from dismantled Volvo cars are investigated. They are ABS and ABS-polycarbonate (ABS/PC) as major components and PMMA and polyamide (PA) as minor components. Blending recycled ABS and PC/ABS (70/30) with a small amount of methyl methacrylate-butadiene-styrene core-shell impact modifiers gives the mixture better impact properties than any of its individual components. Some 10% of PMMA from tail light housings can follow the PC/ABS blends made. The property profile will rather be improved. However, PA is an incompatible component that should be sorted out from the mixture. Antioxidants and metal deactivators do not help the recyclates show better mechanical properties. Two toughness measurements, Charpy impact strength and J-integral method, show complimentary results for such blends. 10 refs.

SCANDINAVIA; SWEDEN; WESTERN EUROPE

Accession no.752305

Item 151

Molding Systems

57, No.10, Oct.1999, p.10

"VITAMINS", "STEROIDS" PUMP UP MOULDING TECHNOLOGY

Dow Plastics has introduced a new class of polymers which it says give moulders improved economics through greater material selection options. The process involved modification of ABS with a high-performance, glass-filled material, Isoplast engineering thermoplastic PU resin, to provide optimal results. On the machine side, Milacron has pumped up the performance of its Sentry small injection moulding machine line. The line features a PC-based control and a digitally linearised clamp that can reduce cycle times in short-stroke moulding by 25% or more.

DOW PLASTICS; MILACRON INC.
USA

Accession no.751311

Item 152

Molding Systems

57, No.10, Oct.1999, p.6-7

PLASTIC REPLACES METAL IN SERVER CABINET SIDE PANELS

Hewlett-Packard opted for engineering thermoplastics over metal for its next generation server cabinet. The design employs smaller modular plastic panels moulded from GE

Plastics' Cyclooloy PC/ABS using a combination of sequential injection and gas-assist moulding. The HP Rack System/E is designed to house hot and heavy computer servers, peripherals and instruments in a package that sports lightweight, modular, snap on/off side panels.

GE PLASTICS; HEWLETT-PACKARD CO.
USA

Accession no.751309

Item 153

Iranian Journal of Polymer Science & Technology

12, No.1, Spring 1999, p.21-6

Persian

USING DIFFERENT METHODS TO DETERMINE MONOMER REACTIVITY RATIOS IN STYRENE/ACRYLONITRILE COPOLYMER

Kavousian A; Ziaee F; Mohaghegh S M S;
Nekoomanesh M H; Zare K

Tehran, Islamic Azad University; Iran, Polymer Institute

The bulk ampoule copolymerisation reaction of styrene and acrylonitrile was studied, using benzoyl peroxide as initiator at about 70C and 0.1 mm Hg. Copolymer composition was determined using PMR spectroscopy. The reactivity ratios in the ultimate model were calculated using Mao-Huglin(MH), Tidwell-Mortimer, Mayo-Lewis, Fineman-Ross(FR), inverted FR, Kelen-Tudos(KT), extended KT and Ezrielev-Brokhina-Roskin theories at low conversion. By using the MH method, the calculated ratios were $r(\text{acrylonitrile})$ 0.059 and $r(\text{styrene})$ 0.399 and the azeotrope composition was 0.61. Confidence limits and joint confidence limits were calculated. The reactivity ratios for the penultimate model were obtained by the curve fitting method. 34 refs.

IRAN

Accession no.750983

Item 154

Patent Number: US 5955540 A 19990921

PROCESS FOR THE PREPARATION OF MULTIMODAL ABS POLYMERS

Dion R P; Mitchell D W; Leng P B

Dow Chemical Co.

Rubber-modified monovinylidene aromatic copolymers having enhanced gloss, toughness and melt flow are produced by partially agglomerating a rubber latex having a specified particle size, emulsion graft polymerising it to a specified graft copolymer molec.wt. and agglomerating it during subsequent dewatering and/or melt compounding operations.

USA

Accession no.750780

Item 155

Kunststoffberater

43, No.3, 1998, p.20-2

German

COMMON PVT DATA FOR MOULDING COMPOUND FAMILIES

Wendisch P; Patzschke H

Leipzig, Kunststoff-Zentrum

Specific volume in dependence on pressure and temperature (pvt) possesses a high place value in characterising mould compounds and in fixing processing parameters. Pvt data is a prerequisite for the simulation of a real mould compound in the injection moulding process. Considerable expenditure on tests linked to the investigation of pvt data makes it clear why there is a need for using the same pvt data set for all types of a mould compound family. Here pvt data has been investigated for a range of polypropylene and ABS mould compound types and deviations have been calculated with respect to a common pvt data set. 3 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.749908

Item 156

Journal of Applied Polymer Science

74, No.1, 3rd Oct.1999, p.179-88

INTERCALATION OF STYRENE-ACRYLONITRILE COPOLYMER IN LAYERED SILICATE BY EMULSION POLYMERIZATION

Myung Hwan Noh; Lee Wook Jang; Dong Choo Lee
Inha, University

A styrene-acrylonitrile copolymer/montmorillonite nanocomposite was prepared by emulsion copolymerisation of styrene and acrylonitrile in the presence of sodium ion-exchanged montmorillonite. The prepared material was purified using hot tetrahydrofuran extraction. Room temperature X-ray diffraction showed that the 001d-spacing of the montmorillonite had increased by 1.60 nm, and transmission electron microscopy confirmed that the silicate layers were arranged in good order. The thermal stability of the composites, determined using thermogravimetric analysis, was enhanced by the presence of the montmorillonite. The modulus of elasticity of the composite increased with increasing montmorillonite content, whilst the tensile strength decreased. 16 refs.

KOREA

Accession no.749642

Item 157

Journal of Polymer Science: Polymer Physics Edition

37, No.14, 15th July 1999, p.1749-52

LOCAL FREE VOLUME IN BLENDS OF ACRYLONITRILE-BUTADIENE-STYRENE COPOLYMER AND POLYAMIDE 6. A POSITRON LIFETIME STUDY

Dlubek G; Alam M A; Stolp M; Radusch H-J
Bristol, University; ITA Institut fuer Innovative
Technologien GmbH; Halle-Wittenberg, Universitat

Positronium lifetime spectroscopy was used to study the nature of free volume holes in polyamide-6 (PA6)/ABS blends containing between 20 and 90 wt% PA6, together with their changes as a function of blend composition. Experimental results for ortho-positronium lifetime and its intensity differed strongly from calculated ortho-positronium lifetimes. Reasons for these results were discussed with reference to the miscibility, phase structure and crystallinity of the blends. 16 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; UK; WESTERN EUROPE

Accession no.747661

Item 158

Plastics in Building Construction

23, No.9, 1999, p.5

FAUCET SYSTEM USES PLASTICS

This article supplies brief details of a new 'Pure Touch' filtering faucet system made by Moen Incorporated of North Olmstead, Ohio. The tap has several parts made of plastic. The wand housing is made of ABS plastic, and the cartridge body and filter are made from Amoco Polymer's 'Udel' polysulphone. Brief details of the advantages and features of the tap are supplied.

MOEN INC.; AMOCO POLYMERS

USA

Accession no.747591

Item 159

Advances in Polymer Technology

18, No.3, 1999, p.255-65

INTERFACE/MORPHOLOGY/PROPERTY RELATIONSHIPS IN POLYAMIDE 6/ABS BLENDS

Lacasse C; Favis B D

Bayer/Monsanto Canada Inc.; Ecole Polytechnique de Montreal

A study was made of the range of applicability of the emulsification curve to a polyamide 6/ABS blend produced by twin-screw and single-screw extrusion. The importance of interfacial saturation in determining the impact strength of this blend was also investigated. The effect of compatibiliser concentration on the impact strength of the blend and the influence of blend composition on morphology and impact strength were also examined. It was found that the emulsification curve quantitatively distinguished good mixing (twin screw) from poor mixing (single screw) and that the main difference between twin-screw and single-screw extrusion were related to the efficacy of migration of the modifier to the interface. 19 refs.

CANADA

Accession no.745971

Item 160

Plast' 21

No.81, May 1999, p.18-9

Spanish

MARKED DIFFERENCES WITH NEW GRADES OF THERMOPLASTIC RESINS

An examination is made of some new grades of Cicolac ABS and Valox PBTP introduced by GE Plastics. Properties of these materials and applications in domestic appliances and other sectors are reviewed.

GE PLASTICS

USA

Accession no.745845

Item 161

Macplas International

No.10, Aug.1999, p.88-9

CLEAR VISION

LumiLeds Lighting, in cooperation with DSM Engineering Plastics, has developed a completely new generation of traffic lights, based on the utilisation of LEDs. The housing is an aluminium preform coinjected with a 30% glass fibre-reinforced, flameproof grade of Stapron C polycarbonate/ABS blend. Xantar polycarbonate was chosen for the coloured lenses. Meanwhile, two high-viscosity polycarbonate grades, Makrolon LQ 2847 and 3147, have been developed specifically for corrective lenses.

DSM ENGINEERING PLASTICS; LUMILED S LIGHTING

EUROPEAN COMMUNITY; EUROPEAN UNION; NETHERLANDS; WESTERN EUROPE

Accession no.745375

Item 162

Machine Design

71, No.16, 19th Aug.1999, p.28

RECYCLING MIXED PLASTICS

It is briefly reported that Argonne National Laboratory has developed a process, froth flotation, for recycling mixed plastics. Almost 600 million pounds of mixed ABS and HIPS go into landfills every year as waste from cars and appliances. The method produces 99.5% pure postconsumer ABS. The recycled plastic has been injection moulded to form headlamp back-cans for new cars.

ARGONNE NATIONAL LABORATORY

USA

Accession no.745299

Item 163

European Plastics News

26, No.8, Sept.1999, p.31

BAYER IS A TT WINNER

Audi's TT features extensive use of plastics from Bayer. The door claddings and central console are made from Lustran ABS, while the A and C pillars and parcel shelf use Bayblend polycarbonate/ABS. The Lustran and

Bayblend materials have demonstrated their heat stability in tests involving the Audi TT in different desert regions of the northern and southern hemispheres.

BAYER AG; AUDI AG
EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.745249

Item 164

European Plastics News

26, No.7, July/Aug.1999, p.29

THOMPSON WINS CATERPILLAR CONTRACTS

Thompson Plastics is producing a range of exterior and cab interior components for Caterpillar's new Compact Wheel Loader and Mini Hydraulic Excavator vehicles, it is briefly reported. Interior parts, such as dashboards and consoles, are vacuum and pressure formed from UV-resistant ABS sheets in two-tone colours. Exterior parts, including roof body and door panels, are made from self-coloured, high-gloss acrylic-capped ABS sheets.

THOMPSON PLASTICS

EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.743077

Item 165

European Plastics News

26, No.7, July/Aug.1999, p.20

BAYER ADDS NEW BLENDS FOR ROVER

Bayer has begun European production of its Cadon styrene maleic anhydride/ABS blend and its Triax ABS/PA blend for use in Rover's latest 75 luxury car. The Cadon glass fibre-reinforced ABS/SMA blend is being used in the Rover's instrument panel armature. Triax ABS/PA is used in a number of interior parts including the steering wheel shroud and cowl, the demister bezel, the console lid, parcel shelf vents and CD box.

BAYER AG

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.743071

Item 166

Plastics News(USA)

11, No.21, 12th July 1999, p.9

ROADTRIP! ABS LIGHTENING THE LOAD OF RVS

Ledson S

Coachmen Recreational Vehicle has teamed up with Bayer, Spartech and Viking Formed Products to create ABS parts for recreational trailers. ABS can be thermoformed into various shapes, updating the trailer's look. The ABS parts are 45% lighter than fibreglass and are more weatherable. Coachmen uses the parts for the end caps and ground effects on the trailers.

COACHMEN RECREATIONAL VEHICLE CO.
USA

Accession no.742851

Item 167

High Performance Plastics

Aug.1999, p.4

SPECIAL ABS/SMA BLEND IS DEVELOPED FOR NEW ROVER CAR

A blend of ABS and styrene-maleic anhydride has been developed by Bayer for use in the manufacture of the dashboard of the Rover 75 model. The blend is claimed to offer a combination of high stiffness and rigidity, good dimensional stability, and high heat resistance, together with good adhesion to PU foam. The material is one of more than 26kg of of Bayer plastics used in the car, and brief details of which are given.

BAYER PLC

EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.742668

Item 168

Molding Systems

57, No.8, Aug.1999, p.11-3

THINWALL INTERIOR DOOR PANEL REDUCES COST, WEIGHT ON 1999 GM VANS

General Motors is reported to be using an ultra-thinwall ABS door substrate, moulded from Dow Automotive's Magnum 347 EZ resin in its 1999 GMC Safari and Chevy Astro vans. The innovation is claimed to have reduced costs and weight, while meeting GM performance requirements.

GENERAL MOTORS; DOW AUTOMOTIVE
USA

Accession no.742648

Item 169

Macplas

24, No.207, April 1999, p.66-7

Italian

THERMOFORMING DEVELOPMENTS IN THE REFRIGERATOR SECTOR

De Nichilo G

Rigo Group

Developments in thermoforming processes and machinery for the manufacture of ABS and high-impact PS refrigerator components are reviewed.

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY;
WESTERN EUROPE

Accession no.742590

Item 170

Patent Number: EP 933396 A2 19990804

FLAME RETARDANT POLYCARBONATE RESIN/ABS GRAFT COPOLYMER BLENDS

Chen F-S F; Van Bennekom A C M; Govaerts L C;
Miyake H
General Electric Co.

Disclosed is a thermoplastic composition comprising a polycarbonate, a mass polymerised rubber modified graft copolymer containing a discontinuous rubber phase dispersed in a continuous rigid thermoplastic phase and an organophosphorus flame retardant. At least a portion of the rigid thermoplastic phase is chemically grafted to the rubber phase.

USA

Accession no.742367

Item 171

Injection Molding

7, No.6, June 1999, p.46

DECORATING OPTIONS ABOUND IN ABS

A new series of Cycolac ABS resin offers eye appeal and internal decorative effects. Called Cycolac Magix, this material can offer product designers the special effects of a marble surface, the look of granite, a gun metal effect, the glitter of metallic particles, or even fluorescence. The material has been available in Europe for four years, and is now offered in North America. One of its first uses is in the Hoover Self-Propelled Wind Tunnel vacuum cleaner housing. It is available in high gloss, matte and opaque finishes, as well as in a wide choice of pastel colours or dark colours with the metallic effects. The effects are achieved through special additive packages that contain metal flake pigments added to a special base resin. The resin provides a consistent fleck size throughout the part, a distinct advantage over an applied decorative surface. GE Plastics says batch-to-batch consistency is very good, and that mechanical properties are not compromised. Because the effect is compounded into the resin, scrap can be easily recycled. Pricing varies depending on application and fleck size. This abstract includes all the information contained in the original article.

GE PLASTICS

USA

Accession no.741667

Item 172

Injection Molding

7, No.6, June 1999, p.44

STRUCTURAL 'VITAMINS' FOR ABS

Maniscalco M

Dow Chemical is offering moulders, designers and OEMs the ability to add a highly glass-filled engineering TPU (Isoplast) to ABS at the press. The amount of ETPU 'vitamins' can be adjusted to provide a spectrum of cost-effective, flexible resin solutions, according to the company. Bringing the two polymers together at the machine is said to give more than merely a glass-filled ABS/Isoplast blend. It produces a compound in which the ETPU acts as an adhesive between the glass filler and

the ABS, due to ETPU's affinity for glass and its natural compatibility with ABS. This arrangement gives better physical properties than a conventional compound containing glass and ETPU dispersed in ABS. Details are given.

DOW PLASTICS

USA

Accession no.741665

Item 173

ACS Polymeric Materials Science & Engineering, Volume 80. Conference proceedings. Anaheim, Ca., Spring 1999, p.512-3

ELECTORHEOLOGICAL CHARACTERISTICS OF EMULSION POLYMERIZED SAN-CLAY NANOCOMPOSITE SUSPENSIONS

Kim J W; Noh M H; Choi H J; Lee D C

Inha, University; Carnegie-Mellon University

(ACS, Div. of Polymeric Materials Science & Engng.)

Styrene-acrylonitrile clay nanocomposites were prepared by emulsion polymerisation using sodium montmorillonite, and the presence of intercalation was confirmed using Fourier transform infrared spectroscopy and X-ray diffraction. An electrorheological (ER) fluid, prepared using the intercalated particles and silicone oil, exhibited typical ER behaviour, including high shear stress in the presence of an electric field, and yield stress increased with particle concentration. The critical shear rate at which the ER fluid exhibited pseudo-Newtonian behaviour was also observed. 16 refs.

KOREA; USA

Accession no.741382

Item 174

Patent Number: US 5804656 A 19980908

COMPOSITIONS OF THE ABS TYPE FOR PROCESSING BY EXTRUSION AND DEEP DRAWING

Eichenauer H; Kruger P; Staratschek H; Leitz E;

Wittman D; Piejko K E; Ramthun J

Bayer AG

Compositions of the ABS type containing (A) one or more graft rubbers of A.1) 10-60 pbw of one or more monomers on A.2) from 40-90 pbw of one or more rubber backbones having glass transition temperatures below 0C and B) at least one rubber free thermoplastic resin obtained by radical polymerisation of resin forming monomers, wherein the rubber backbone A.2) has average particle diameters of from 0.20-0.35 um and the graft rubber A) has been produced by radical emulsion graft polymerisation with the use of an initiator system comprising organic hydroperoxide and an organic reducing agent, and the use thereof for the production of mouldings by deep drawing.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.740254

Item 175

Plastverarbeiter

49, No.10, Oct.1998, p.122-24

German

LIGHT BUT ROBUST

This article is an overview of BASF plastic usage in the automotive industry. The automotive industry is regarded as being the most innovative market for plastic uses. A driving force in the use of plastics in automotive external parts is the concomitant 50% average weight-saving, ease of forming and integrating. In small to medium series cars plastic compares well, price-wise, with sheet steel. For many years BASF has been making Luran S, a UV-resistant ASA for mirror housings. Bodywork is now being made from Luran S 797 S due to its good heat resistance. Luran S/C has good weather-, heat- and impact resistance and is used in the Rover 200 spoiler. BASF is co-operating with GE Plastics on PPE/PA blends.

BASF AG

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.739965

Item 176

Polymer Degradation and Stability

64, No.3, 1999, p.449-55

**MECHANICAL, MICROSCOPICAL AND FIRE
RETARDANT STUDIES OF ABS POLYMERS**

Owen S R; Harper J F

Loughborough, University

Antimony trioxide (Sb₂O₃) is a common additive in ABS flame retardant formulations and the effects of adding it, with four commercial brominated materials, to ABS are reported. The results focus on mechanical, rheological, microscopical and flame retardant properties, and the effects of four Sb₂O₃ materials with average particle sizes ranging from 0.5 to 11.8 μm. Compounds are produced using a twin-screw co-rotating machine and subsequently injection moulded into flexural and impact specimens, the latter being tested with instrumented falling weight equipment. Effects on rheological properties are studied using a capillary rheometer. Dynamic mechanical thermal analysis and LOI flame testing are also carried out. The brominated materials have more influence than Sb₂O₃ on ABS rheology, although a trend of increased melt viscosity with increasing (Sb₂O₃) particle size and loading is noted. The brominated materials generally increase flexural modulus and reduce deflection at peak force values, whereas modulus and strength are relatively unaltered with Sb₂O₃ at the loadings studied. The impact strength of the ABS is detrimentally affected by both additives as loading level and average particle size increase. The presence of 5 wt.% sub-micron Sb₂O₃ causes a 20% reduction in impact strength while the reduction due to the brominated materials depends upon the specific halogenated compound used. Scanning electron microscopy shows good dispersion of Sb₂O₃

regardless of particle size and transmission electron microscopy reveals that Sb₂O₃ resides in the SAN phase of the polymer. The DMTA response of ABS is not altered by Sb₂O₃. 12 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.739421

Item 177

Plastics Engineering

55, No.6, June 1999, p.6

HUMMER PARTS ARE THERMOFORMED

It is briefly reported that a variety of interior thermoplastic parts and components for the civilian version of the Hummer are being formed on custom thermoformers made by MAAC Machinery. Two different high-temperature, high-heat grades of ABS are used for the components.

MAAC MACHINERY CORP.

USA

Accession no.739212

Item 178

Plastics News(USA)

11, No.18, 21st June 1999, p.4

ADVANCE USA SEES FUTURE BEHIND STRATA
Renstrom R

In November, Advance USA started using its polymer matrix composite technology, trademarked Strata, at a leased plant in New Stanton, Pa. The company has a long-term contract under which it will produce 15-20,000 single-piece Coleman camper tops this year for a folding-trailer line. In making the tops, operators thermoform the outer layers from coextruded sheet made from ASA and ABS. Next, they use preforming to shape and bond a matrix of bidirectional glass fibre and PU to the inner surface of the outer thermoplastic layers. Finally, they inject low-density, foaming PU to form a core between the layers.

ADVANCE USA

USA

Accession no.739106

Item 179

Advanced Materials & Processes

155, No.5, May 1999, p.24

**CO-EXTRUDED ABS RESIN PROVIDES
AESTHETICS, STRENGTH**

Lustran coextruded ABS resin is used to manufacture the rear door storage compartments on the Isuzu Trooper, it is announced. Brief details are given of the use of Lustran 456 and Lustran 752 coextruded sheets which are said to provide the strength and aesthetic requirements for this application.

BAYER CORP.; SPARTECH PLASTIQUES;

NEOCON INTERNATIONAL INC.

USA

Accession no.736667

Item 180

Plast' 21

Nos.77/8, Jan./Feb.1999, p.31-2

Spanish

CHEMISTRY IN THE SERVICE OF COMFORT, SAFETY AND EFFICIENCY

Applications of polymers produced by Bayer in Volkswagen's New Beetle car are reviewed. Materials examined include ABS, polycarbonate, ABS/polycarbonate blends, polyamides and PU foams and paints.

BAYER AG; VOLKSWAGEN AG; SOMMER ALLIBERT IND.MEXICO SA DE CV; LIGNOTOCK GMBH; MANKIEWICZ GEBR.& CO.; ELASTOGRAN GMBH; HERBERTS EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; MEXICO; WESTERN EUROPE

Accession no.736311

Item 181

Patent Number: US 5883189 A 19990316

THERMOPLASTIC HIGH-GLOSS MOULDING COMPOSITIONS OF THE ABS TYPE

Eichenauer H; Leitz E

Bayer AG

These comprise (I) at least one graft polymer obtained by emulsion polymerisation of monomers in the presence of a mixture composed of two butadiene polymer latices (A) having specified particle diameters, particle diameter distributions and gel contents, (II) at least one graft polymer obtained by emulsion polymerisation of monomers in the presence of a butadiene polymer latex having a specified particle diameter, particle diameter distribution and gel content, and (III) at least one rubber-free copolymer.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.736022

Item 182

Patent Number: US 5883190 A 19990316

THERMOPLASTIC MOULDING COMPOSITIONS OF THE ABS TYPE

Eichenauer H

Bayer AG

These contain at least one graft polymer, which is obtained by emulsion polymerisation of e.g. styrene and acrylonitrile, under special conditions, at least one graft polymer produced by solution, bulk or suspension polymerisation of e.g. styrene and acrylonitrile, in the presence of a rubber, and at least one rubber-free copolymer of e.g. styrene and acrylonitrile.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.735417

Item 183

Polymer Engineering and Science

39, No.4, April 1999, p.708-20

IMPACT FATIGUE OF A POLYCARBONATE/ACRYLONITRILE-BUTADIENE-STYRENE BLEND

Ming-Hsiung Ho; Jiun-Ren Hwang; Ji-Liang Doong; Chin-Ping Fung
Taiwan,National Central University; Chung-Cheng Institute of Technology

Specimens of a PC/ABS blend were prepared under various injection moulding conditions and impact tests were performed with a Dynatup drop weight impact tester at different impact energies. The fracture mechanism was examined by SEM. The results indicated that the load-time history of the PC/ABS blend had approximately a sinusoidal form in impact. The best injection moulding conditions were a filling time of 12 s, a melting temp. of 260C and a mould temp. of 80C. In this case, the specimen showed the highest energy absorbed in single impact, together with the highest impact number in impact fatigue. The impact number and the accumulation energy seemed to follow an exponential curve as the impact energy decreased. The PC/ABS blend material clearly exhibited ductile fracture with a continuous reduction in strength by viscoplastic deformation. The accumulation energy increased with increasing impact number. The accumulation energy of impact fatigue with impact energy 10J was about 35 to 45 times greater than the energy absorbed in single impact. Tearing, shear fracture and plastic deformation were the major fracture mechanisms of the PC/ABS blend matrix in single impact and repeated impact conditions. 27 refs.

TAIWAN

Accession no.734643

Item 184

Antec '99.Volume 1.Conference proceedings.

New York City, 2nd-6th May, 1999, p.1000-4.012

NEW METHODOLOGY FOR DETERMINING THE BLOW MOULDABILITY OF ENGINEERING RESINS FOR AUTOMOTIVE APPLICATIONS

Garcia-Rejon A; Carmel M; Ramanathan R
Canada,National Research Council; Dow Chemical Co. (SPE)

A methodology for determining the relationships between the relevant rheological properties and key processing material behaviour parameters (swell and sag) for the blow moulding process is described. The technique was applied to the intermittent extrusion of a polycarbonate-ABS blend, and processing parameters including drop time, extrusion temperature and die gap were studied. 8 refs.

CANADA; USA

Accession no.734084

Item 185

Plastics Engineering

55, No.3, March 1999, p.6

ABS RESINS HELP KEEP CARGO IN ITS PLACE

The selection of Lustran 456 and Lustran 752 ABS resins from Bayer Corp. for multi-functional rear-door storage compartments on the new "Trooper" sports utility vehicle from Isuzu is the topic of this small article. Brief details of the reasons for the choice are provided.

BAYER CORP.; SPARTECH PLASTICS; NEOCON INTERNATIONAL INC.
CANADA; USA

Accession no.733417

Item 186

Antec '99. Volume 1. Conference proceedings.
New York City, 2nd-6th May, 1999, p.844-9. 012

OPTIMIZATION OF THERMOFORMING WITH PROCESS MODELLING

DiRaddo R; Laroche D; Bendada A; Ots T
Canada, National Research Council; Quality Thermoform
(SPE)

The thermoforming process: sheet reheat, vacuum forming, and solidification, was modelled using a non-isothermal viscoelastic constitutive equation. Good agreement was obtained between model predictions and experimental measurements of a box formed using ABS. 6 refs.

CANADA

Accession no.733010

Item 187

Antec '99. Volume 1. Conference proceedings.
New York City, 2nd-6th May, 1999, p.836-40. 012

NUMERICAL AND EXPERIMENTAL STUDIES OF 3-DIMENSIONAL THERMOFORMING PROCESS

Nam G J; Ahn K H; Lee J W
Sogang, University; Cheil Industries Inc.
(SPE)

Two ABS polymers were characterised using hot tensile and dynamic shear tests at various temperatures. They were shaped by thermoforming and their behaviours compared using numerical simulation. The material parameters for the simulation were provided by the hot tensile results. The simulation results based on a hyperelastic rubber-like model were reasonably accurate in predicting deformation behaviour. The more temperature sensitive polymer in the hot tensile test also showed more temperature sensitive thickness distribution in the actual thermoforming process. 19 refs.

KOREA

Accession no.733008

Item 188

Antec '99. Volume 1. Conference proceedings.
New York City, 2nd-6th May, 1999, p.516-20. 012

NYLON 6 IN THIN-WALL HOUSINGS

Stevenson J F; Dubin A
AlliedSignal Inc.
(SPE)

Nylon 6 compositions, with and without glass reinforcement, were compared with polycarbonate (PC) and ABS by studies of injection moulding cycle times, impact tests and flexural modulus. It was concluded that nylon 6, which is semi-crystalline, offered substantial processing and product-performance advantages over PC and ABS, which are amorphous. The benefits were generally enhanced with decreasing wall thickness. 2 refs.
USA

Accession no.732947

Item 189

Antec '99. Volume 1. Conference proceedings.
New York City, 2nd-6th May, 1999, p.481-4. 012

EFFECT OF THE SKIN/CORE RATIO ON THE FLOW BEHAVIOUR DURING CO-INJECTION MOULDING

Derdouri A; Garcia-Rejon A; Nguyen K T; Simard Y; Koppi K A; Salamon B A
Canada, National Research Council; Dow Chemical
(SPE)

The effect of the core:skin ratio on the overall flow behaviour in the co-injection moulding of a rectangular plaque was studied. ABS was used for both the skin and the core, whilst polycarbonate was used only for the skin. A black pigment was added to the core to make it visible. The results are discussed in terms of relative viscosities, injection speed, melt and mould temperatures. 14 refs.

CANADA; USA

Accession no.732940

Item 190

Coloring Technology for Plastics.
New York, N.Y., Plastics Design Library, 1999, p.149-55. 52

EFFECTS OF INJECTION MOULDING PARAMETERS ON COLOUR AND GLOSS

Dawkins E; Horton K; Engelmann P; Monfore M
Western Michigan, University; Ralston Foods
Edited by: Harris R M

Within the plastics industry there is a growing trend towards producing unpainted finished products. This places an increased emphasis on understanding which process variables can induce shifts in colour. This study focuses on ABS parts using a newly specified automotive red colourant. A 1/8 fractional factorial design of experiment is used to test the effects of seven independent variables upon colour and gloss. The results show which parameters are responsible for influencing colour and gloss. Also determined is the colour range achievable within the process window. 8 refs.

USA

Accession no.732210

Item 191

Polymer

40, No.15, 1999, p.4237-50

EFFECT OF COMPATIBILIZATION AND ABS TYPE ON PROPERTIES OF PBT/ABS BLENDS

Hale W R; Pessan L A; Keskkula H; Paul D R
Texas, University

Toughened blends of polybutylene terephthalate (PBT) with appropriate ABS materials were prepared without a compatibiliser within limited melt processing situations. TEM showed that coarsening of uncompatibilised blends occurred even under certain moulding conditions resulting in a deleterious effect on blend properties. Methyl methacrylate/glycidyl methacrylate (GMA)/ethyl acrylate terpolymers were shown to be effective reactive compatibilisers for PBT/ABS blends that broadened the processing window and provided improved low temp. impact properties, ABS dispersion and morphological stability. A twin screw extruder was more effective than the single screw extruder used in this study for processing these reactive blends. Several ABS types with different rubber contents were examined. In general, materials with very high rubber contents were found to be more beneficial for toughening PBT. Among these high rubber content materials, the ABS material having the lowest melt viscosity was found to be superior for optimising morphology and impact properties. At least 30% of this material, containing a minimum of 36% rubber, was required for producing toughened blends. Moderate amounts of GMA functionality in the compatibiliser and small amounts of compatibiliser in the blend significantly improved low temp. impact properties and ABS dispersion. Higher amounts of GMA in the blend increased the room temp. impact strength with little effect on the ductile-brittle transition temp. and increased blend viscosity. 32 refs.

USA

Accession no. 732014

Item 192

Molding Systems

57, No.5, May 1999, p.11

SILENCING THE HABITUAL SNORER

The SP 1010 and SP 1100 Somnoplasty devices from Somnus Medical Technologies use an electrode to emit low-power, low-temperature radio frequency energy that shrinks tissue in the mouth and nose to treat snoring and nasal obstruction. The disposable portions of both devices use Bayer's Lustran ABS 348 resin.

BAYER CORP.; SOMNUS MEDICAL
TECHNOLOGIES INC.

USA

Accession no. 731097

Item 193

British Plastics and Rubber

April 1999, p.35-6

CASE FOR AUTOMATION IN INJECTION MOULDING

The advantages of automating the injection moulding process for the production of insert moulded parts are discussed. An example of a production cell designed and built by Battenfeld Automation is presented. A production system for an automotive plug housing was required to produce 10,000 parts per day. Production of the ABS housings involved two overmoulding systems in sequence.

BATTENFELD AG

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no. 731094

Item 194

Antec '99. Volume 1. Conference proceedings.

New York City, 2nd-6th May 1999, p.157-61 .012

EXPERIMENTAL COMPARISON OF FLOATING RING MIXING DEVICES

Myers J A; Barr R A; Spalding M A; Hughes K R
Glycon; Barr R., Inc.; Dow Plastics
(SPE)

The performance of three floating ring mixing devices, designed to operate in a standard extruder barrel, was evaluated for the blending of colour concentrate with ABS. The mixing devices were: a Twente mixing ring; a Barr sleeve mixer; and a Barr ring mixer, and their performance was evaluated by determining axial pressure gradients, discharge temperatures, extrusion rates, and extrudate sampling. High-speed data acquisition was used to measure ring rotation rates. It was concluded that all three devices provided excellent mixing performance at conditions which exceed current industrial practice. 13 refs.

USA

Accession no. 730990

Item 195

Antec '99. Volume 1. Conference proceedings.

New York City, 2nd-6th May 1999, p.140-4 .012

ULTRA HIGH SPEED EXTRUSION OF VARIOUS POLYMERS

Sheth H R
HMP Corp.
(SPE)

A patented extruder screw design is described which permits very high screw speeds without compromising the properties of the extrudate. Trials were conducted on high impact polystyrene, high density polyethylene, ABS, polycarbonate, and filled polypropylene, with temperature, pressure, output and mixing being measured. An excellent balance between high output rates, temperature build-up and mixing is reported. 6 refs.

USA

Accession no. 730987

Item 196

European Plastics News

26, No.5, May 1999, p.46

TRANSPARENT ANTI-STATIC ABS ALLOYS

It is briefly reported that LNP has introduced Stat-Loy A-E clear, a new transparent alloy with permanent antistatic modification. It can be used for both extruded and injection moulded products. Stat-Loy A clear is a high-flow grade developed specifically for injection moulded applications. Both grades are based on ABS.

LNP

USA

Accession no.730548

Item 197

Patent Number: US 5849827 A 19981215

EXTREMELY FINELY DIVIDED INORGANIC POWDERS AS FLAME RETARDANTS IN THERMOPLASTIC MOULDING COMPOSITIONS

Boediger M; Eckel T; Wittmann D; Alberts H
Bayer AG

Thermoplastic moulding compositions are disclosed which contain (A) a thermoplastic polymer of ethylenically unsaturated monomers or a polycondensate of bifunctional reactive compounds; (B) 0.01 to 50, preferably 0.1 to 10 parts by weight per 100 parts by weight of (A) of extremely finely divided inorganic powder with a mean particle diameter of 1 to 200 nm, preferably 1 to 150 nm, in particular 1 to 100 nm; and (C) 0.1 to 50, preferably 0.5 to 20 parts by weight per 100 parts by weight of (A) of flame retardant.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.730215

Item 198

Journal of Adhesion Science and Technology

13, No.4, 1999, p.523-39

ADHESION OF ABS RESIN TO METALS TREATED WITH TRIAZINE TRITHIOL MONOSODIUM AQUEOUS SOLUTION

Sasaki H; Kobayashi I; Sai S; Hirahara H; Oishi Y; Mori K

Iwate, University

Details are given of the adhesion of ABS to bronze, brass plates, and electro-nickel plating during injection moulding. Adhesion data are presented with and without the use of triazinetrithiol monosodium surface treatment. 8 refs.

JAPAN

Accession no.730179

Item 199

Patent Number: US 5864004 A 19990126

FLAME RETARDANT POLYMER RESIN

COMPOSITION HAVING IMPROVED HEAT DISTORTION TEMPERATURE AND MECHANICAL PROPERTIES

Kim S R; Choi Y J; Song J S

Samyang Corp.

Describes a flame retardant resin composition having improved heat distortion temperature and mechanical properties comprising 5-20 parts by weight of phosphate-based flame retardant and 0.01-10 parts by weight of tetrafluoroethylene powder per 100 parts by weight of PC/ABS which comprises 5-95 per cent by weight of polycarbonate and 5-95 per cent by weight of acrylonitrile-butadiene-styrene copolymer. The resin composition may be applied to indoor applications such as the housing of domestic electric appliances, the interior decoration of automobiles, etc.

SOUTH KOREA

Accession no.728957

Item 200

Polymer

40, No.13, 1999, p.3665-76

EFFECT OF CROSSLINKING REACTIONS AND ORDER OF MIXING ON PROPERTIES OF COMPATIBILIZED PBT/ABS BLENDS

Hale W; Keskkula H; Paul D R

Texas, University at Austin

The degree of dispersion of ABS in PBTP/ABS blends was improved by incorporating terpolymers of methyl methacrylate, glycidyl methacrylate and ethyl acrylate (MGE) as compatibilisers. The fracture properties depended on the order of mixing of the blend components. When all the compatibilised blend components were mixed together in a single-pass extrusion, the low temperature toughness was improved, but the room temperature impact strength was reduced relative to uncompatibilised blends. When PBTP and MGE were melt mixed together in a first extrusion and ABS was incorporated in a second extrusion (two-pass extrusion method), the room temperature impact strength was better than that of blends prepared by the single-pass method. When a two-pass method was used in which ABS and MGE were combined before extrusion with PBTP, the impact properties at all temperatures were worse than those of uncompatibilised blends. Residual acids present in emulsion-made ABS were thought to cause a crosslinking reaction between the epoxy units of the compatibiliser, resulting in a deleterious effect on the mechanical properties of ABS and its blends with PBTP. The sequence in which chemical reactions occurred (ie grafting versus crosslinking) could be altered by changing the order of mixing used and thus, blend properties could be optimised. 55 refs.

USA

Accession no.727167

Item 201

Materie Plastiche ed Elastomeri

No.9, Sept.1998, p.530-2

Italian

SCOOTERS: AN ALL-ITALIAN REVOLUTION

Modini G

An account is given of plastics materials used by Malaguti Moto and Moto Guzzi of Italy in the manufacture of motor cycles, including HDPE, PP, ABS, polycarbonate and glass fibre-reinforced polyamides.

MALAGUTI MOTO; MOTO GUZZI; NYLTECH; GE PLASTICS; MONTELL POLYOLEFINS; NORD COLOR

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY; USA; WESTERN EUROPE

Accession no.726315

Item 202

Materie Plastiche ed Elastomeri

No.9, Sept.1998, p.516-25

Italian

CALL OF STYRENICS

Modini G

The polymerisation, properties and applications of PS and styrene copolymers are examined. The use of PS foams in packaging and thermal insulation, styrene-butadiene-styrene block copolymers in food packaging films, PS and ABS in electronic applications and ASA/PBTP blends in automotive applications is described, and a number of materials developments by BASF and EniChem are reviewed.

BASF AG; ENICHEM SPA

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; ITALY; WESTERN EUROPE

Accession no.726313

Item 203

Revue Generale des Caoutchoucs et Plastiques

No.770, Sept.1998, p.49-50

French

A LA CARTE MATERIALS FOR CHIP CARDS

Lavabre S

A survey is made of developments in chip cards and plastics materials used in their manufacture, with particular reference to trends in the use of PETP and ABS in place of PVC.

GEMPLUS; DE LA RUE; SCHLUMBERGER; ELF ATOCHEM SA; BAYER AG; SONY CORP.

EUROPEAN COMMUNITY; EUROPEAN UNION; FRANCE; GERMANY; JAPAN; UK; USA; WESTERN EUROPE

Accession no.726306

Item 204

Plastics and Rubber Weekly

No.1781, 9th April 1999, p.7

CLEAR LEAD BY LNP IN ANTISTATIC ABS

It is briefly reported that LNP has added new transparent ABS grades to its Stat-loy antistatic alloy range. Stat-loy A-E clear is for extruded and injection moulded products, while Stat-loy A is a high-flow injection moulding grade.

LNP ENGINEERING PLASTICS

EUROPEAN COMMUNITY; EUROPEAN UNION; NETHERLANDS; WESTERN EUROPE

Accession no.724548

Item 205

Injection Molding

7, No.1, Jan.1999, p.61

THIN-WALL MOLDING WITH ABS LIGHTENS WET/DRY VACUUM

This small article explains why "Novadur" ABS from Bayer was selected for use in the housing of a vacuum cleaner sold by the Turkish firm Arcelik. The walls in the housing are very thin, thus saving weight. Brief details are provided.

BAYER CORP.; ARCELIK

TURKEY; USA

Accession no.723624

Item 206

Injection Molding

7, No.3, March 1999, p.69

INSULATED CUPS HOLD THE HEAT AND THE COLD

Thermo-Serv's range of insulated cups, mugs and other beverageware items are double-walled and injection moulded from Tyril, a SAN from Dow Plastics. The suitability of Tyril for these applications is briefly described, and includes its ability to flow well into straight walled moulds and heavily textured moulds.

DOW PLASTICS; THERMO-SERV INC.

USA

Accession no.723161

Item 207

Kunststoff Journal

28, No.5, Oct.1994, p.38-40

German

CASE FOR HIGH TECHNOLOGY

The EAW tool and specialist machinery firm has produced a tool set for injection moulding of cases for a new range of measuring devices. The precision made ABS cases satisfy functional design and safety requirements. They consist of 13 parts which are easily assembled. Reducing assembly costs was vital in order to compete with imported goods.

STATRONELEKTRONIK GMBH; EAW

WERKZEUGE UND SONDERUIASCHIMEU

GMBH; NANOTRON GESELLSCHAFT FUER

MIKROTECHNIK GMBH

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.721511

Item 208

Asian Chemical News

5, No.209, 22nd March 1999, p.25

TREND SETTER

Wilczek M

Transparent polycarbonate tinted in fruit colours is all the rage for personal computers and peripherals this season. Market players emphasise that the trend will not have much of an effect on the polycarbonate and ABS markets as a whole. However, overall growth for ABS is not strong. The polymer has been under attack from lower-priced HIPS in the office automation equipment market. Some ABS producers are offering transparent ABS which is almost as clear as polycarbonate and prices are expected to start at least 10% below injection-grade polycarbonate prices.

USA

Accession no.721090

Item 209

Modern Plastics International

29, No.3, March 1999, p.69-72

THINWALLING IS POSSIBLE WITH STANDARD EQUIPMENT

Schott N R; Tantakom P

Massachusetts, University

This study demonstrates that a conventional injection moulding machine is capable of producing good, quality thin-wall mouldings if the melt temperature, cooling rate, injection speed and mould surface temperature are properly controlled. The resins used were Lexan SP 7602 polycarbonate and Magnum 9015 ABS.

USA

Accession no.719667

Item 210

Plastics Pipes X. Conference proceedings.

Goteborg, Sweden, 14th-17th Sept.1998, p.529-35.

6H21

LONG-TERM CREEP OF ABS PIPES AT VARIABLE TEMPERATURES

Lu J P; Burn L S

CSIRO

(Institute of Materials)

One of the characteristic behaviours of plastics (or viscoelastic) materials is the creep phenomenon, which is defined as the continuing deformation under a constant load with time. Although research on creep of plastics pipes has been widely carried out in other plastics, little work has been reported for creep in ABS pipes at high temperatures. The generalised Kelvin series of formulae, which consists of six Kelvin elements, a power model, as well as linear regressions, are applied to the experimental data measured from creep tests under constant bending stresses at different temperatures. The least-squares method is used to

adjust Kelvin model parameters, and a Levenberg-Marquardt non-linear least-squares regression procedure is used to determine the creep parameters in the power model. This leads to an empirical formulae of creep compliance equal to the reciprocal of the creep modulus. This creep modulus can provide a means to evaluate the long-term structural properties for different resins used in pipe production. 12 refs.

AUSTRALIA

Accession no.718933

Item 211

Milan, 1996, pp.6. 12 ins. 31/12/98.

SINKRAL ABS RESINS

EniChem SPA, Styrenics & Engineering Plastics Div.

Tabulated properties are presented for grades of Sinkral ABS resins from EniChem. Injection moulding grades are available as general purpose, high impact, medium heat and high heat types, and extrusion grades are available for the production of foil, sheets and profiles and pipes.

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY; WESTERN EUROPE

Accession no.716939

Item 212

Redditch, 1997. pp.32. 12 ins. 17/2/99.

German; Dutch; English

RONFALIN. TYPICAL PROPERTIES OF ABS GRADES

DSM UK Ltd.

Properties are given for the grades of Ronfalin ABS available from DSM. The material is claimed to combine high gloss and excellent colour possibilities with good mechanical and physical properties such as high impact strength, heat resistance and flow properties.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK; WESTERN EUROPE

Accession no.716886

Item 213

(Redditch), c.1999, pp.23. 12 ins. 17/2/99.

German; Dutch; English

STAPRON C/E. TYPICAL PROPERTIES OF POLYCARBONATE BLENDS

DSM UK Ltd.

Typical properties are described for grades of Stapron C polycarbonate/ABS blends and Stapron E polycarbonate/polyester blends. Details are given of standard and special grades of each. Stapron C is suitable for a wide range of applications, whilst Stapron E has been developed for use by the car industry.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK; WESTERN EUROPE

Accession no.716884

Item 214

Ludwigshafen, 1997, pp.16. 12 ins. 9/2/99.

**TERLURAN ACRYLONITRILE/BUTADIENE/
STYRENE POLYMER (ABS). RANGE CHART,
FEATURES, TYPICAL VALUES, APPLICATIONS**
BASF AG

Comprehensive property data are tabulated for grades of Terluran ABS polymers. The product line contains two variants for the rubber phase. The Terluran 800 products consist of a finely divided butadiene-acrylic rubber submicroscopically distributed in the SAN matrix, whereas the Terluran 900 products are modified by a butadiene rubber. The material is available in grades for injection moulding, blow moulding and extrusion.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.716870

Item 215

Gummi Fasern Kunststoffe

51, No.9, Sept.1998, p.734-9

German

**FIBRE-SAVING PLASTICISATION OF FIBRE-
REINFORCED PLASTICS**

Gleich K

Kannegiesser KMH Kunststofftechnik GmbH

A novel fibre-saving technology developed by Kannegiesser KMH makes it possible to produce large-dimensioned components economically, using long-fibre reinforced plastics. Materials that can be used include polypropylene, polyamide, polyethylene terephthalate, polybutylene terephthalate, polycarbonate/ABS, and thermosets based on epoxy and polyester resins. Information is also given on the possibility of using processing waste. 4 refs. Articles from this journal can be requested for translation by subscribers to the Rapra produced International Polymer Science and Technology.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.716716

Item 216

Polymer Engineering and Science

39, No.1, Jan.1999, p.78-88

**UNSTEADY MULTIFLUID FLOW MODEL:
APPLICATION TO SANDWICH INJECTION
MOULDING PROCESS**

Schlatter G; Agassant J F; Davidoff A; Vincent M
CNRS; MATRA Datavision

Details are given of a thermomechanical model based on lubrication approximations describing the flow of two polymers into the sandwich injection mould cavity. An experimental study using PS and ABS was performed in order to test the influence of processing parameters on the interface location. Numerical simulations were compared with measurements. 15 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; FRANCE;
WESTERN EUROPE

Accession no.716312

Item 217

Polymer Engineering and Science

39, No.1, Jan.1999, p.62-77

**STUDY OF GAS FINGERING BEHAVIOUR IN
GAS-ASSISTED INJECTION MOULDING**

Lu X; Chiang H H; Fong L; Zhao J; Chen S C S
Singapore, Gintic Institute of Manufacturing
Technology; Chung-Yuan Christian University

Nondestructive techniques were used to quantitatively characterise gas bubble geometry in specially designed gas-assisted injection moulding polycarbonate, ABS, and PS parts. The most crucial process parameters to control gas fingering were identified through factorial design experiments. 17 refs.

CHINA; SINGAPORE

Accession no.716311

Item 218

Polymer Engineering and Science

39, No.1, Jan.1999, p.3-17

**CONTROL OF INJECTION VELOCITY USING A
FUZZY LOGIC RULE-BASED CONTROLLER
FOR THERMOPLASTICS INJECTION
MOULDING**

Tsoi H-P; Gao F

Hong Kong, University of Science & Technology

Details are given of the design and development of a real-time, closed-loop feedback and feedforward control system based on fuzzy logic for controlling the injection velocity during injection moulding. Experimental results using HDPE and ABS are presented. 16 refs.

CHINA

Accession no.716306

Item 219

Advanced Materials & Composites News

21, No.4, 15th Feb.1999, p.6

**FLAME-RESISTANT PLASTICS BROKEN
DOWN COMPLETELY INTO OIL**

The Japanese National Institute for Resource and Environment has succeeded in decomposing to oil several flame-resistant plastics, ABS-based with flame retardant, used for PC housings. When heated together with tetralins solvent and carbon-based catalysts, the material was completely decomposed to oil with no generation of dioxins observed.

JAPAN, NATIONAL INSTITUTE FOR RESOURCES
& ENVIRONMENT
JAPAN

Accession no.715695

Item 220

Chemical Marketing Reporter

255, No.6, 8th Feb.1999, p.3/15

ABS MAKERS LAUNCH AGGRESSIVE PROGRAMMES TO BOOST US DEMAND

Tullo A

The three major ABS players in the US, GE Plastics, Dow Chemical and Bayer, are approaching the market differently, but share a common goal of strengthening demand. GE Plastics recently formed a new specialty products and services unit to focus on specialty compounded products and custom colour services. Dow supplies customers with natural resins and teaches customers how to procure machinery and find masterbatches to perform colouring on-site. Bayer is working with customers to develop applications for its coextruded products.

GE PLASTICS; DOW CHEMICAL CO.; BAYER CORP.

USA

Accession no.714454

Item 221

Injection Molding

6, No.11, Nov.1998, p.75

SATELLITE PHONE ANTENNA HOLDS THE SIGNAL WITH ASA

Protection of the antenna on the Westinghouse Series 1000 satellite telephone system is a vital concern, and for the purpose the company chose "Luran S" from BASF. Luran S is an acrylonitrile-styrene-acrylate terpolymer. Brief details are provided in this short item.

BASF CORP.; WESTINGHOUSE; BLUE RIDGE INDUSTRIES

USA

Accession no.711941

Item 222

Plastics in Building Construction

23, No.1, 1998, p.3

ASA FOR GARAGE DOOR WINDOW FRAMES

"Luran" acrylonitrile-styrene-acrylate (ASA) terpolymer from BASF is being used for the injection-moulded window frames within a new design of garage doors from a North Carolina manufacturer, it is reported in this small article. Brief details are provided on the selection and properties of the ASA.

BASF

USA

Accession no.711831

Item 223

Plastics in Building Construction

23, No.2, 1998, p.4-6

ASA POLYMER BLENDS FOR CONSTRUCTION MARKETS

Excerpts are published from a talk given by Terry Carothers of GE Plastics on the use of acrylonitrile-styrene-acrylate terpolymers (ASA) for construction and building applications. Modifications to improve weathering resistance are discussed, and include blending and coextrusion.

GE PLASTICS

USA

Accession no.711727

Item 224

Polymer Recycling

3, No.2, 1997/1998, p.107-18

REACTIVE COMPATIBILISATION OF NEAT AND WASTE ABS/PA BLENDS

Liu X; Bertilsson H

Chalmers University of Technology

The present work attempts to implement reactive compatibilisation blending technique on recycling of engineering plastics. Primarily, reactive compatibilisation of SAN/PA blends, reactive compatibilisation and rubber particle toughening of pristine ABS/PA6 are investigated. Blends of recycled ABS/PA have also been investigated. Mechanical properties of all these blends including J-integral and Charpy impact are characterised. 23 refs.

SCANDINAVIA; SWEDEN; WESTERN EUROPE

Accession no.711207

Item 225

Kunststoffe Plast Europe

85, No.7, July 1995, p.32-3

RECYCLING ABS RADIATOR GRILLES

Bledzki A K; Gillung E; Hammerschick J

Kassel,Universitat

Details are given of a project in which ABS radiator grilles from scrap VW cars were recycled. Tests were carried out on recycled and virgin ABS to determine the effect of reprocessing on properties. Various characteristic values were determined such as melt index and mechanical properties, and recycle fracture was investigated by scanning electron microscopy. The influence of weathering was also considered. 7 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.709899

Item 226

Journal of Applied Polymer Science

70, No.13, 26th Dec.1998, p.2729-47

USE OF STYRENE-MALEIC ANHYDRIDE COPOLYMERS (SMA RESINS) IN EMULSION COPOLYMERISATION

Nzudie D T; Dimonie V L; Sudol E D; El-Aasser M S
Lehigh University

The composition and quantity of styrene-maleic anhydride (SMA) copolymer resins were varied in emulsion

copolymerisation of methyl methacrylate and n-butyl acrylate conducted by both batch and semicontinuous processes. The resulting particle sizes and levels of coagulum were measured to determine the optimum conditions for incorporation of the SMA resins into the resulting latexes. A semicontinuous process, in which no buffer was included and the SMA was added in a second stage comonomer emulsion, was found to produce coagulum-free latexes. 13 refs.

USA

Accession no.709577

Item 227

Polymer

40, No.6, March 1999, p.1525-36

EFFECT OF PEEL RATE AND TEMPERATURE ON DELAMINATION TOUGHNESS OF PC-SAN MICROLAYERS

Ebeling T; Hiltner A; Baer E
Cleveland,State University

The effect of peel rate and temperature on peel toughness and delamination failure mode of coextruded microlayer sheet consisting of layers of polycarbonate and SAN was studied with a T-peel test. Measurements were correlated with observations on SAN crazing in microlayers and in bulk. 24 refs.

USA

Accession no.709499

Item 228

Journal of Materials Science

33, No.18, 15th Sept.1998, p.4491-501

MECHANICAL PROPERTIES OF INJECTION MOULDED STYRENE MALEIC ANHYDRIDE (SMA). II. INFLUENCE OF SHORT GLASS FIBRES AND WELDLINES

Chrystostomou A; Hashemi S
North London,University

The dependence of the various mechanical and fracture properties on the volume fraction of short glass fibres in the styrene-maleic anhydride polymer was investigated. Special attention was given to describing the dependence of various mechanical properties on the volume fraction of the glass fibres, by way of the rule of mixtures. 11 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK; WESTERN EUROPE

Accession no.709265

Item 229

Plastics News(USA)

10, No.48, 11th Jan.1999, p.4

JCI AND LEGO WORK TOGETHER ON CHILDREN'S ACTIVITY CENTRE

Pryweller J

Johnson Controls and Lego Systems have established an alliance to create one of the automotive industry's first

child activity centres. The centre is injection moulded from ABS and features a stand to hold games or Lego building sets. The sole function of the centre is to keep children amused while travelling in a vehicle.

JOHNSON CONTROLS INC.; LEGO SYSTEMS INC.
USA

Accession no.709220

Item 230

Plasticulture

No.114, 1997, p.5-13

English; French

MECHANICAL CHARACTERISTICS OF RECYCLED PLASTICS POSTS FOR LIGHT AGRICULTURAL STRUCTURES

Scarascia Mugnozza G; Manera C; Margiotta S; Picuno P
Bari,University; Basilicata,University

The use of posts made from recycled plastics as supporting structures for specialised tree crops is discussed. Results are presented of tests undertaken to assess the mechanical properties of posts manufactured from heterogeneous reclaim consisting of HDPE, LDPE, PETP and ABS. 15 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY; WESTERN EUROPE

Accession no.706070

Item 231

Journal of Materials Science

33, No.17, 1st Sept.1998, p.4349-56

BIAXIAL MONOTONIC AND FATIGUE FRACTURE OF SOME COMMERCIAL ABS AND PVC SHEETS

Atkins A G; Jeronimidis G; Arndt S
Reading,University

Biaxial loading of pre-cracked cruciform test specimens was performed in a novel rig attached to a uniaxial testing machine. Fracture toughness of the ductile ABS and PVC determined by the Cotterell-Mai method was dependent on remote biaxiality. 22 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK; WESTERN EUROPE

Accession no.705646

Item 232

Gummi Fasern Kunststoffe

48, No.11, 1995, p.778-82

German

ENGINEERING POLYMERS FOR KITCHEN AND BATHROOM

Fontanier A G
GE Plastics Netherlands

Modern designs of bathrooms featuring vacuum-formed bathtubs and integrated shower and make-up facilities, and modern kitchens and kitchen appliances are described,

based on the use of Nuvel, a mineral-filled pigmented surfacing material with a matrix of thermoplastic polyester (PBT), Enduran, Cycolac ABS and Lexan HP polycarbonate are described. Articles from this journal can be requested for translation by subscribers to the Rapra produced International Polymer Science and Technology.

EUROPEAN COMMUNITY; EUROPEAN UNION;
NETHERLANDS; WESTERN EUROPE

Accession no.705023

Item 233

Injection Moulding International

3, No.6, Oct./Nov.1998, p.39

ABS USED IN NEW CONCEPT BICYCLE LOCK

The new AXA SL-7 bicycle lock is a new concept that integrates a lock into the bicycle's frame, thus reducing the risk of theft. The bike can be anchored with the lock and a cable, which can be locked and unlocked with a key. Bicycle frames, such as those manufactured by Batavus, Gazelle and Sparta, are now being made with a fixed plate onto which the lock can be mounted. When the lock is closed, a bracket interlocks with the lips of the plate, so that frame and lock are integrated. Stenman Holland, maker of the AXA, chose DSM's Ronfalin ABS (SFA81) as the material for the lock's housing. The material offers high mechanical strength and good processibility. It also offers good design and colour options, allowing the lock to have a modern, robust appearance. It has been especially developed to allow colouring with masterbatches, which are supplied by DSM's subsidiary company Curver. This allows a rapid change to other colours, while requiring only minimum stock levels. DSM and Curver have developed the materials also to provide a good metallic lustre. This abstract includes all the information contained in the original article.

DSM CORP.

EUROPEAN COMMUNITY; EUROPEAN UNION;
NETHERLANDS; WESTERN EUROPE

Accession no.704741

Item 234

Kunststoffe Plast Europe

85, No.2, Feb.1995, p.26-7

RECYCLED ABS PROVIDES SAFETY IN TRANSPORTATION

Wernetshammer D; Kriese M; Brunnhofer X

Manufacturers of graphic films have increasingly been supplying their products in roll form. Each roll of film is enveloped in black light-impervious LDPE film, as the graphic film is photosensitive. Plastics flanges are stuck onto both ends of such film rolls to prevent the graphic film from coming in contact with the cardboard package during transit. This precaution is necessary because bruises may lead to partial density on the developed film, thus making the recorded information

unusable. As graphic films sensitively respond to chemical impurities by forming a haze, all package components used must be free from outgassing. Even minute radioactivity will produce traces on the graphic film so that any radiation emanating from the packaging material is to be excluded. The only function of some of the roll end flanges used for the above purpose - these are outside the light-impervious plastics film - is to provide safety in transit. A second category of so-called 'Hell'-flanges (they are within the plastics film) perform an additional function when the film is positioned in exposure systems. These flanges must therefore meet external specifications of non-distortion and outer dimensions. Both types of flange are subject to defined requirements of strength and flexibility. Even when used for packaging graphic films having the maximum width, the flanges must not break should the correspondingly longest roll boxes weighing roughly 15 kg fall from the shipping pallet. The use of recycled ABS in this application is described. Illustrations may be found in *Kunststoffe*, 85, No.2, 1995, p.238/40.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.704427

Item 235

Plasty a Kaucuk

32, No.8, 1995, p.229-31

Czech

NEW DEVELOPMENTS IN THE PRODUCTION OF POLYSTYRENE PLASTICS AT KAUCUK A.S.

Kaucuk a.s.,Kralupy nad Vltavou

Information is presented on the physico-mechanical properties and applications of the Krasten series of polystyrenes and Forsan ABS/polycarbonate blend X-883. Articles from this journal can be requested for translation by subscribers to the Rapra produced International Polymer Science and Technology.

CZECH REPUBLIC

Accession no.704198

Item 236

Kunststoffe Plast Europe

85, No.4, April 1995, p.27-8

ABS WITH A LOW POLYAMIDE CONTENT IS MORE BRITTLE

Stolp M; Radosch H J; Bledzki A K

Merseburg, Technische Hochschule; Kassel, Universitat

The morphology and mechanical properties of a practically oriented recyclate is investigated with respect to mixtures of ABS and small amounts of nylon 6. These mixtures are reported to allow optimum reprocessing only if the influence of this nylon contamination on the properties of the recyclate is known. Investigations are described, which aim at elucidating the correlations between the respective phase morphology and the

resultant mechanical properties. Results indicate how far a relatively low polyamide content may affect the properties of ABS with particular reference to brittleness. 5 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.703660

Item 237

Kunststoffe Plast Europe

85, No.6, June 1995, p.18-9

ASA COPOLYMERS: PROPERTIES AND APPLICATIONS

Rosenau B

BASF AG

Acrylonitrile-styrene-acrylate copolymers are reviewed in terms of properties and the applications for which they are suited. The chemical structure of ASA is described, which accounts for their superior ageing behaviour compared to that of ABS. In applications, ASA is seen to be replacing ABS in areas such as automotive. Further areas of applications, including its use in blends are examined, and include bathroom fittings, boats, garden equipment, building, and electronic and electrical goods. 7 refs

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.703621

Item 238

Muanyag es Gumi

32, No.3, March 1995, p.73-77

Hungarian

MODERN ADDITIVES FOR THE PLASTICS INDUSTRY. PART 1. ANTIOXIDANTS

Volk J

Hoechst Hungaria Kft

A comprehensive review is given of the role of antioxidants, presenting primary and secondary antioxidants corresponding to modern requirements. The efficiency of particular combinations of antioxidants is illustrated with examples of stabilisation of polypropylene, linear polyethylene, high-density polyethylene and ABS. Articles from this journal can be requested for translation by subscribers to the Rapra produced International Polymer Science and Technology.

EASTERN EUROPE; HUNGARY

Accession no.703563

Item 239

Injection Molding

6, No.9, Sept.1998, p.80

“WORLD” GRADE ABS NOW AVAILABLE

This short item introduces three new grades of “Terluran” ABS from BASF: Terluran GP-22, Terluran GP-35, and

Terluran HI-10. The properties of each of the grades is briefly described, and applications are mentioned.

BASF

USA

Accession no.703451

Item 240

Polymer

40, No.2, Jan.1999, p.365-77

COMPATIBILISATION OF PBT/ABS BLENDS BY METHYL METHACRYLATE-GLYCIDYL METHACRYLATE-ETHYL ACRYLATE TERPOLYMERS

Hale W; Keskkula H; Paul D R

Texas,University

Details are given of the synthesis of methyl methacrylate-glycidyl methacrylate-ethyl acrylate terpolymers and their use as compatibilisers for PBTP/ABS blends. Evidence for reaction between the carboxyl endgroups of PBT and the epoxide groups of glycidyl methacrylate during melt processing to form a graft copolymer is presented. The effect of terpolymer composition and content on morphology generation and stabilisation of PBT/ABS blends was studied in depth. 53 refs.

USA

Accession no.703007

Item 241

Molding Systems

56, No.8, Oct.1998, p.11

ABS & TPU GRADES ANNOUNCED

BASF has established standard “world grades” in its Terluran family of ABS compounds, it is briefly reported. The new grades include an easy-flowing, general purpose moulding grade and a medium-flow moulding grade with very high impact strength. Meanwhile, BF Goodrich is introducing several PU-based grades for injection moulding. Estane 58810 is said to have excellent cut, abrasion resistance and UV resistance for components such as wheels, grommets and shock pads.

BASF CORP.; GOODRICH B.F.,CO.

USA

Accession no.702602

Item 242

West Conshohocken, PA, 1997, pp.8.

ASTM F 628-. SPECIFICATION FOR ACRYLONITRILE-BUTADIENE-STYRENE (ABS) SCHEDULE 40 PLASTIC DRAIN, WASTE, AND VENT PIPE WITH A CELLULAR CORE

American Society for Testing & Materials

ASTM F 628-

Version 97. Photocopies and loans of this document are not available from Rapra.

USA

Accession no.701722

Item 243

Plasty a Kaucuk

31, No.12, 1994, p.368-72

Czech

REACTIVE COMPATIBILISATION OF BLENDS OF ABS AND NYLON 6

Grmela V; Konecny D

Kralupy, Synthetic Rubber Research Institute

The authors show how the addition of a compatibiliser consisting of a maleinised polymer containing functional groups results in a chemical reaction between the compatibiliser and nylon 6 during extrusion of ABS and nylon 6 blend resulting in bonding. As a result the morphology of the blend is changed, leading to a marked increase in the toughness of the blend. The effects of the compatibiliser concentration, nylon content, amount of elastomer in the ABS and the extrusion conditions on the physical and mechanical properties of the product are described. 10 refs. Articles from this journal can be requested for translation by subscribers to the Rapra produced International Polymer Science and Technology.

CZECH REPUBLIC

Accession no. 701675

Item 244

Modern Plastics International

28, No.11, Nov.1998, p.90

ABS HOUSING FOR REFRIGERATOR

A Turkish refrigerator manufacturer, which has already captured about 10% of the European market, is using Cycolac S700 ABS from GE Plastics for the injection moulded outer skin of its latest, up-market No-Frost Orbital high energy-efficiency series. The liner is thermoformed from Cycolac S848, it is briefly reported.

GE PLASTICS BV

EUROPEAN COMMUNITY; EUROPEAN UNION;
NETHERLANDS; WESTERN EUROPE

Accession no. 700615

Item 245

Plastics Technology

44, No.11, Oct.1998, p.24

ABS 'WORLD GRADES' ARE WHITE, GLOSSIER

A new emulsion polymerisation method developed by BASF is said to produce superior products that will soon become the company's global line of standard resins. These 'world grades' of Terluran ABS were commercialised at a plant in Germany last year and one in South Korea in March. A third plant using this technology will start up early next year in Altamira, Mexico, to supply the North American market. BASF is now premarketing the materials. They have gloss levels about 10 points higher than any other ABS material, and they have very consistent colour that is lighter than almost all other emulsion grades. They are also said to have a

better balance of flow, impact, stiffness and heat resistance, allowing fewer grades to fill a wide range of uses. Brief details are noted.

BASF; AG; BASF CORP.

USA

Accession no. 699964

Item 246

Plastics Technology

44, No.10, Sept.1998, p.39

WHAT'S ON TOP IN KITCHENS & BATHS? NEW COEX SHEET IS SOLID PROSPECT

Knights M

In response to a forecasted rise in demand for Do-It-Yourself kitchen and bathroom fittings, GE Plastics has developed a new type of coextruded thermoformable sheet, which combines Enduran highly filled PBTP and ABS. The sheet is reported to offer advantages in terms of performance and price. It consists of high melt strength Enduran HV7322 extrusion and thermoforming grade and a special ABS (Cycolac END 2810) that is modified to bond with the PBTP. GE Plastics has conducted processing trials at its Plastics Processing and Development Center in order to be able to educate thermoformers in the use of the material. The main results of these trials are summarised here.

GE PLASTICS

USA

Accession no. 699586

Item 247

Machine Design

70, No.17, 24th Sept.1998, p.153

EXTRUDED PLASTIC HAS TRUCK BEDS COVERED

The design of the world's first all-engineered plastic tonneau cover is briefly described. Created by Prodesign, a coextruded sheet of Lustran ABS was chosen together with Centrex weatherable polymer. Spartech Corp. coextruded sheets of the two materials which are then thermoformed. The cover weighs only 83 pounds compared to traditional fibreglass covers weighing 125 to 150 pounds.

PRODESIGN; BAYER CORP.; SPARTECH

USA

Accession no. 699570

Item 248

Materie Plastiche ed Elastomeri

No.9, Sept.1997, p.560-5

Italian

TELECTRONICS: NEW HORIZONS FOR THE USE OF STYRENIC MATERIALS

Bellintani R; Maffezzoli P

EniChem SpA

Trends in the consumer electronics, information technology, telecommunications and audio-video markets are reviewed, and the use of plastics materials produced by EniChem in electrical and electronic applications is examined. These include different grades of Edistir general purpose and high-impact PS, Sinkral ABS, Koblend PCA ABS/polycarbonate blends and Kostil C36 SAN.

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY; WESTERN EUROPE; WORLD

Accession no.698964

Item 249

Plastiques Flash

Nos.294/5, Jan./Feb.1997, p.54-7

French

NEW START FOR PBTP

A survey is made of developments by BASF in Ultradur PBTP resins and Ultradur S PBTP/ASA blends, including glass fibre-reinforced grades. Automotive and electrical applications of these materials are described.

BASF AG; GE PLASTICS

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; USA; WESTERN EUROPE

Accession no.698921

Item 250

Polymers & Polymer Composites

6, No.4, 1998, p.223-7

EXPERIMENTAL STUDY OF POLYMER BLEND MIXING IN TWIN-SCREW EXTRUDERS

Papathanasiou T D; Higgins J S; Soontaranum W
London,University,Imperial College

The performance of a laboratory-scale fully intermeshing twin screw extruder for the production of SAN/PMMA blends was investigated. The uniformity of the extruded material was analysed using IR spectrophotometry on samples taken at various locations along a strand extruded from a cylindrical die. The possibility of degradation was investigated through GPC. 9 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK; WESTERN EUROPE

Accession no.697318

Item 251

Polymer

39, No.21, 1998, p.4993-5000

REACTIVE COMPATIBILISATION OF A/(B/C) POLYMER BLENDS. PART 2. ANALYSIS OF THE PHASE INVERSION REGION AND THE CO-CONTINUOUS PHASE MORPHOLOGY

Dedecker K; Groeninckx G
Leuven,Catholic University

Polyamide-6 (PA-6)/PMMA blends were compatibilised using the reactive copolymer styrene-maleic anhydride with 20 wt% maleic anhydride (SMA20). SEM was used

to analyse the region of phase co-continuity for the non-compatibilised and compatibilised blends. The blend composition range of phase co-continuity was shifted to a lower PA-6 content when compatibiliser was added and the co-continuous structures were observed over a much narrower composition range. The composition range of phase co-continuity was shifted to lower PA-6 content with decreasing molecular weight of PA-6; this shift was in agreement with the change in viscosity of PA-6. Dynamic mechanical thermal analysis confirmed the SEM results. A change in storage modulus and damping was observed in the phase inversion region. Fractionated crystallisation occurred in the blends where PA-6 formed the dispersed phase. 21 refs.

BELGIUM; EUROPEAN COMMUNITY; EUROPEAN UNION; WESTERN EUROPE

Accession no.696591

Item 252

Polymer

39, No.21, 1998, p.4985-92

REACTIVE COMPATIBILISATION OF A/(B/C) POLYMER BLENDS. PART 1. INVESTIGATION OF THE PHASE MORPHOLOGY DEVELOPMENT AND STABILISATION

Dedecker K; Groeninckx G
Leuven,Catholic University

The compatibilisation of polyamide-6 (PA-6)/PMMA blends with styrene-maleic anhydride copolymer (SMA) was studied. Compatibilisation using the reactive copolymer SMA20 (20 wt% MA) was quite efficient. Five to 6 wt% SMA20 copolymer was needed to produce the minimum particle size for the dispersed PMMA phase in the blend PA-6/PMMA (75/25). During melt blending experiments, the phase morphology was analysed as a function of the extrusion time. Diffusion of SMA towards the PA-6/PMMA interface was concluded to be the rate limiting step for the formation of the graft copolymer PA-6-g-SMA and hence for the reactive compatibilisation process. The reduction of coalescence in the compatibilised blends was the main reason for the dispersed phase particle size reduction. The use of SMA copolymers with different MA contents showed that the functionality of SMA was a critical parameter for its compatibilising efficiency in the blends because it affected the miscibility of SMA with PMMA. When low molecular weight PA-6 was used, the added SMA compatibiliser was used more efficiently. 33 refs.

BELGIUM; EUROPEAN COMMUNITY; EUROPEAN UNION; WESTERN EUROPE

Accession no.696590

Item 253

Injection Moulding International

3, No.5, Aug/Sept.1998, p.60-2

SOLUTIONS TO COSMETIC DEFECTS, PART 3: PLATING PROBLEMS FROM BLUSH AND

HAZE

Hatch B
Prime Alliance

Problems with surface defects on a plating grade of injection moulded ABS are troubleshooted. The part was an oval shape which had haze on the curved section and blush at the gate. Details are given of changes made to the size of the runner to improve the flow path and run lower barrel heats, and in addition, the runners were vented to get rid of excess air that was being forced through the gates and overloading the parting line vents. The gates were found to be undersized and were causing blush on the part. This was rectified and the gates were perimeter vented. Improved cycle time was achieved as well as an almost zero rejection rate from the plater.

USA

Accession no.696443

*Item 254***Plastics Engineering**

54, No.9, Sept.1998, p.51

PC/ABS AUTOMOTIVE IPS

Cycloy IP 1000, an engineering thermoplastic grade of polycarbonate/ABS resin is being targeted by GE Plastics as a suitable material for the manufacture of automotive instrument panels. The PC/ABS blend is said to combine the best properties of both materials in terms of processability, higher heat resistance and impact strength. In addition, the benefits of a higher flow offer advantages to injection moulders, details of which are briefly outlined.

GE PLASTICS

USA

Accession no.695864

*Item 255***Plastics Engineering**

54, No.9, Sept.1998, p.50

TEA MAKES HANGING ON EASIER

Applications and properties are briefly outlined for Multiflex thermoplastic elastomer alloys (TEA) from Multibase Inc. Their adhesive qualities have made them useful in automotive applications such as overmoulding seals on ABS backlights and PMMA indicators. It is also useful for hand-held tools and toothbrushes where a soft-grip touch is required. Designed as an alternative to polyester and polyurethane elastomers, Multiflex TEA is based on SEBS chemistry.

MULTIBASE INC.

USA

Accession no.695863

*Item 256***Plastics in Building Construction**

22, No.10, July 1998, p.4-5

RAILING MANUFACTURER SELECTS LONG FIBRE REINFORCED ABS/PVC EXTRUSIONS

CW Ohio has selected Celstran long-fibre reinforced ABS for use in its rails and newel posts. The hollow-section, long-glass reinforced extrusions, with a coextruded skin of PVC for appearance and UV resistance, meet building codes for structural integrity and hold tight dimensions over a broad temperature range. CW Ohio together with Intek Plastics, which pioneered the extrusion of VHME (Very High Modulus Extrusions), pursued the first architectural application of long-fibre reinforced thermoplastics.

CW OHIO INC.

USA

Accession no.695054

*Item 257***Advanced Materials**

10, No.12, 20th Aug 1998, p.934-8

LINEAR POLARIZERS BASED ON ORIENTED POLYMER BLENDS

Jagt H; Dirix Y; Hikmet R; Bastiaansen C

Eindhoven, University of Technology; Philips Research Laboratories; Zurich, Institut für Polymere

Linear sheet polarisers based on the anisotropic scattering of light can be made from commercial polymers using conventional processes. The selection of materials and processing conditions for the production of large-area, flexible films of phase-segregated polymer blends suitable for polarisation applications are described. The polarisers are produced from solid-state polymer blends. Results are reported for blends based on poly(ethylene-2,6-naphthalenedicarboxylate) as the continuous phase and a styrene/methylmethacrylate copolymer as the dispersed phase. The polarisers produced possess a high efficiency and display other potential advantages in comparison to dichroic polarisers such as enhanced temperature and humidity resistance and an enhanced light stability, properties which are useful for projection displays, projection screens, and displays in automotive dashboards. 35 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; NETHERLANDS; SWITZERLAND; WESTERN EUROPE

Accession no.694478

*Item 258***Polymer**

39, No.25, 1998, p.6315-24

DEVELOPMENT OF TOUGHNESS IN ABS RESINS

Giaconi G F; Castellani L; Maestrini C; Ricco T
Trento, University; EniChem Research Centre

Acrylonitrile-styrene-butadiene (ABS) polymers were prepared by emulsion and mass polymerisation techniques, and their microstructures investigated. The effect of the morphology of the disperse phase on the mechanical properties of the polymers was characterised by fracture mechanics testing, and the plastic deformation

mechanisms were investigated in situ by transmission electron microscopy, which was correlated to the observed fracture properties. Dynamic mechanical analysis was used to obtain information on the stress field in and around the dispersed particles. The microstructure of the materials was related to the differences and mechanical properties. Particles from emulsion polymerisation were able to cavitate and promote plastic deformation through shear yielding. 23 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY;
WESTERN EUROPE

Accession no.694455

Item 259

Patent Number: US 5719232 A 19980217

**ABS TYPE THERMOPLASTIC MOULDING
COMPOUNDS**

Schmidt A; Eichenauer H; Jansen U
Bayer AG

ABS type thermoplastic moulding compounds obtainable by (A) producing a rubber latex with an average particle diameter of 30-160nm and a gel content of 75-100 wt.%, (B) emulsion polymerisation of an amount of butadiene and optionally up to 50 wt.% (with reference to the total amount of monomer in stage (B) of a comonomer in the presence of the rubber latex (B) with an average particle diameter 220-330nm and a gel content of 25-70 wt.% is produced, (C) emulsion polymerisation of 40-95 pbw of a mixture of styrene and acrylonitrile, which optionally contains up to 50 wt.% (with reference to the total amount of monomers used in stage (C) of one or more comonomers, in the presence of 5-60 pbw (with reference to solids) of the rubber obtained in stage (B) by introducing the monomer in such a way that 55-90 wt.% of the monomers are added within the first half of the total monomer introduction time, and (D) mixing the polymer obtained in stage (C), preferably after first converting it into a powder, with at least one thermoplastic vinyl resin.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.693395

Item 260

Injection Molding

6, No.7, July 1998, p.46

PC/ABS BLEND OFFERS HIGH FLOWS

Cycloxy IP1000 polycarbonate/ABS resin, an engineering thermoplastic grade developed particularly for automotive instrument panels, provides improvements in flow and productivity with up to 20% better production than comparable resins, according to GE Plastics. It offers good processability, high heat resistance and good impact strength. These benefits, combined with higher flow, give moulders reduced injection pressures, which result in less tool wear. Cycloxy IP-1000 enables longer flow lengths,

making the moulding of complex parts simpler, and has a high modulus over a broad range of temperatures, with a heat distortion temperature of 230 deg.F. It also keeps its good impact resistance even at low temperatures (-22 deg.F). Notched Izod is 10 ft-lb/in. (ASTM D256) and the total energy is 550 in.-lb (ASTM D3763). This abstract includes all the information contained in the original article.

GE PLASTICS

USA

Accession no.692621

Item 261

Plastics Technology

44, No.8, Aug.1998, p.26

FAST-CYCLE PC/ABS HITS THE ROAD

A recently-commercialised high-flow polycarbonate/ABS for automotive instrument panels can improve productivity by up to 20% compared with standard grades, according to GE Plastics. Cycloxy IP1000 offers moulders longer flow and lower injection pressures, simplifying production of complex parts. It also has an HDT of 230 deg.F and notched Izod impact strength of 10 ft-lb/in. at -22 deg.F. It is reported to offer good high-impact resistance even at very low temperatures. This abstract includes all the information contained in the original article.

GE PLASTICS

USA

Accession no.692590

Item 262

Kunststoffe Plast Europe

88, No.7, July 1998, p.33-4

DESIGN UNDER THE BONNET TOO

Seitz G; Schmidt H-J; Engel J

The construction of a central control device in the engine compartment of vehicle imposes high demands concerning material selection on designers. A glass fibre-reinforced PBTP/ASA blend permits the production of this complicated unit without major warpage problems and with high surface quality. Details are given.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.692474

Item 263

Plastics and Rubber Weekly

No.1753, 11th Sept.1998, p.8

DOW ENGINEERS BIG SAVINGS FOR FORD

It is briefly reported that Pulse ABS/PC resin from Dow Automotive enabled a joint team to achieve cost and weight savings in developing the instrument panel for Ford's new Mercury Cougar sports coupe. Meanwhile, Dow's Spectrim BP80 polyurea composite is reducing

weight and assembly steps in the fender flares on the new Ford F-350 dual rear wheel trucks.

DOW AUTOMOTIVE
USA

Accession no.691515

Item 264

Patent Number: US 5726258 A 19980310

CONTINUOUS PREPARATION OF POLYMERS

Fischer W; Baumgaertel M
BASF AG

Copolymers of styrene and acrylonitrile, in particular, are produced by bulk or solution polymerisation, which involves passing the reaction components through tubes of a recycle reactor, which has at least one tube bundle reactor with straight tubes around which a liquid heat transfer medium flows. Each tube bundle reactor consists of at least two shell and tube heat exchangers, which are connected together by at least one intermediate mixing section. The volume of the shell and tube heat exchangers is at least 50% of the total volume of the arrangement. The intermediate mixing sections consist of tubes with static mixing elements around which tubes a heat transfer medium flows.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.690536

Item 265

Plastics Engineering

54, No.6, June 1998, p.57

RESIN YOU COULD LOVE

Bayer believes that its Triax family of resins offers features any moulder or OEM would like - impact and fatigue resistance, colourability, chemical and saltwater resistance, easy processability; toughness right out of the mould, low specific gravity, reduced moisture absorption compared with conventional nylon and improved dimensional stability. The Triax resins include grades 1120, 1180, 1220, 1315, and a developmental product, Triax DP2-1305. All are blends of nylon 6 and ABS (ABS). Triax 1120 is a general-purpose resin. Triax 1180, a general-purpose product for injection moulding of larger parts where smooth finish and consistent appearance are important is said to be especially suited for low cycle time applications. Triax 1220 is a high-impact, satin-gloss extrusion product, especially useful where chemical and abrasion resistance are required. Triax 1315 is a 15% glass-reinforced blend for injection moulding useful in making flat, thin parts requiring rigidity and warpage control. Triax DP2-1305 is a developmental material using a smaller amount of glass fibre than 1315, but having many similar positive properties, including dimensional stability. This abstract includes all the information contained in the original article.

BAYER CORP.
USA

Accession no.690471

Item 266

Modern Plastics International

28, No.7, July 1998, p.132

ABS RECYCLATE

It is briefly reported that Novodur R 5320 ABS recyclate, made from part-production rejects, is a general-purpose grade for injection moulding. The material, from Bayer, has a tensile stress at yield of 38 MPa and a flexural stress at 3.5% strain of 67 MPa.

BAYER AG

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.688545

Item 267

Injection Moulding International

3, No.4, June/July 1998, p.35

CORVETTE WINNER CHOCK FULL OF THERMOPLASTICS

The Corvette, which won the 1998 Motor Trend Car of the Year and the 1998 North American Car of the Year awards, deserves praise for the innovative use of thermoplastics on the car. Inside the Corvette, long-term quality was the critical consideration, according to Engineered Plastic Products, a Tier One supplier who provided many of the interior trim components. The parts include A-pillars, A-pillar extensions, sills, lock pillars and front and rear headers, all moulded from Magnum 344HP, Dow's ABS. Other parts include the foot bracket and luggage support bracket, moulded from Pulse 83 polycarbonate/ABS blend, also from Dow. Brief details are noted.

DOW EUROPE SA; ENGINEERED PLASTIC
PRODUCTS INC.

SWITZERLAND; USA; WESTERN EUROPE

Accession no.687961

Item 268

Injection Moulding International

3, No.4, June/July 1998, p.30

PORSCHE MIRROR HOUSING USES GAS-ASSISTED MOULDING

Innovative mould engineering and a gas-assist process have allowed the housings for the exterior side mirrors on the Porsche Boxster to be manufactured through injection moulding. The mirror housing in ABS (EniChem's Sinkral C350) is injection moulded by Donnelly Hohe in Germany, employing the gas-assist injection moulding technique (Airpress III) on an FM 250 from Ferromatik Milacron. The moulds are also built at Donnelly Hohe. The Airpress III process involves the key stages of injecting the molten plastic into the mould cavity, forcing in additional polymer to compensate for shrinkage, injecting gas into the still-molten centre of the polymer and forming the gas channels, and expelling

the still-molten centre into an overflow cavity. Brief details are given.

ENI GROUP

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY;
WESTERN EUROPE

Accession no.687955

Item 269

Advanced Materials & Processes

153, No.6, June 1998, p.42

THERMOPLASTICS MEET HEAD-IMPACT CRITERIA

A new design and new materials are being used at Chrysler to meet the most recent government regulations for head-impact criteria (HIC) on the Concorde and Intrepid sedans. The design incorporates a one-piece thermoplastic zipper interior pillar system with moulded-in ribs designed to manage energy. Constructed of Magnum 7150EM impact modified ABS resin from Dow Chemical, the product also meets requirements for low-temperature ductility, elimination of paint, low-gloss aesthetics, speed to market and minimal packaging space. The 1998 Chrysler Concorde and Dodge Intrepid sedans are the first Chrysler production cars to meet the new standard. The company reports savings of 1.75 million US dollars over the thermoplastic pillar and energy-absorbing foam design, and 3.25 million US dollars compared with the painted PC/ABS pillar design. This abstract includes all the information contained in the original article.

DOW CHEMICAL CO.; CHRYSLER CORP.
USA

Accession no.687896

Item 270

Antec '98. Volume II. Conference proceedings.

Atlanta, Ga., 26th-30th April 1998, p.1668-71. 012

CRAZE GROWTH IN STRESS RELAXATION CONDITIONS: EFFECTS OF PHYSICAL AGEING

Delin M; McKenna G B

US,Inst.of Standards & Technology
(SPE)

Craze growth in a styrene-acrylonitrile copolymer under stress relaxation conditions is examined as a function of time after a quench, i.e. physical ageing time, at four temperatures from ambient to 60 deg.C. It is found that the craze length varies linearly in the logarithm of loading time. A transition from a high logarithmic growth rate to a rate some 4-6 times slower is found to occur with respect to ageing time. The transition seems to move to shorter ageing times as temperature increases. The slow growth rate is relatively insensitive to temperature for all four temperatures investigated and the rapid growth rate is also approximately the same for both temperatures, for which it is observable in the ageing time range accessible in these experiments. 15 refs.

USA

Accession no.687614

Item 271

Patent Number: US 5672645 A 19970930

FLAME RESISTANT POLYCARBONATE/ABS MOULDING COMPOUNDS RESISTANT TO STRESS CRACKING

Eckel T; Wittmann D; Oeller M; Alberts H
Bayer AG

The invention relates to flame resistant, thermoplastic moulding compounds containing (A) 40 to 98 pbw of an aromatic polycarbonate, (B) 3 to 50 pbw of a vinyl copolymer, (C) 0.5 to 40 pbw of a graft copolymer, (D) 0.5 to 20 pbw of a mixture of (i) 10 to 90 wt.%, relative to (D), of a specific monophosphorus compound, (ii) 90 to 10 wt.%, relative to (D), of a specific oligomeric phosphorus compound, and (E) 0.5 to 5 pbw of a fluorinated polyolefin with an average particle diameter of 0.05 to 1000 microns, a density of 1.2 to 2.3 g/cm³ and a fluorine content of 65 to 76 wt.%.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.687339

Item 272

Patent Number: EP 752270 A2 19970108

METHOD AND APPARATUS FOR THE CONTINUOUS PRODUCTION OF POLYMERS

Fischer W; Baumgartel M
BASF AG

A method is disclosed for the continuous production of polymers, especially styrene-acrylonitrile copolymers, by bulk or solution polymerisation. The process comprises passing the reaction components through a loop reactor which contains at least one tubular reactor containing static mixer element(s) through which a liquid heat transfer medium flows. Also claimed is an apparatus for this process. Preferably the monomer mixture contains (a) vinylaromatic monomer(s) and (b) (meth)acrylonitrile, (1-8 C alkyl) (meth)acrylate and/or maleic anhydride; preferably (a) is styrene, O-methylstyrene and/or p-methylstyrene. Suitable solvents for solution polymerisation are 6-12 C aromatic hydrocarbons, preferably benzene, toluene, ethyltoluene or ethylbenzene, in amounts of 1-25 (preferably 2-18) wt% to 100 wt% monomer mixture, together with up to 5 wt% water. The mixture leaving the reactor is subjected to single- or multi-stage evaporation to reduce the content of volatiles to less than 1 (preferably less than 0.5) wt% w.r.t. polymer, and the volatile components are preferably condensed and recirculated to the reactor. The reactor is operated at 50-230C (preferably 50-180C) and 0.1-100 bar (preferably 0.5-75 bar), and/or the mean dwell time of monomers in the reaction mass is 20-420 (preferably 45-300) minutes, and/or the flow rate of the reaction medium in the tube reactor is 0.5-20 (preferably 2-15) cm/sec.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.686540

Item 273

Patent Number: EP 752269 A2 19970108

METHOD AND APPARATUS FOR THE CONTINUOUS PRODUCTION OF POLYMERS

Fischer W; Baumgartel M
BASF AG

A method is disclosed for the continuous production of polymers, especially styrene-acrylonitrile copolymers, by bulk or solution polymerisation. The process comprises passing the reaction components through a loop reactor which contains at least one bank of tubes in thermal contact with a liquid heat transfer medium and which is connected with at least one static mixer element. Also claimed is an apparatus for this process.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.686539

Item 274

Patent Number: EP 752268 A2 19970108

METHOD AND APPARATUS FOR THE CONTINUOUS PRODUCTION OF POLYMERS

Fischer W; Baumgartel M
BASF AG

A method for maximising space-time yield in bulk or solution polymerisation is disclosed. The novel features in the bulk or solution polymerisation (especially styrene/acrylonitrile copolymer manufacture) involving feed of the reaction components to a recycle reactor are that: (a) the reactor has at least one tubular bundle reactor with straight or upright tubes sprinkled with a fluid heat-exchange medium; and (b) each tubular bundle reactor consists of at least two tubular bundle heat exchangers linked to each other via at least one intermediate mixing zone, preferably a static mixer. The apparatus is also claimed per se.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.686538

Item 275

Materie Plastiche ed Elastomeri

No.4, April 1997, p.194/9

Italian

POLYMERS IN THE HOME

Modini G

The activities of some leading Italian companies in the manufacture of housewares using polymeric materials are reviewed. Applications of plastics and thermoplastic elastomers in this field are examined, and particular attention is paid to Terluxe, a modified ABS developed by BASF using methyl methacrylate as a fourth monomer.

FRATELLI GUZZINI; BAYER AG; GRUPPO GIOVENZANA; LAURA G; GIO STYLE SPA;

SANELLI; ADVANCED ELASTOMER SYSTEMS;
BASF AG

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; ITALY; USA; WESTERN EUROPE

Accession no.686309

Item 276

Ludwigshafen, 1996, pp.12. 28cms. 17/11/97

LURAN STYRENE/ACRYLONITRILE COPOLYMER (SAN) : RANGE CHART - FEATURES - APPLICATIONS - TYPICAL VALUES

BASF AG

Detailed technical information is presented on the Luran range of styrene-acrylonitrile copolymers from BASF. The materials are produced by copolymerisation of styrene and acrylonitrile, with random distribution of the monomeric building blocks in the polymer chain. The brochure provides tabulated data on processing features, applications, flammability, mechanical characteristics, and thermal and electrical properties for each of the seven available grades.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.685123

Item 277

Ludwigshafen, 1996, pp.16. 28cms. 17/11/97

TERLURAN ACRYLONITRILE/BUTADIENE/STYRENE POLYMER (ABS) : RANGE CHART - FEATURES - TYPICAL VALUES - APPLICATIONS

BASF AG

Detailed technical information is presented on the Terluran range of ABS polymers from BASF. The product line comprises two variants: the 800 series based on a finely divided butadiene-acrylic rubber submicroscopically distributed in the SAN matrix, and the 900 series modified by a similarly finely divided butadiene rubber. Processing, flammability, and properties data are tabulated for each of the twenty-three Terluran grades, together with details of typical applications for the materials.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.685121

Item 278

Antec '98. Volume I. Conference proceedings.

Atlanta, Ga., 26th-30th April 1998, p.676-80. 012

EXPERIMENTAL AND THEORETICAL STUDY OF THE THERMOFORMABILITY OF INDUSTRIAL POLYMERS

Laroche D; Erchiqui F

Canada,National Research Council (SPE)

The processability of industrial polymers is experimentally and numerically investigated. The heating

temperature of ABS and high-impact PS sheets is systematically varied in order to determine the minimum sheet temperature required for vacuum forming onto two different cavity moulds. Finite element simulations of the process using hyperelastic and viscoelastic constitutive equations are also performed in order to analyse the models ability to predict thermoformability of polymers. Prediction of minimum required sheet temperature as well as the part thickness distribution are compared to experimental measurements. 9 refs.

CANADA

Accession no.684502

Item 279

Antec '98. Volume I. Conference proceedings.

Atlanta, Ga., 26th-30th April 1998, p.672-5. 012

MATERIAL CONSTANTS IDENTIFICATION FOR THERMOFORMING SIMULATION

Derdouri A; Connolly R; Khayat R; Verron E; Peseux B
Canada,National Research Council; Nantes,Ecole Centrale

(SPE)

Using the bubble inflation experiment, biaxial tests are conducted on ABS sheets at 145 deg.C and the pressure versus height at the hemispheric pole recorded. When solving the non-linear equilibrium equations governing the inflation process, use is made of the experimental values to identify the material constants. The results of this work show that the bubble inflation technique can be useful in characterising polymeric materials in the rubbery state. 9 refs.

CANADA; EUROPEAN COMMUNITY; EUROPEAN UNION; FRANCE; WESTERN EUROPE

Accession no.684501

Item 280

Antec '98. Volume I. Conference proceedings.

Atlanta, Ga., 26th-30th April 1998, p.367-71. 012

PROCESSING STRATEGIES FOR THIN WALL INJECTION MOULDING

Tantakom P; Schott N R

Lowell,Massachusetts University

(SPE)

Controlling the mould surface temperature as a means to enhance the capability of a conventional injection moulding machine in producing thin wall parts is investigated. An HPM, 90 ton, 170 g conventional injection moulding machine with a single cavity, cold runner, plaque mould is employed. The materials used in the study are polycarbonate and ABS. A data acquisition system is used to acquire the cavity pressure and temperature profiles of parts for further analysis. A design of experiment technique is applied to optimise the process parameters of the thin wall process. The process is also simulated on C-Mould process simulation software for a comparative study. 2 refs.

USA

Accession no.683975

Item 281

Polymer

39, No.17, 1998, p.3901-4

TERMINAL AND PENULTIMATE MODELS OF COPOLYMERIZATION IN THE STYRENE-ACRYLONITRILE SYSTEM IN BULK ACCORDING TO UNIFAC

Kaim A; Oracz P

Warsaw,University

The terminal and penultimate models of copolymerisation in the styrene-acrylonitrile monomer system in the bulk at 333.15K were described by the UNIFAC group contribution method for determination of local monomer concentration and the simplex method for determination of reactivity ratios. The results obtained showed that the procedure was applicable for prediction of the kinetic behaviour of the comonomer pair. Local monomer concentrations, true reactivity ratios, distribution coefficients and the newly-introduced parameter A, measuring deviation of the local concentration from the global concentration, were calculated. The results indicated that the absolute value of the distribution coefficient depended on the type of reactivity ratio but not on the monomer ratio in the feed. 19 refs.

EASTERN EUROPE; POLAND

Accession no.683616

Item 282

Patent Number: US 5708079 A 19980113

THERMOPLASTIC ABS MOULDING COMPOSITIONS

Eichenauer H; Leitz E; Piejko K-E; Krueger P

Bayer AG

These contain (A) 5 to 95 pbw of at least one particle-shaped graft rubber polymer of the ABS type produced by emulsion polymerisation, (B) 95 to 5 pbw of at least one particle-shaped graft rubber of the ABS type prepared by emulsion polymerisation and, optionally, (C) 0 to 300 pbw of at least one thermoplastic rubber-free resin. The graft rubber particles of A have such a structure detectable by TEM, in which the individual particles contain irregular cell-shaped inclusions of resin-forming polymer and the surface of the particles exhibits such an irregular toothed structure that, for every particle imaged, 5 to 30 of such teeth are present, which are distinguished from an idealised round particle. The graft rubber particles of B have such a structure detectable by TEM, in which the individual particles do not have a pronounced inner structure as in A and possess a round particle shape with a completely tooth-free surface.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.683467

Item 283

Polyblends '97. Retec proceedings.

Boucherville, Qc., 9th-10th Oct.1997, p.448-62. 6125

**EFFECTS OF EXTRUDER TYPE,
COMPATIBILISER LEVEL AND COMPOSITION
ON THE MORPHOLOGY AND IMPACT
STRENGTH OF A POLYAMIDE 6/ABS BLEND**

Lacasse C; Favis B

Montreal, Ecole Polytechnique; Bayer/Monsanto
Canada Inc.

(SPE; Industrial Materials Institute; National Research
Council of Canada)

The influence of extruder type and the compatibiliser level in ABS/polyamide 6 blends is studied by detailed morphological analysis (emulsification curve). The impact strength is analysed in order to observe its behaviour at the critical concentration for interfacial saturation as well as the effect of dispersed phase composition. Blends are prepared on single- and twin-screw extruders. The size of the dispersed domains reveals important differences between the compounding effects of the single-screw as compared to a twin-screw extruder. A compatibilising agent renders such a blend more homogeneous by reducing the particle size of the dispersed phase. It is also found for the single-screw extruder that the interface is not saturated and the phase size equilibrium value is not obtained. The higher efficacy of the twin-screw extruder in migrating the modifier to the interface is clearly demonstrated through the use of the emulsification curve. The impact strength shows a significant increase, which correlates well with the critical concentration of interfacial modifier from the emulsification study (interfacial saturation). The impact strength of the compatibilised system as a function of dispersed phase composition displays an optimal impact strength around 50% ABS in the co-continuous morphology region. 10 refs.

CANADA

Accession no.683353

Item 284

Antec '98. Volume I. Conference proceedings.

Atlanta, Ga., 26th-30th April 1998, p.272-6. 012

**PERFORMANCE OF A STRATABLEND MIXING
SCREW FOR SINGLE-SCREW EXTRUSION**

Somers S A; Spalding M A; Hughes K R; Frankland J D
Dow Plastics; NewCastle Industries

(SPE)

Experiments are performed on a mixing screw to assess its melting, pumping and mixing characteristics. This is done by extrusion trials, extrudate sampling, extrusion solidification experiments and comparison with results for a screw without a mixing section. Comparisons are made as a function of screw speed and colour concentrate letdown ratio. 9 refs.

USA

Accession no.683330

Item 285

**Composites Part A: Applied Science and
Manufacturing**

29A, Nos.5-6, 1998, p.631-41

**FRACTURE RESISTANCE OF UNFILLED AND
CALCITE-PARTICLE-FILLED ABS COMPOSITES
REINFORCED BY SHORT GLASS FIBRES (SGF)
UNDER IMPACT LOAD**

Shao-Yun Fu; Lauke B

Dresden, Institute for Polymer Research eV

ABS terpolymer, unfilled and filled with calcium carbonate (calcite) particles, was used as a matrix for reinforcement with short glass fibres. All of the materials were prepared by injection moulding and the fibres in the specimens were oriented preferentially in the flow direction, i.e. the axial direction of the specimens. The composites were studied with respect to the work of fracture, the notched Charpy impact energy, determined by the Charpy V-notch impact test. The fracture surfaces of the composites were studied by SEM. The total work of fracture theory for short fibre-reinforced composites was used to evaluate the interface energy and the matrix fracture work, whereby the fibre fracture work was neglected because of the brittleness of glass fibres, only a small amount of broken fibres being observed experimentally. 26 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.682582

Item 286

Kunststoffe Plast Europe

88, No.5, May 1998, p.33. (Translated from
Kunststoffe 88 (1998) 5, pp.732-733.)

HOUSINGS FOR MEDICAL EQUIPMENT

Krueger R

Fried Kunststoffe GmbH

A housing for a defibrillator was redesigned using plastic structural foam moulding techniques. The required property and performance characteristics of the component are described, and advantages afforded by the use of an ABS housing with a cellular inner core and a solid outer skin are examined. The cellular structure assists impact absorption and structural foam moulding techniques are said to give designers a high degree of freedom. The design of the twin-cavity mould is described, which were relatively inexpensive to produce using unannealed steels or high strength aluminium alloys. The housing parts produced by structural foam moulding are said to have higher dimensional accuracy and precision than conventional injection mouldings.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.682371

Item 287

Revue Generale des Caoutchoucs et Plastiques

No.756, Feb.1997, p.39-42

French

PORTABLE ELECTRIC TOOLS IN A BUOYANT MARKET

Soler L

A survey is made of developments in the market for electric tools and the influence of the growth in do-it-yourself activities. A number of statistics show the French and European markets for these and other types of tools. Plastics materials used in the manufacture of such tools are examined, including ABS, polyacetals and glass fibre-reinforced PP and nylon 6.

BOSCH POWER TOOLS; BLACK & DECKER LTD.; PRODUCTION OUTILLAGE ELECTRIQUE; PEUGEOT; SKIL CORP.; ATLAS COPCO AB EUROPE-GENERAL; EUROPEAN COMMUNITY; EUROPEAN UNION; FRANCE; GERMANY; SCANDINAVIA; SWEDEN; UK; USA; WESTERN EUROPE; WORLD

Accession no.682300

Item 288

Modern Plastics International

28, No.6, June 1998, p.30-1

THINWALL MOULDING ASCENDS TO LARGE-PART PRODUCTION

Grande J A

GE Plastics is focusing on reducing the wall thickness on a 17-inch computer monitor by 33%, or to 2mm from the conventional 3mm. Such reduced thicknesses will result in less weight plus cycle time reductions of 20-30%. GE's high-flow Cycology C2800, a non-halogenated PC/ABS is being used. To meet the part's long flow length demands, GE has developed sequential valve gating. Meanwhile, the company has announced a new, cost-effective approach to providing inherent EMI/RFI protection for electronics makers.

GE PLASTICS
USA

Accession no.681877

Item 289

European Polymer Journal

34, No.2, Feb.1998, p.261-7

OPTIMUM CONDITIONS OF ELECTROLESS NICKEL PLATING ON CARBON FIBRES FOR EMI SHIELDING EFFECTIVENESS OF ENCF/ABS COMPOSITES

Chi-Yuan Huang; Jui-Fen Pai
Tatung, Institute of Technology

Nickel coated carbon fibres, the best conductive fillers for electromagnetic interference (EMI) shielding, were produced by electroless nickel plating. The carbon fibres, T300C and T700SC, were plated at different workloads, pH values and temperatures of plating bath, and were used for preparing composites of acrylonitrile-butadiene-styrene by polymer blending to test the EMI shielding effectiveness by the coaxial transmission line test. Surface morphology of the fibre was also studied. 18 refs.

TAIWAN

Accession no.681644

Item 290

Plastics News(USA)

10, No.10, 4th May 1998, p.12

GE PLASTICS LAB PUSHES PROCESSING ENVELOPE

Esposito F

The Polymer Processing Development Center of GE Plastics is described in terms of its developments in processing technologies for its range of engineering resins. Details are given of manufacturing technologies described at the PPDC's recent 10th anniversary, which includes thin walled computer monitors made from PC/ABS blends; increased use of carbon filled polycarbonate for EMI/RFI shielding applications; the Quick Tool software for product development; the improvement of graphics in insert mould decorations on cellular phone keypads and pagers; the use of True2Form brand PC film in automotive tail-lights; increased testing and processing research in the Optical Media Development Center which focuses on the use of polycarbonate in compact and digital versatile discs; spiral flow head blow moulding technology; the coextrusion of extra-wide sheeting; and a four-station rotary thermoforming machine for production of larger parts with high gloss surfaces.

GE PLASTICS
USA

Accession no.681363

Item 291

Journal of Injection Molding Technology

2, No.1, March 1998, p.23-9

NONDESTRUCTIVE PRODUCT CHARACTERISATION OF GAS BUBBLES IN GAS-ASSISTED INJECTION MOULDED PARTS

Lu X; Fong L; Chiang H H
Singapore, Gintic Institute of Manufacturing Technology

Scanning X-ray tomography, scanning acoustic microscopy and ultrasonic thickness gauge measurement were used to examine the gas bubble characteristics in gas-assisted injection moulded parts. Polycarbonate and ABS moulded parts with different size, geometry, and gas channel designs were examined. 7 refs.

SINGAPORE

Accession no.681075

Item 292

European Plastics News

25, No.6, June 1998, p.74

MATHEMATICAL REPRESENTATIONS OF ABS MELTS PUT THROUGH THEIR PACES

Researchers from Bayer and the Massachusetts Institute of Technology have been working together on a project to evaluate the mathematical representations for ABS polymer melts. The aim is to help improve computer models designed to optimise processing parameters and

improve part quality during thermoforming, injection moulding, blow moulding and other processes, it is briefly reported.

BAYER CORP.; MASSACHUSETTS INSTITUTE OF TECHNOLOGY
USA

Accession no.680705

Item 293

European Plastics News

25, No.6, June 1998, p.74

ABS IN ULTRA-LIGHT ALL PLASTIC TRAILER

It is briefly reported that a prototype, all-plastic rental trailer has been manufactured using coextruded sheets of Bayer's Lustran ABS. Weighing just 208kg when empty, the aerodynamic trailer can be towed behind even the smallest compact car, it is claimed.

BAYER CORP.
USA

Accession no.680704

Item 294

European Plastics News

25, No.6, June 1998, p.74

ENICHEM PUTS IN A GOOD APPEARANCE

EniChem has developed Sinkral PD M323, an injection moulding ABS grade which exhibits outstanding flow and thermal stability, it is briefly reported. The product effectively stands up to the ageing and thermal oxidation that can take place during processing and potentially affect colour. Sinkral C 423/M3 is a special low gloss ABS grade for injection moulding that couples good impact resistance with good flow, enabling the production of complex shapes.

ENICHEM
EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY;
WESTERN EUROPE

Accession no.680703

Item 295

European Plastics News

25, No.6, June 1998, p.74

ABS WITHSTANDS FIRE AND ICE

It is briefly reported that safety equipment cases manufactured from Royalite R21 ABS sheet are standing up to the rigours of a joint Norwegian-British expedition to the North Pole. Royalite has also launched a flame-retardant ABS sheet with improved performance to meet increasing legislative demands.

ROYALITE
EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.680702

Item 296

Patent Number: US 5696204 A 19971209

THERMOPLASTIC MOULDING

COMPOSITIONS OF THE ABS TYPE

Eichenauer H; Leitz E; Piejko K-E; Alberts H
Bayer AG

These comprise (A) 1 to 60 pbw of at least one particulate graft rubber polymer of the ABS type, which is produced by emulsion polymerisation, (B) 40 to 99 pbw of at least one particulate graft rubber polymer of the ABS type, which is produced by solution or bulk polymerisation and has a morphology characteristic of bulk types of ABS, and, optionally, (C) 0 to 200 pbw of at least one thermoplastic, rubber-free resin. At least 50% of the graft rubber particles have a structure detectable by TEM photographs in which the individual particles contain irregular cellular inclusions of resin-forming polymer and the surface of the particles has an irregular jagged structure such that 5 to 30 of such peaks are present per depicted particle.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.680396

Item 297

Polymer

39, No.12, 1998, p.2447-60

**COMPATIBILIZATION OF NYLON 6/ABS
BLENDS USING GLYCIDYL METHACRYLATE/
METHYL METHACRYLATE COPOLYMERS**

Kudva R A; Keskkula H; Paul D R
Texas,University at Austin

The use of a series of glycidyl methacrylate-methyl methacrylate (GMA-MMA) copolymers as compatibilisers for blends of nylon-6 with ABS and with styrene-acrylonitrile copolymers (SAN) was studied. The GMA-MMA copolymers were found to be less effective than anhydride-based compatibilisers in generating an optimum phase morphology in order to toughen nylon-6-ABS blends. The suggested reason for this was that the epoxide ring of GMA was difunctional with respect to nylon-6, resulting in crosslinking reactions, whereas anhydrides react only with the amine ends of polyamide chains. 90 refs.

USA

Accession no.680067

Item 298

Polymer Additives: What's new and review. Retec proceedings.

Ft.Mitchell,Ky., 20th-22nd Oct.1997, p.143-50

**NEW PROCESS STABILISATION SYSTEM FOR
EMULSION POLYMERISED ABS**

Earhart N J
CIBA Specialty Chemicals Corp.
(SPE,Polymer Modifiers & Additives Div.)

In emulsion polymerised ABS, an antioxidant system is added to the latex prior to coagulation. The antioxidant protects the polymer against the high temperatures

encountered during drying and processing. This paper discusses an antioxidant stabilisation system based entirely on hindered phenol chemistry. This system provides excellent performance compared to the traditional systems without the presence of a phosphite or sulphur based co-stabiliser. 2 refs.

USA

Accession no.679958

Item 299

Polimeros: Ciencia e Tecnologia

7, No.1, Jan./March 1997, p.67-72

Portuguese

MECHANICAL AND THERMOMECHANICAL BEHAVIOUR OF PBTP/ABS BLENDS

Ferreira L A S; Pessan L A; Hage E

Sao Carlos,Universidade Federal

A study was made of the impact and tensile strength and heat deflection temperature (HDT) of blends of PBTP with three different grades of ABS. The chemical composition of the ABS component had a more pronounced effect on blend properties than did the phase composition, and ABS of higher acrylonitrile content gave better properties. Low levels of ABS gave a high increase in HDT without variation of impact strength. Blends with low levels of PBTP showed properties similar to those of neat ABS, except for impact strength which was significantly reduced. 9 refs.

BRAZIL

Accession no.679098

Item 300

Journal of Macromolecular Science A

A35, No.4, 1998, p.577-88

TERMINAL AND PENULTIMATE REACTIVITY RATIOS IN THE STYRENE-ACRYLONITRILE FREE-RADICAL COPOLYMERISATION SYSTEM IN BULK

Kaim A

Warsaw,University

The terminal and penultimate model reactivity ratios for the styrene-acrylonitrile monomer system in bulk were investigated by the simplex and scanning method. The uniqueness in determination of the terminal model reactivity ratios and non-uniqueness in determination of the terminal and penultimate model reactivity ratios in the free radical copolymerisation in bulk was clearly demonstrated. 14 refs.

EASTERN EUROPE; POLAND

Accession no.678808

Item 301

European Plastics News

25, No.4, April 1998, p.19

DOW HELPS CHRYSLER TO MEET NEW HEAD-IMPACT LEGISLATION

Chrysler claims it has saved itself an estimated 5m US dollars on the development of new "A" pillar interior trim by calling in Dow Automotive at the concept stage to work with moulders, Venture Industries. The part had to comply with Head Impact Criteria. Dow used Magnum 1150EM impact-modified ABS resin to produce a new one-piece thermoplastic interior pillar system with moulded-in ribs designed to manage energy during accidents.

CHRYSLER CORP.; DOW AUTOMOTIVE

USA

Accession no.677013

Item 302

Patent Number: EP 832933 A1 19980401

COMPOSITIONS BASED ON ABS POLYMERISATES

Guilland J-F H; Merle O; Lecomte Y

General Electric Co.

These include 100 pbw of ABS or a blend of the latter and 5 to 100 pbw of at least one polyester of given formula and with a number-average molec.wt. of between 800 and 7,000. They may be used to make flexible products by extrusion, calendering and the like.

USA

Accession no.675914

Item 303

Modern Plastics International

28, No.3, March 1998, p.56-9

ABS SUPPLIERS EYE VALUE-ADDED GRADES TO SPUR SAGGING MARKETS

Grande J A

Suppliers of ABS are facing declining demand, overcapacity and eroding prices. The ABS market has evolved into a two-tiered market, with a commodity side that has lost share to PP and high-impact PS, and an engineering segment that is attempting to expand in value-added applications. GE Plastics has launched a series of special-effect resins and a flame-retardant ABS for use in hollow bricks for home construction in Third World countries. Suppliers are working on coextrusions of urethane/ABS and ASA/ABS with urethane foam.

WORLD

Accession no.673005

Item 304

London, 1997, pp.12.

BS ISO 4894/1. PLASTICS - STYRENE/ACRYLONITRILE (SAN) MOULDING AND EXTRUSION MATERIALS - DESIGNATION SYSTEM AND BASIS FOR SPECIFICATIONS

British Standards Inst.

BS ISO 4894/1

Version 97. Identical to ISO 4894/1-. Photocopies and loans of this document are not available from Rapra.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.671371

Item 305

Journal of Polymer Science : Polymer Chemistry Edition

35, No.13, 30th Sept.1997, p.2607-17

NOVEL EMULSION GRAFT COPOLYMERISATION ONTO THE SILYLMETHYL GROUP OF POLY(DIMETHYLSILOXANE)

Okaniwa M; Ohta Y

Japan Synthetic Rubber Co.Ltd.

The influence of radical initiators upon the emulsion graft copolymerisation of styrene and acrylonitrile onto poly(dimethylsiloxane) was studied. As initiators, a series of peroxides and hydroperoxides were coupled with ferrous sulphate, among which the tert-butyl peroxyaurate system gave the highest grafting efficiency (30%). The tert-butyl peroxyaurate initiator fulfilled the criteria for efficient radical grafting by generating only the tert-butoxy radical, which is reluctant to form a carbon radical via beta-scission, being highly hydrophobic, and not carrying a tertiary hydrogen that may be abstracted by a radical. Carbon-13 NMR analysis of the products showed that the grafting occurred on the silylmethyl groups of PDMS to give 1-25 grafts per polymer and graft ratio in the range 44-140%. The PDMS graft copolymers thus obtained could be used as surface-modifying agents to improve the lubricity and water-repellency of ABS. Data are given for impact strength (falling dart and Izod), surface gloss, friction coefficient, wear, contact angle (water), density and heat deflection temperature for blends of the grafted copolymer with ABS and SAN, the non-grafted PDMS with ABS and SAN, ABS alone and polyoxymethylene alone. 44 refs.

JAPAN

Accession no.66979

Item 306

Plastics and Rubber Weekly

No.1727, 13th March 1998, p.12

LG'S ALLOY ADVANCE

It is briefly reported that LG has expanded its product range in the UK with the addition of PC/ABS for the first time. The new alloy is available in general purpose flame retardant and filled grades. The LG family displays high impact resistance over a wide temperature range, good dimensional stability, low warpage and excellent processability.

LG GROUP

SOUTH KOREA

Accession no.669611

Item 307

Plastics News(USA)

9, No.46, 12th Jan.1998, p.4

VIKING TENT CAMPER PIONEERING WAY FOR ABS

Pryweller J

The design and performance is examined of an all-plastic body on a trailer tent manufactured and designed by Viking Recreational Vehicles using ABS supplied by Bayer. It consists of a 17 foot long, fold-down camping trailer, made from engineered ABS coextruded in sheets and bonded to a wood substrate.

VIKING RECREATIONAL VEHICLES INC.; BAYER CORP.

USA

Accession no.669250

Item 308

Molding Systems

56, No.1, Jan.1998, p.13

INS AND OUTS OF NEW VEHICLES

Solvay's Sequel 1440 engineered polyolefin has replaced TPO on 1998 Dodge Intrepid sedan bumper fascias. The wall thickness has been reduced from 3.5mm in the TPO parts to 2.9mm in the new rear fascia and 2.7mm in the front. For the fascia on the 1998 Mercury Sable, Solvay's Dextral TPO with carbon filler produces a conductive surface that allows electrostatic painting without an adhesion promoter or primer. Dow's Pulse 2100LG PC/ABS blend provides low gloss, cold impact resistance and moulded-in, UV resistant colour for the centre seat console of the 1998 Lincoln Town Car.

SOLVAY; DOW AUTOMOTIVE

USA

Accession no.669114

Item 309

European Plastics News

25, No.2, Feb.1998, p.45

DISSIPATIVE ABS USED IN MONITOR

3M is using LNP's Stat-Loy A for the housing of its new model 721 continuous wrist strap monitor, it is briefly reported. The monitor is designed to alert users in a manufacturing environment that their resistance to ground has exceeded a preset value. Stat-Loy A is an inherently dissipative ABS compound, with the high impact resistance required by 3M.

3M CO.

USA

Accession no.668182

Item 310

Patent Number: US 5639801 A 19970617

PROCESSING OF ANHYDRIDE-CONTAINING THERMOPLASTIC RESINS

Mallikarjun R; Cleland W J
Nova Chemicals Inc.

Resins, such as styrene-maleic anhydride copolymers, are processed in a vented extruder in the presence of a nitrogenous chemical blowing agent to imidise at least a portion of the anhydride groups and remove volatile residues, such as unreacted styrene monomer, from the resin.

USA

Accession no.667856

Item 311

Patent Number: EP 745624 A1 19961204

ABS MOULDING COMPOSITIONS WITH IMPROVED PROPERTIES

Eichenauer H; Jansen U; Piejko K-E; Leitz E
Bayer AG

Tough ABS thermoplastic moulding composition for injection moulding etc. are disclosed, which comprise (a) graft polymer(s) obtained by emulsion polymerisation of styrene and acrylonitrile in 90:10-50:50 weight ratio in the presence of at least 2 butadiene polymer latices of type (A) and (B), each of which contains 0-50 wt.% of another vinyl monomer, with a weight ratio of added monomers to butadiene polymer of 25:75-70:30; and (b) copolymer(s) of styrene and acrylonitrile in 90:10-50:50 weight ratio. In both (a) and (b), the styrene and/or acrylonitrile may be (partly) replaced by O-methylstyrene, methyl methacrylate or N-phenyl maleimide. The latices have a given particle diameter; a particle size distribution (from the integral particle size distribution) of (A) 30-100, (B) 50-500 nm; and a given gel content. Also claimed are compositions in which (A) and (B) have different properties.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.667031

Item 312

Kunststoffe Plast Europe

87, No.12, Dec.1997, p.19-20

ABS/PA BLENDS

De Clercq Zubli M; Verhooren P
DSM

Applications and properties are described for Stapron N from DSM which is a blend of ABS and nylon. The product is characterised by high impact strength combined with thermal stability and chemical resistance as well as high dimensional stability. These properties make it suitable for demanding applications, some of which are examined in examples such as car interiors, bumpers, garden tools and equipment and razors.

EUROPEAN COMMUNITY; EUROPEAN UNION; NETHERLANDS; WESTERN EUROPE

Accession no.666986

Item 313

European Polymer Journal

34, No.1, Jan.1998, p.37-43

EFFECT OF REPROCESSING ON THE EMI SHIELDING EFFECTIVENESS OF CONDUCTIVE FIBRE-REINFORCED ABS COMPOSITES

Chi-Yuan Huang; Tay-Wen Chiou
Tatung, Institute of Technology

Composites were prepared with ABS as the matrix and Ni-coated conductive carbon fibre(NCF) and conductive carbon fibre(CF) as the conductive fillers. A twin-screw extruder(TSE) and a Brabender Plasticorder were used for compounding the composites. The fibre length of composites compounded in the TSE was below the critical length, 200 micrometres, so the TS and modulus were not increased by adding the fibres. At the same time, the conductive fibre could not form a conductive network and, in this case, the shielding effectiveness(SE) value of composites was 0 dB. When the composites were processed using the Brabender, however, the fibre length was above the critical length even after three processings. The maximum SE value of conductive composites was 47 dB. The SE values of composites decreased with increasing number of processing cycles. The viscosity of composites decreased with increasing number of processing cycles. The interfacial adhesion between ABS and CF was better than that between ABS and NCF. 11 refs.

TAIWAN

Accession no.666728

Item 314

Polymer Composites

18, No.6, Dec.1997, p.748-56

PROCESSING CONDITIONS FOR ELECTROMAGNETIC INTERFERENCE SHIELDING EFFECTIVENESS AND MECHANICAL PROPERTIES OF ABS BASED COMPOSITES

Chiang W-Y; Cheng K-Y
Tatung, Institute of Technology

Conductive carbon fibres were compounded into ABS in a twin-screw extruder. The effects of various processing parameters prior to injection moulding were investigated. The electromagnetic interference shielding effectiveness, fibre length, processability, and mechanical properties of the composites were studied. 25 refs.

CHINA

Accession no.666692

Item 315

Journal of Vinyl and Additive Technology

3, No.4, Dec.1997, p.292-4

NEW PROCESS STABILISATION SYSTEM FOR EMULSION POLYMERISED ABS

Earhart N J
Ciba Specialty Chemicals Corp.

Details are given of an antioxidant stabilisation system for ABS based entirely on hindered phenol chemistry. Advantages over commercial antioxidants are mentioned. 2 refs.

USA

Accession no.666647

Item 316

Revue Generale des Caoutchoucs et Plastiques

No.750, May 1996, p.47/50

French

**DOMESTIC APPLIANCES: GERMANY
INNOVATES IN RECYCLING**

Kaiser H; Kirsch S

Huls AG; Metallgesellschaft AG

A process developed by HM Gesellschaft fuer Werkstoff-Recycling, a joint venture between Metallgesellschaft and Huls, for the recycling of plastics and metals from post-consumer domestic appliances is described. Properties of ABS from the recycling of vacuum cleaners and of PP from the recycling of coffee machines are examined. 9 refs.

HM GESELLSCHAFT FUER WERKSTOFF-
RECYCLING MBH;

ABFALLENTSORGUNGSGESELLSCHAFT
RUHRGEBIET MBH

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.666447

Item 317

Japan Chemical Week

39, No.1960, 22nd Jan.1998, p.1

**REVOLUTIONARY ABS TECHNOLOGY
PIONEERED: S.KOREA'S LG CHEM**

LG Chemical has developed a new ABS product, it is briefly reported. Productivity can be raised by 80% or more compared with existing levels and shock resistance is improved by 50% compared with the company's existing products. The company anticipates widespread adoption of the new ABS resin in automotive, building and electrical/electronic applications.

LG CHEMICAL LTD.

SOUTH KOREA

Accession no.666402

Item 318

Patent Number: EP 810242 A2 19971203

**PROCESS OF PRODUCING AN ABS RESIN, AN
ABS RESIN, AND AN ABS-POLYCARBONATE
RESIN COMPOSITION MAKING USE OF THE
SAME**

Koura T; Sugimoto R; Kawano K; Iwamoto M; Ikeda
T; Otsuzuki S

Mitsui Toatsu Chemicals Inc.

Styrene and acrylonitrile or styrene, acrylonitrile and a vinyl monomer copolymerisable with at least one of the monomers are polymerised in the presence of 4 to 50 pbw of a rubbery polymer by continuous bulk and/or continuous solution polymerisation to form a polymer of the monomer component as a continuous phase and particles of the rubbery polymer as a dispersed phase. The polymerisation step comprises at least 2 substeps, one being a first-stage substep of forming particles of the rubbery polymer and the other a second-stage substep of adjusting the particle sizes of the particles. The first-stage substep is conducted in a polymerisation system using a plug flow reactor or a batch polymerisation reactor and conducts polymerisation at least until the particles are formed in the polymerisation mixture. The second-stage substep increases the amount of the monomer component converted into the polymer compared with that in the particle forming substep and reduces the particle size.

JAPAN

Accession no.663736

Item 319

Plastiques Flash

No.289, May 1996, p.70-3

French

**CORRECT USE OF GOOD MATERIALS: THE
BAYER APPROACH**

Automotive applications of Bayer's engineering plastics are described, and the advantages of hybrid metal/plastics structures are discussed. Materials examined include ABS, polycarbonate, ABS/polycarbonate blends and polyamides.

BAYER AG; BAYER FRANCE SA

EUROPEAN COMMUNITY; EUROPEAN UNION; FRANCE;
GERMANY; WESTERN EUROPE

Accession no.663551

Item 320

International Polymer Science and Technology

24, No.6, 1997, p.T/78-9

**DETERMINATION OF THE MECHANICAL AND
CHEMICAL COMPONENTS OF ADHESION
DURING SEPARATION OF METAL COATING
FROM ABS PLASTIC**

Bikul'chyus G D

The adhesion between ABS sheets and metal coatings (copper and nickel) was investigated by artificial elimination of one of the components of adhesion, specifically the chemical component. The results obtained indicated that the main contribution to adhesion was from the mechanical bonds which, for the case studied, comprised about 2/3 of all possible bonds between the metal coating and the ABS. 4 refs. (Full translation of Plast.Massy, No.6, 1996, p.27)

CIS; COMMONWEALTH OF INDEPENDENT STATES

Accession no.663044

Item 321

Modern Plastics International

27, No.11, Nov.1997, p.95

ABS MEDICAL GRADE

BASF's ABS medical grade meets the compatibility requirements of the FDA-modified ISO 10993, Part 1. Lustran 348 offers the same performance and quality as its predecessor, Lustran 248, but has more thermal stability during processing. It is a medium-impact, high-gloss resin with a good balance of physical properties, intermediate abuse resistance and rigidity. Typical applications include components for intravenous (IV) systems, diagnostic test kits and surgical instruments. This abstract includes all the information contained in the original article.

BAYER AG

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.662163

Item 322

European Plastics News

24, No.10, Nov.1997, p.65

RONFALIN LOCKS UP BICYCLES

It is briefly reported that Stenman Holland has developed a new bicycle lock made in Ronfalin ABS from DSM Performance Polymers. This AXA lock is a safety lock which is integrated in the bicycle frame and so reduces the risk of theft. Ronfalin ABS SFA81 is used for the lock housing as it offers high mechanical strength, enhanced design freedom, good processability and an attractive appearance.

STENMAN HOLLAND; DSM PERFORMANCE
POLYMERS

EUROPEAN COMMUNITY; EUROPEAN UNION;
NETHERLANDS; WESTERN EUROPE

Accession no.659362

Item 323

European Plastics News

24, No.10, Nov.1997, p.33

FORMOLD DEVELOPS THERMOFORMING APPLICATIONS

It is briefly reported that Formold has developed a reusable ABS packaging tray for the transport of tractor transmission components. Formold has also manufactured reusable plastic trays for the in-store display of margarine products. The vacuum formed trays can be expanded to fit any shelf size.

FORMOLD LTD.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.659341

Item 324

Patent Number: EP 808856 A1 19971126

PROCESS FOR THE PREPARATION OF ABS RESINS

Preti D; Rossi A G; Nocci R; Vecchini N

Enichem SpA

A solution consisting of a diblock linear rubber of the S-B type dissolved in a mixture of monomers comprising styrene and acrylonitrile has added thereto at least one preformed ABS resin having an average volumetric diameter of rubber particles contained in the polymeric matrix of more than 1.5 microns. The preformed ABS is dissolved in the solution and this solution is fed to a polymerisation reactor and polymerised to produce an ABS with a multimodal morphology.

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY;
WESTERN EUROPE

Accession no.659069

Item 325

Journal of Applied Polymer Science

66, No.8, 21st Nov.1997, p.1531-42

EFFECTS OF ANNEALING IN ABS TERNARY BLENDS

Kim B K; Yoon L K; Xie X-M

Pusan,National University; Tsing Hua,University

ABS/PMMA binary blends, and ABS/PMMA/polycarbonate ternary blends were prepared using a co-rotating twin-screw extruder. Changes in morphology and mechanical properties with annealing were studied transmission electron microscopy image analyser and tensile tester. 16 refs.

CHINA; KOREA

Accession no.657767

Item 326

Journal of Polymer Science : Polymer Physics Edition

35, No.16, 30th Nov.1997, p.2583-92

IMPACT FRACTURE BEHAVIOUR OF NYLON 6/ABS BLENDS

Mamat A; Vu-Khanh T; Cigana P; Favis B D

Sherbrooke,University; Montreal,Ecole Polytechnique

Tensile and impact properties of uncompatibilised injection moulded nylon 6/ABS blends were studied. Results of mechanical performance were correlated with morphology observations. 21 refs.

CANADA

Accession no.657420

Item 327

Macromolecular Rapid Communications

18, No.9, Sept.1997, p.787-94

CARBOXY-TERMINATED HOMO- AND COPOLYMERS OF STYRENE USING DICARBOXYLIC ACID-FUNCTIONAL AZO INITIATOR AND 2,2,6,6-TETRAMETHYL-1-PIPERIDYLOXYL(TEMPO)

Baumert M; Muelhaupt R

Albert-Ludwigs,University

Carboxy-terminated PS, styrene-acrylonitrile copolymer and polystyrene-block-poly(styrene-co-acrylonitrile) with

ratios of weight- to number-average molar masses below 1.3 were synthesised via a controlled radical polymerisation mechanism. The polymerisations were initiated with 4,4'-azobis(4-cyanopentanoic acid) and 2,2,6,6-tetramethyl-1-piperidyl radical and conducted in bulk at elevated temps. The polymerisation was monitored by NMR spectroscopy, size exclusion chromatography, end group titration and DSC. 21 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.652956

Item 328

Modern Plastics International

27, No.10, Oct.1997, p.36/8

HIGH-FLOW RESINS LIGHTEN UP HAND-HELD DEVICES

Snyder M R

The 1mm wall thickness barrier has been broken in housings for cellular phones, pagers and laptop computers. Much of the credit goes to higher-flowing grades of polycarbonate and PC/ABS blends. GE Plastics supplies high-flow materials for such devices, including Cyclocol C1200 HF, a PC/ABS, and Lexan SP6400, a high-flow PC. GE has been working to develop high-speed, high-pressure thinwall moulding using sequential valve gating. Tests are being carried out on a Husky G-Series 550-ton machine with 240,000kPa injection pressure.

GE PLASTICS

USA

Accession no.652333

Item 329

Plastics and Rubber Weekly

No.1707, 10th Oct.1997, p.22

GLENDENNING MAKES TOP DESIGN WITH SANDRETTO

Glendenning Plastics is producing a three-piece family toilet seat on two Sandretto injection moulding machines. The patent ABS toilet seat, the Twolette developed by Marleton Cross, features an integral child's seat hinged between a traditional adult seat and cover. It is briefly reported that Glendenning Plastics also helped Garland Products to develop a self-watering hanging basket incorporating a detachable reservoir.

GLENDENNING PLASTICS

EUROPEAN COMMUNITY; EUROPEAN UNION; UK; WESTERN EUROPE

Accession no.652294

Item 330

Patent Number: US 5605963 A 19970225

ABS POLYMER COMPOSITIONS HAVING A UNIFORM MATT SURFACE

Leitz E; Eichenauer H; Piejko K-E; Wittmann D; Froberg E
Bayer AG

These consist of (A) 5 to 80 pbw of at least one ABS polymer prepared by mass polymerisation or solution polymerisation and having rubber particles with an average particle diameter of from 800 to 15,000 nm and a rubber content of from 1 to 20 wt.%, (B) 1 to 50 pbw of at least one ABS polymer prepared by emulsion polymerisation and having an average particle diameter of from 50 to 500 nm and a rubber content of from 20 to 80 wt.%, (C) 0 to 70 pbw of at least one thermoplastic vinyl resin prepared by radical polymerisation of at least two monomer components, such as styrene, alpha-methylstyrene, methyl methacrylate, acrylonitrile or n-phenylmaleimide and (D) 0.5 to 10 pbw of at least one polybutadiene prepared by emulsion polymerisation and having an average particle diameter in the latex form of from 80 to 500 nm and a gel content of from 10 to 95 wt.%.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.651160

Item 331

Journal of Vinyl and Additive Technology

3, No.2, June 1997, p.170-4

RESORCINOL BIS(DIPHENYL PHOSPHATE), A NON-HALOGEN FLAME-RETARDANT ADDITIVE

Bright D A; Dashevsky S; Moy P Y; Williams B
Akzo Nobel Central Research

A review is presented of resorcinol bis(diphenyl phosphate)(RDP), a non-halogen aromatic, oligomeric phosphate flame retardant and flow modifier. Its high thermal stability and low volatility, compared with triaryl phosphates, make it ideal for use in applications where high processing temperatures are required. Thermogravimetric data showing the effects of RDP on modified PPO and polycarbonate/ABS blends are presented. Current and potential end uses in thermoplastic resins and polyurethanes are discussed. 10 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; NETHERLANDS; WESTERN EUROPE

Accession no.650276

Item 332

Plastiques Flash

No.292, Sept./Oct.1996, p.86-7

French

TOTAL AUTOMATION IN THE DRYING AND COLOURING OF ABS

Details are given of automated drying and colouring systems supplied by Simar to Compagnie Industrielle des Moulages de l'Est (Cimest) of France for use in its ABS injection moulding operations.

CIMEST SA; COMPAGNIE INDUSTRIELLE DES MOULAGES DE L'EST; SIMAR; SECMI

EUROPEAN COMMUNITY; EUROPEAN UNION; FRANCE; GERMANY; WESTERN EUROPE

Accession no.649956

Item 333

Plastics and Rubber Weekly

No.1705, 26th Sept.1997, p.21

PLASTICS PLATING LINE IS A WORLD-BEATER

It is briefly reported that German automotive and plumbing component manufacturer, Bolta has commissioned a high volume automated system for plating of ABS and ABS/PC blends at its plant in Leinburg. The Dyna-Plus triple row line from Atotech is believed to be one of the largest automated plastics plating lines in the world, providing a plating capability of up to 1900m² of plastics components each day.

BOLTA

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.649876

Item 334

Plastics and Rubber Weekly

No. 1703, 12th Sept. 1997, p.9

RONFALIN ABS

DSM's Ronfalin ABS material is being used in the housing of a new integral AXA bicycle lock produced by Stenman Holland and developed in cooperation with the Dutch Bicycle Industry Association. According to DSM, Stenman selected Ronfalin ABS SFA81 for its mechanical strength, good processability and appearance. The design and colour options provided by Ronfalin provide the lock with a robust and modern appearance, the materials company says. This abstract includes all the information contained in the original article.

DSM NV; STENMAN HOLLAND; DUTCH BICYCLE INDUSTRY ASSOCIATION

EUROPEAN COMMUNITY; EUROPEAN UNION; NETHERLANDS; WESTERN EUROPE

Accession no.649360

Item 335

Kunststoffe Plast Europe

87, No.7, July 1997, p.22

SELF-COLOURING OF THERMOPLASTICS

Even ABS can be coloured cost-effectively by processors themselves. A natural-coloured product grade in tandem with appropriately matched colour masterbatches affords high colour constancy, since this base material does not tend to yellow at processing temperatures. For thermoplastics processors, stockkeeping is restricted to the base plastic and the desired colour masterbatches. Processors can respond very rapidly to acute customer needs because they can keep a large number of different colour masterbatches in a small space.

GERSTMEIR-RESINEX KUNSTSTOFFE GMBH; RESINEX DEUTSCHLAND GMBH

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.648057

Item 336

Plastics World

55, No.8, Aug.1997, p.53

DESIGNERS' NOTEBOOK: ASA

Bucher J

ASA is characterised by outstanding resistance to weather, ageing and yellowing, great toughness and rigidity, good resistance to chemicals, good thermal stability, high gloss, good antistatic properties and easy processability over a wide range of temperatures. Factors to be considered when injection moulding or extruding ASA are outlined.

USA

Accession no.648011

Item 337

Ludwigshafen, 1995, pp.6. 12 ins. 29/5/97.

LURAN S (ASA) FOR SATELLITE AND CABLE COMMUNICATION. POLYMER PROPERTIES TO MAKE EVEN THE BEST BRAND-GOODS EVEN BETTER

BASF AG

Properties of Luran S acrylonitrile styrene acrylate terpolymers are described, and the use of the material in satellite and cable communications equipment is discussed. Luran S is characterised by high toughness, stiffness and dimensional stability, chemical resistance, weathering resistance, high heat resistance, durability and recyclability, good electrostatic behaviour and easy processing over a wide range of temperatures.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.647289

Item 338

Injection Molding

5, No.7, July 1997, p.58

SNOWSHOES EVOLVE TO THERMOPLASTIC

To make the sport of snowshoeing more accessible to the general public, Redfeather Design has designed a thermoplastic version of its traditional aluminium-framed shoe and plans to retail it for half the price. The snowshoe, called the Penguin, consists of an injection moulded frame and a deck to which the shoes are bound. Triax, an ABS blend from Bayer, was chosen for the frame, which actually consists of two identical halves connected by a living hinge. The shoe deck is made from Pellethane, a TPU from Dow.

REDFEATHER DESIGN

USA

Accession no.645736

Item 339

Kunststoffe Plast Europe

87, No.6, June 1997, p.21-2

20 MG VIA 2-SHOT MOULDING

Maeder E; Schaeuffele R

An unusual gating approach is reported to permit the two-cavity, two-component injection moulding of a polycarbonate/ABS bezel with a PMMA window. The bezel is part of an audio storage system; details are given.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.642061

Item 340

Industrial & Engineering Chemistry Research

36, No.6, June 1997, p.2156-62

FREEZE COAGULATION OF ABS LATEX

Adler R J; Gardner N; Moore E R; Ceraso J M

Case Western Reserve University; SRI Consulting; Dow Chemical Co.

The coagulation techniques that are available for ABS resins produced by emulsion polymerisation are reviewed, the advantages and disadvantages of each are discussed and particular attention is then paid to coagulation by freezing. Two approaches to freeze coagulation are examined, one involving freezing against a cold surface and the other involving direct contact freezing of a suspension of ABS latex particles in contact with liquid carbon dioxide at about 3340 kPa. 17 refs.

USA

Accession no.641474

Item 341

European Plastics News

24, No.7, July/Aug.1997, p.47

FRIDGE DOOR CONCEPTS FROM GE PLASTICS

GE Plastics has developed two new concepts for fridge and freezer doors based on its Cycolac ABS, it is briefly reported. The first concept is a blow moulded door, which is claimed to offer production economies and greater design flexibility. The second design is based on a front panel, with integrated handle and hinges, injection moulded in Cycolac ABS or Noryl GTX modified PPO alloy. This moulding is joined to a vacuum formed door liner made from an extrusion grade Cycolac.

GE PLASTICS

USA

Accession no.641139

Item 342

Plastics World

55, No.7, July 1997, p.54

STYRENE ACRYLONITRILE

Bucker J

SAN resins are transparent with excellent clarity, good surface gloss, dimensional stability, heat resistance, environmental stress crack resistance, hardness, load-bearing capabilities, processing ease and good economics.

Applications include safety glass, consumer goods, appliances, medical, automotive, packaging and industrial. The fundamental design principles are outlined.

USA

Accession no.641102

Item 343

Antec 97. Volume III. Conference proceedings.

Toronto, 27th April-2nd May 1997, p.2963-6. 012

NEW PROCESS STABILISATION SYSTEM FOR EMULSION POLYMERISATION

Earhart N J

Ciba Specialty Chemicals Corp.

(SPE)

In emulsion polymerised ABS, an antioxidant system is added to the latex prior to coagulation. The antioxidant protects the polymer against the high temperatures encountered during drying and processing. Traditionally, hindered phenols have been used in combination with a co-stabiliser, such as trisnonylphenylphosphite (TNPP) or dilaurylthiodipropionate (DLTDP). An antioxidant stabilisation system is discussed, which is based entirely on hindered phenol chemistry. This system provides excellent performance compared to the traditional systems without the presence of a phosphite or sulphur-based co-stabiliser. In addition, the new antioxidant system is a liquid allowing for ease of emulsification and handling. 2 refs.

USA

Accession no.640451

Item 344

Antec 97. Volume III. Conference proceedings.

Toronto, 27th April-2nd May 1997, p.2697-701. 012

EFFECTS OF INJECTION MOULDING PARAMETERS ON COLOUR AND GLOSS

Dawkins E; Horton K; Engelmann P

Western Michigan,University

(SPE)

Within the plastics industry there is a growing trend towards producing unpainted finished products. This places an increased emphasis on understanding which process variables can induce shifts in colour. Emphasis is placed on ABS parts using a newly specified automotive red colourant. A 1/8 fractional factorial design of experiment was used to test the effects of seven independent variables upon colour and gloss. The results showed which parameters were responsible for influencing colour and gloss. 8 refs.

USA

Accession no.640399

Item 345

(Leverkusen), 1996, pp.8. 30cms. 7/5/97

German; English

LUSTRAN/NOVODUR (ABS) PREFERRED GRADES

Bayer AG,Plastic Busin.Gp.

Bayer ATI 999 d,e

This data sheet provides tabulated information on injection moulding and extrusion grades of Lustran and Novodur ABS. The rheological, mechanical, thermal and electrical properties of each grade are shown, together with a brief description of typical features and/or applications.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.640353

Item 346

Antec 97. Volume III. Conference proceedings. Toronto,27th April-2nd May 1997,p.3580-3. 012

MELTING OF POLYMER BLENDS IN CO-ROTATING INTERMESHING, TWIN-SCREW EXTRUDERS

Busby F; McCullough T W; Hughes K R; Kirk R O
Dow Plastics
(SPE)

The melting of polymer blend components in twin-screw extruders (TSEs) is a critical step in the production of compounded products that have the desired physical and aesthetic properties. Yet little is known about the mechanisms by which melting occurs in TSEs. Visual insight into the melting of polycarbonate and ABS blends is presented for a 30 mm diameter, co-rotating twin-screw extruder. Experiments are performed under conditions that accurately reflect those used for polycarbonate/ABS blends processing. 3 refs.

USA

Accession no.639796

Item 347

Industrial & Engineering Chemistry Research

36, No.4, April 1997, p.1218-23

SATURATION SWELLING OF ABS LATEX PARTICLES BY STYRENE AND ACRYLONITRILE MONOMER MIXTURES

Xiang Liu; Nomura M; Yao-Huang Liu; Ishitani K; Fujita K
Fukui,University

In order to explain the experimentally observed saturation swelling of ABS latex particles by a styrene and acrylonitrile monomer mixture, a two-phase swelling model is proposed based on the assumption that, in ABS latex particles, poly(styrene-co-acrylonitrile) (SAN) domains are randomly dispersed in a continuous polybutadiene matrix and that thermodynamic equilibrium for both styrene and acrylonitrile monomers is attained among the SAN domain, polybutadiene matrix, and monomer droplet phases, respectively. It is shown that the observed saturation concentration of styrene and acrylonitrile monomers in ABS latex particles consisting of different weight ratios of polybutadiene/SAN agree very well with those predicted by this model. 10 refs.

JAPAN

Accession no.639154

Item 348

British Plastics and Rubber

May 1997, p.33

CONDUCTIVE MATERIAL GUARDS AGAINST EXPLOSION

The new Butox Micro 500 gas detector is safe to use in explosive atmospheres thanks to a housing moulded in a conductive material developed by DSM Performance Polymers. The material, one of DSM's Faradex range, is an ABS loaded with very fine stainless steel fibres, it is briefly reported. A special compounding process is used to achieve an even distribution so that good conductivity is developed with a low fibre content of only 0.5 to 1.5% by volume.

DSM PERFORMANCE POLYMERS

EUROPEAN COMMUNITY; EUROPEAN UNION; NETHERLANDS; WESTERN EUROPE

Accession no.638740

Item 349

Plastics and Rubber Weekly

No.1692, 27th June 1997, p.17

GE TARGETS APPLIANCE MARKET

It is briefly reported that GE Plastics has developed two concepts for household appliances that feature the use of Cycloc ABS resins for fridges and freezer doors. These are said to offer long term energy efficiency and allow styling to provide increased volume. The company has also advanced its PEI technology. New Ultem HTX is an impact modified PEI and Ultem ATX resin is a blend of PEI and polycarbonate-ester. The materials are suitable for use in making steam irons, kettles and food processors.

GE PLASTICS

USA

Accession no.638667

Item 350

Polymer

38, No.13, 1997, p.3237-50

IMPACT MODIFICATION OF POLY(BUTYLENE TEREPHTHALATE) BY ABS MATERIALS

Hage E; Hale W; Keskkula H; Paul D R

Texas,University at Austin

PBTP was impact modified by blending with appropriate ABS materials. Very tough blends could be produced without the addition of a compatibiliser. The very high impact strength generated by adding ABS to PBTP could extend to temperatures of -30C and lower. The extent of improvement in toughness was strongly dependent on the ABS type and was moderately influenced by the PBTP grade. The toughness of the PBTP/ABS blends depended strongly on the moulding and extrusion conditions. The results were discussed. 41 refs.

USA

Accession no.638568

Item 351

Patent Number: US 5569709 A 19961029

**GRAFTING, PHASE-INVERSION AND
CROSSLINKING CONTROLLED MULTI-STAGE
BULK PROCESS FOR MAKING ABS GRAFT
COPOLYMERS**

Sue C-Y; Koch R; Pace J E; Prince G R
General Electric Co.

A method is provided for continuous mass polymerisation of ABA type thermoplastics. The method involves charging a liquid feed comprising a vinylidene aromatic monomer, an unsaturated vinyl nitrile monomer and a synthetic butadiene polymer dissolved therein into a grafting reactor to react the liquid mass to form grafted rubber continuous phase polymeric product. This product is then charged to a phase inversion reactor where free rigid copolymer in monomer is the only continuous phase, and where dispersed particles of grafted rubber with occluded rigid copolymer and monomer are immediately formed from the product of the grafting reactor. The second polymerisation product, which is coming out from the phase inversion reactor, is then charged to a finishing reactor wherein the material is further polymerised to form a third polymerisation product which then can be devolatilised to provide a final thermoplastic composition. The process provides unique capacity and flexibility in controlling and adjusting rubber grafting and rubber particle morphology. Process conditions can be controlled to produce a high gloss or a low gloss resin product.

USA

Accession no.638164

Item 352

Modern Plastics International

27, No.6, June 1997, p.152

**RECYCLED POLYCARBONATE/ABS FIRE
RETARDANT BLENDS**

Bayblend R-FR390 and 610 grades of recycled polycarbonate/ABS fire retardant blends for injection moulding applications are announced. They are prepared from post-consumer and production waste, and may contain virgin material when necessary to achieve required properties. This abstract includes all the information contained in the original article.

BAYER AG

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.638015

Item 353

Polymer Engineering and Science

37, No.4, April 1997, p.692-701

**HOT-TOOL AND VIBRATION WELDING OF
ACRYLONITRILE-BUTADIENE-STYRENE**

Stokes V K

GE Corporate R & D

Thermoplastic window frames are manufactured by hot-tool welding of mitred, extruded profiles. The effects of weld process conditions on the strengths of hot-tool butt joints were investigated for a grade of ABS that was developed especially for window frame applications. Vibration weld strength data, obtained on a research machine in which all the process variables could be independently controlled, were used to benchmark strengths of hot-tool welds made on a commercial welding machine. Process differences between hot-tool butt welding and the hot-tool welding of mitred, extruded profiles are discussed. 21 refs.

USA

Accession no.637646

Item 354

Plastics World

54, No.3, March 1996, p.88

ABS

ABS is a three-monomer amorphous engineering thermoplastic. The ratios of the three monomers can vary considerably, yielding a large family of resins with special emphasis on clarity, heat-warpage resistance, high impact strength, platability and flame retardance. ABS is widely used in automotive applications and in domestic appliances. Design considerations are discussed including wall thickness, and projections such as ribs and bosses.

USA

Accession no.637611

Item 355

European Plastics News

24, No.6, June 1997, p.62

CONDUCTIVE ABS FOR GAS DETECTOR

It is briefly reported that DSM Performance Polymers, in collaboration with Buveco, has developed the housing for a new portable gas detector, the Butox Micro 500. The housing is made from DSM's Faradex, a conductive compound based on ABS and stainless steel fibres. The ABS grade was chosen because it protects the meter's electronics from electromagnetic radiation. Faradex's good surface conductivity and wear resistance ensure that the detector is explosion-proof.

DSM; BUVECO

EUROPEAN COMMUNITY; EUROPEAN UNION;
NETHERLANDS; WESTERN EUROPE

Accession no.637570

Item 356

Antec 97. Volume I. Conference proceedings.

Toronto, 27th April-2nd May 1997, p.1247-51. 012

**WELDABILITY OF ABS AND TESTING OF
WELD STRENGTH AT VARIOUS STRAIN
RATES. STUDY IN ULTRASONIC WELDING**

Grewell D A

Branson Ultrasonics Corp.

(SPE)

The effects of amplitude control during the ultrasonic welding cycles of ABS are reviewed. The benefits of amplitude profiling have previously been detailed as increased strength and reduced part marking. These same benefits are seen with ABS. The results are used to provide information on the selection of a particular material for a specific application - a medical device which, when used, will apply impact-tensile loading on the weld. It is found that amplitude profiling increases joint strength, particularly at faster strain rates, for all three materials tested, and that an untoughened grade performs best. 6 refs.

USA

Accession no.636829

Item 357

Plastics and Rubber Weekly

No.1686, 16th May 1997, p.9

BLOOD SAMPLING DEVICE DRAWS ON MIR'S IDEAS

MIR has recently developed a special two material moulding machine for production of a new blood sampling device, it is briefly reported. The machine manufactures a dual material closure for a blood sampling bottle. This closure comprises a main body moulded in ABS with a TPE central section which allows a blood sampling needle to be inserted through it. MIR's system is build around a 100 tonne hydromechanically clamped horizontal moulding machine fitted with a 2+2 cavity mould with a rotating third plate.

MIR SPA

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY;
WESTERN EUROPE

Accession no.636202

Item 358

Journal of Applied Polymer Science

64, No.6, 9th May 1997, p.1123-34

PREPARATION AND CHARACTERISATION OF SBR/SAN STRUCTURED LATEX PARTICLES

Hu R; Dimonie V L; El-Aasser M S

Lehigh University

A series of SBR copolymers were prepared by emulsion polymerisation and an SAN copolymer was polymerised by a semicontinuous process in the presence of SBR to form a core/shell morphology. The effects of initiator concentration, monomer feeding rate, core/shell ratio, and gel fraction of the core on the core/shell particles morphology were studied. Morphology and T_g were characterised by TEM, DSC, and dynamic mechanical spectroscopy. 28 refs.

USA

Accession no.635876

Item 359

Plastics News(USA)

8, No.46, 13th Jan.1997, p.4

WILL THE BIG THREE EMBRACE MOULDED-IN COLOUR?

Pryweller J

The article supplies details of the latest concept car, the Plymouth Pronto, unveiled recently by Chrysler Corp. The car contains no paint, its body panels being composed of acrylonitrile styrene acrylate thermoplastic with a single body colour moulded in throughout the entire length of the automobile. The article supplies details of the innovation, the process, its features and advantages.

CHRYSLER CORP.; GENERAL MOTORS CORP.;
FORD MOTOR CO.

USA

Accession no.632536

Item 360

Polymer Engineering and Science

37, No.2, Feb.1997, p.355-62

NOVEL STRUCTURES BY MICROLAYER COEXTRUSION: TALC FILLED PP, PC/SAN AND HDPE/LLDPE

Mueller C D; Nazarenko S; Ebeling T; Schuman T L;
Hiltner A; Baer E

Case Western Reserve University

The application of microlayer coextrusion technology in the manufacture of films or sheets with up to thousands of alternating layers is examined, and results are presented of studies of the properties of a number of coextruded structures. These include studies of the mechanical properties of structures consisting entirely of talc filled PP layers and of alternating layers of talc filled and unfilled PP, mechanical properties and interfacial adhesion of polycarbonate/SAN structures, and interdiffusion in HDPE/linear LDPE structures. 17 refs.

USA

Accession no.632347

Item 361

Polymer News

22, No.1, Jan.1997, p.23

SNAKELIGHT SLITHERS TO TOP OF BLACK & DECKER PRODUCT LAUNCHES

Black & Decker Corp.; Bayer Corp.

Brief details are given of the use of Lustran 648 ABS in the Snakelight flexible flashlight. Mention is made of chemical resistance and impact strength.

USA

Accession no.632080

Item 362

Kunststoffe Plast Europe

87, No.3, March 1997, p.17-8

COMPARISON OF ASA AND ABS

Zahn A

ASA plastics are characterised by good weathering and heat ageing resistance. Detailed studies of different

products in comparison with ABS are reported to confirm this. Emphasis is placed on weathering according to DIN 53 387 and ISO 4892, heat ageing, greying test, assessment of ageing, yellowing, impact testing in accordance with DIN 53453 and penetration testing according to DIN 53443 part 2.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.631978

Item 363

Plastics Technology

43, No.4, April 1997, p.48-50

CIM BRINGS OUT THE BEST IN THERMOFORMING

Knights M

It is said to be quite rare to hear of a thermoformer with experience in computer integrated manufacture (CIM). However, American Sheet Extrusion gained enough confidence from operating a CIM system on its three ABS and HIPS sheet lines to put a separate CIM system to work monitoring 7 of its 11 thermoformers. Those custom-built, roll-fed machines form up to 39 different refrigerator door panels for the company's main customer, Whirlpool. In three years, real-time process monitoring with CIM has helped American Sheet Extrusion reduce average thermoforming cycle times by about 2 seconds, or almost 10%. The company's CIM system gathers process data from each thermoformer with a PLC 5 programmable controller from Allen-Bradley. The data are transmitted over an Allen-Bradley Data Highway Plus network to several personal computers in plant offices. The monitoring programs are customised from a PC-based CIM software platform called Paragon TNT from Intec Controls. American Sheet Extrusion developed around 50 proprietary screens with the software. 34 are process related, 8 of them specifically for time and heat settings, and 26 others are used for SPC applications like trend charts and histograms. Eight other screens are for production status and alarms, and another eight are for machine maintenance. Details are given.

AMERICAN SHEET EXTRUSION CORP.; INTEC CONTROLS CORP.; ROCKWELL SOFTWARE INC.; ALLEN-BRADLEY CO.INC.

USA

Accession no.631887

Item 364

Polymer

38, No.8, 1997, p.1787-808

EVOLUTION OF MORPHOLOGY IN COMPATIBILISED VERSUS UNCOMPATIBILISED POLYAMIDE BLENDS

Majumdar B; Paul D R; Oshinski A J
3M Co.; Austin, University of Texas

The development of phase morphology in reactive and non-reactive blends of nylon 6 or nylon 66 with SAN

and styrene-ethylene butylene-styrene (SEBS) triblock copolymers and maleated SEBS in a co-rotating twin-screw extruder was investigated by SEM and transmission electron microscopy. For the SAN blends, a study was made of the effects of compatibilisation with a reactive imidised acrylic polymer which was miscible in the SAN phase and had functional groups capable of reacting with the amine end groups in the polyamide phase. The particle size and coalescence of the dispersed phase and the extent of chemical reaction were examined as a function of screw speed and configuration, flow rate, blend composition, compatibiliser content and annealing. 115 refs.

USA

Accession no.629889

Item 365

Polymer Engineering and Science

37, No.1, Jan.1997, p.205-18

EFFECT OF PROCESSING ON WELD LINE STRENGTH IN FIVE THERMOPLASTICS

Selden R

Swedish Institute for Fibre & Polymer Research

Weld line strength was measured for injection moulded specimens of ABS, polyphenylene oxide (PPO), talc filled PP and glass fibre-reinforced nylon-6 and polyphenylene sulphide. Flexural, impact and (for PPO) tensile tests were undertaken, and fracture surfaces were examined by SEM. The effects of holding pressure, injection velocity, melt temperature and mould temperature on weld line strength were studied using experimental design. For each parameter setting the weld line strength was measured and compared with the bulk strength via a weld line (WL) factor, defined as strength of specimens with weld line/strength of specimens without weld line. The highest WL factors were obtained for unfilled materials moulded using high melt temperature and holding pressure and low mould temperature. 33 refs.

SCANDINAVIA; SWEDEN; WESTERN EUROPE

Accession no.629164

Item 366

Polymer Engineering and Science

37, No.1, Jan.1997, p.128-37

ULTIMATE PROPERTIES OF POLYCARBONATE BLENDS: EFFECTS OF INCLUSION PLASTIC DEFORMATION AND OF MATRIX PHASE CONTINUITY

Kolarik J; Lednický F; Locati G; Fambri L
Czech Republic, Academy of Sciences; EniChem; Trento, University

Binary blends of polycarbonate (PC) with SAN and ternary blends of PC with SAN and a styrene-methyl methacrylate copolymer were prepared and characterised for T_g, phase structure and tensile properties. The effects on ultimate mechanical properties of the plastic deformation of particles of the dispersed or co-continuous

brittle polymers and of controlled PC matrix phase continuity in the ternary blends were investigated. 71 refs. CZECH REPUBLIC; EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY; WESTERN EUROPE
Accession no.629154

Item 367

Kunststoffe Plast Europe

87, No.2, Feb.1997, p.15-7

COMPUTER HOUSINGS IN MATERIAL RECYCLING LOOP: USED HOUSINGS AS RAW MATERIAL FOR RECYCLATES

Burgdorf P; Keller B

Siemens Nixdorf Informationssysteme AG; Bayer AG

An electronic equipment manufacturer is operating a complex recycling program. In a three-stage concept, the manufacturer concentrated first on re-use and then recycling. The aim in the recycling stage is to produce a quality assured regrind which can be supplied to a basic recyclate to the compounding plant of the raw material manufacturer for reprocessing. 4 refs. Translation of Kunststoffe, 87, No.2, Feb.1997, p.176-8

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.629121

Item 368

Johor, c.1996, pp.32. 12ins. 26/4/96.

EURAPIPE ADVANCED THERMOPLASTIC PIPING SYSTEMS. ABS PIPE SYSTEMS, TECHNICAL, DESIGN, & INSTALLATION

Eurapipe Industries Sdn.Bhd.

The ABS pipe system from Eurapipe Industries Sdn. Bhd. is described, with particular reference to the materials used, its manufacture, properties, sizes, classes and pressure ratings, design and installation, pressure/temperature relation, and health and safety aspects.

MALAYSIA

Accession no.628385

Item 369

Journal of Materials Science

32, No.4, 15th Feb.1997, p.971-7

ABS-TOUGHENED POLYSULPHONE OF BISPHENOL A BLENDS: INFLUENCE OF PROCESSING TEMPERATURE AND COMPOSITION

Ruiz De Gauna B E; Gaztelumendi M; Nazabal J San Sebastian,Universidad del Pais Vasco

Polysulphone-ABS blends were obtained by direct injection moulding at different temperatures. Miscibility, electrical properties, morphology and mechanical properties are discussed. 19 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; SPAIN; WESTERN EUROPE

Accession no.626488

Item 370

Injection Moulding International

2, No.1, Jan./Feb.1997, p.28-9

GAS-ASSIST MOULDING REPLACES MOULD SLIDES

The manufacture of the internal panel of a car tailgate using the gas-assisted injection moulding process is described. The panel needed two depressions for gripping in order to pull the tailgate shut easily. In a conventional mould, these depressions must be made by hydraulically operated angled slides. Gas assist was used instead of slides to prevent the undesirable accumulation of excess material. The one-piece panel was made from high-impact ABS.

SAUER & SOHN

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.624847

Item 371

Journal of Applied Polymer Science

63, No.10, 7th March 1997, p.1361-8

EFFECT OF LITHIUM PERCHLORATE ON RADICAL POLYMERISATION OF METHYL METHACRYLATE

Seno M; Matsumura N; Nakamura H; Sato T Tokushima,University

The effect of lithium perchlorate (LPC) on the radical polymerisation of methyl methacrylate (MMA) using dimethyl-2,2'-azobisisobutyrate as initiator was studied at 50C in MEK. Polymerisation proceeded homogeneously even at LPC concentrations as high as 3 mol/L. The polymerisation rate and PMMA molecular weight profoundly increased with increasing LPC. The rate equation depended on the presence or absence of LPC. The overall activation energies of polymerisation were 38.5 kJ/mol in the presence of 3 mol/L of LPC and 77.4 kJ/mol in the absence of LPC. The tacticities of PMMA were insensitive to the presence of LPC. In the copolymerisation of MMA and styrene, increasing LPC led to enhanced alternating copolymerisability. 19 refs.

JAPAN

Accession no.624427

Item 372

Journal of Applied Polymer Science

63, No.10, 7th March 1997, p.1279-86

THERMAL CONDUCTIVITY AND HEAT CAPACITY OF ABS RESIN COMPOSITES

Tsukuda R; Sumimoto S; Ozawa T Daicel Chemical Industries Ltd.

Thermal conductivity and heat capacity were measured for ABS composites filled with glass beads or rutile titanium dioxide, and the data were compared with those calculated using the Maxwell, Eucken and Bruggeman equations for thermal conductivity and additivity for heat capacity. Above a critical temperature, good agreement

was found for the glass bead composites, but considerable deviation was found below this temperature. For titanium dioxide composites, the observed heat capacity was higher than the theoretical value, but a linear relation was found among the composites and filler in the whole temperature range. Good agreement was found between the observed thermal conductivity and the theoretical values except in a low temperature range. The mechanism for these discrepancies was investigated by studies of dynamic viscoelastic behaviour. 11 refs.

JAPAN

Accession no.624417

Item 373

Journal of Applied Polymer Science

63, No.8, 22nd Feb.1997, p.991-1000

FOURIER TRANSFORM INFRARED SPECTROSCOPIC STUDIES OF POLYSTYRENE-CO-ACRYLONITRILE AND POLYVINYL CHLORIDE-CO-VINYL ACETATE BLENDS

Das G; Banerjee A N

Calcutta, University

Blends of SAN and a vinyl chloride-vinyl acetate copolymer prepared by solution blending, melt blending and coprecipitation methods were studied by Fourier transform IR spectroscopy. In the case of miscible blends, significant band shifting was observed, indicating the presence of specific molecular interactions. Immiscible blend systems showed slight or no band shifting, indicating the absence of specific molecular interactions. The miscible blends showed a substantial residual spectrum which was not observed for immiscible blends when a similar subtraction process was carried out. 24 refs.

INDIA

Accession no.624385

Item 374

European Polymer Journal

33, No.1, Jan.1997, p.13-8

DEVELOPMENT OF TOUGH MATRIX/BRITTLE DISPERSED PHASE BLENDS: PSU/SAN BLENDS

de Gauna B E R; Gaztelumendi M; Nazabal J

Pais Vasco, Universidad

Blends consisting of a tough matrix/brittle dispersed phase 75/25 polysulphone of bisphenol A/styrene-acrylonitrile copolymer were obtained both by kneading followed by compression moulding, and by direct injection moulding. Mechanical properties and structure were investigated to provide additional information about the basic mechanical response of blends possessing a tough matrix/dispersed brittle second component. 28 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; SPAIN; WESTERN EUROPE

Accession no.622332

Item 375

Modern Plastics International

27, No.2, Feb.1997, p.26-7

STEAM-HEATED BLOW MOULDING YIELDS CLASS-A MIRROR FINISHES

Moore S

Placo and Japan Synthetic Rubber have unveiled an industrial blow moulding process that is said to allow production of parts with Class A mirror finishes that do not require post-mould treatment such as sanding and painting. The J-Blow process optimises surface gloss by maintaining the temperature of the cavity surface at 120C, just above the Tg of ABS, using steam introduced into the cooling channels of the mould for 1-2 seconds immediately after the mould is clamped. A bathroom cabinet is the first commercial product to be made using the process.

PLACO CO.LTD.; JAPAN SYNTHETIC RUBBER CO.LTD.

JAPAN

Accession no.619785

Item 376

Masterbatch '95. Conference proceedings.

Basel, 20th-22nd June 1995. Paper 21. 621

IMPROVED PIGMENT EFFECTIVENESS THROUGH ANALYSIS OF TWIN SCREW EXTRUDER PERFORMANCE

Toris J; Lea J

APV Baker

This paper describes some preliminary work aimed at characterising the influence that the colour concentrate compounding process has on the dispersion and colour development in the final moulded article. A single colour concentrate formulation (containing two different pigment types; TiO₂ and phthalocyanine green) was used, and compounded on three widely different sizes of compounder, all of which possess identical mixing geometry. The copolymer, styrene/acrylonitrile, was used as a finely ground material. The pigments were steared and no processing aids included. The concentrate was let down using a single screw extruder, and then injection moulded plaques were analysed to determine pigment concentration and colour density. Significant effects of screw design, compounding conditions and extruder size were observed and explanations are proposed. 6 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK; WESTERN EUROPE

Accession no.617642

Item 377

Journal of Applied Polymer Science

62, No. 9, 28th Nov. 1996, p.1395-405

STRUCTURE AND PROPERTIES OF POLYBLENDS OF A THERMOTROPIC LIQUID CRYSTALLINE POLYMER WITH AN ALLOY OF

POLYAMIDE-6 AND ABS

Sawhney G; Gupta S K; Misra A
Indian Institute of Technology

Liquid crystalline copolyester (Vectra A950 from Hoechst Celanese) was melt blended at different compositions with a thermoplastic matrix (Triax 1180 from Monsanto Chemical Co.) which was a compatibilised blend of polyamide-6 and ABS. These blends were prepared under two different sets of injection moulding conditions. In the first case, a higher melt temperature, higher barrel temperature, lower injection pressure, lower mould temperature, and shorter residence time in the mould were used during injection moulding, as compared with the second case. The mechanical properties of the blends were superior to those of the base polymer. In the second case, the resulting injection moulded specimens had a distinct skin-core morphology where elongated fibrils of liquid crystalline polymer constituted the skin layer. The mechanical properties of the blends processed under the second set of processing conditions were superior to those of the first, though the trends in both cases were the same. To study the effects of process variables the 15% liquid crystalline polymer blend and the second set of processing conditions were taken as the base. Samples were injection moulded by varying one parameter at a time. The properties (TS, flexural strength, tensile modulus, EB, flexural modulus) of the blend were increased by maintaining a lower barrel temperature, greater injection pressure, lower injection speed, higher mould temperature, and a greater residence time in the heated mould. 21 refs.

INDIA

Accession no.617153

Item 378

Plastics and Rubber Weekly

No.1667, 20th Dec.1996, p.7

PC HOUSINGS FOR MOTOROLA

It is briefly reported that housings on Motorola's new line of amplifiers feature 10% glass-filled Makrolon 9415 polycarbonate from Bayer, while Bayblend FR100 PC/ABS blend is also employed in covers for the system. The housing and covers are manufactured via gas-assist injection moulding technology. The polycarbonate grades replace aluminium in the application due to greater cost effectiveness and strength.

BAYER AG; MOTOROLA INC.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.615909

Item 379

Journal of Applied Polymer Science

62, No.10, 5th Dec.1996, p.1699-708

MORPHOLOGY-PROPERTY RELATIONSHIPS IN ABS/PETP BLENDS. I. COMPOSITIONAL EFFECTS

Cook W D; Tie Zhang; Moad G; Van Deipen G; Cser F;
Fox B; O'Shea M
Monash,University; CSIRO

Blends of PETP and ABS were prepared by extrusion and injection moulding. DSC and DMTA studies showed that the polymers were immiscible and that the blends consisted of four phases, i.e. SAN, grafted polybutadiene, amorphous PETP and minor amounts of crystalline PETP. The morphology was investigated by TEM and SEM and it was shown that the two major domains, SAN and amorphous PETP, interpenetrated and were co-continuous over the compositional range of 30-70 wt % PETP. The yield stress and flexural modulus increased in an almost linear fashion as the weight fraction of PETP in the blend was increased. In contrast, the notched Izod impact energy passed through a maximum and the Dart impact energy showed a step transition at 5 wt % PETP. SEM studies of the Izod fracture surfaces exhibited considerable plastic deformation in both domains when the specimens were tough, indicating that both phases participated in the toughening process. 26 refs.

AUSTRALIA

Accession no.615780

Item 380

Journal of Macromolecular Science B

35, No.5, 1996, p.829-41

ABS TERNARY BLENDS: MORPHOLOGY, SURFACE GLOSS, AND MECHANICAL PROPERTIES

Kim B K; Choi C H; Xie X M

Pusan,National University; Tsinghua,University

ABS/PMMA/bisphenol A polycarbonate and ABS/PMMA/phenoxy ternary blends were prepared using a corotating twin-screw extruder, where the ABS content was fixed at 60 wt%, and the other ingredients varied up to about 40 wt%. Tensile modulus, yield strength, EB, and notched impact strength varied linearly with compositions in ABS/PMMA/phenoxy blends, whereas positive synergisms of these properties were generally obtained with ABS/PMMA/polycarbonate blends. The results were interpreted in terms of interpositions of PMMA between ABS and polycarbonate, which were seen from TEM micrographs and predicted from the spreading coefficient. Surface gloss of ABS increased in ABS/PMMA (60/40) blend but decreased in ternary blends, and this phenomenon was possibly explained by the pearl gloss mechanism. 24 refs.

CHINA; SOUTH KOREA

Accession no.615191

Item 381

Plastics World

54, No.11, Nov.1996, p.64

MODULAR IP SLASHES PARTS

It is briefly reported that a fully integrated structural instrument panel for the 1997 Dodge Dakota is a three-piece vibration welded structure moulded from Dow's

Pulse PC/ABS resin. The finished assembly functions as the structural retainer and network for heating, ventilation and air conditioning. Use of FEA and other development process improvements cut tooling costs by more than 1.5m US dollars.

DOW PLASTICS
USA

Accession no.614635

Item 382

Plastics and Rubber Weekly

No.1663, 22nd Nov.1996, p.3

MOTOR BOOST FOR SHOES

It is briefly reported that Satra Footwear Technology Centre claims success in recycling high grade plastic waste from end-of-life motor vehicles for use in shoe components. Heels for women's shoes have been moulded from recycled ABS. Components made from recycled nylon 66 and PP from the motor industry are also under investigation.

SATRA FOOTWEAR TECHNOLOGY CENTRE
EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.614566

Item 383

Reinforced Plastics

40, No.11, Nov.1996, p.7

TEKTRONIX'S PRINTER RELIES ON TOUGH PLASTIC PARTS

RTP is working closely with Tektronix and custom moulders to produce plastic components for a colour printer designed to be used in a demanding workgroup environment, it is briefly reported. The printer handle and block mounts are made from RTP 1300 Series PPS GRP. The pick roller cleaning tray and nose guides are made from RTP 2500 Series polycarbonate/ABS blend flame retardant compound. The upper and lower paper guides were designed to use RTP 600 Series ABS material to dissipate the static charge.

RTP CO.
USA

Accession no.610662

Item 384

Patent Number: US 5506304 A 19960409

PROCESS FOR CONTINUOUSLY PREPARING RUBBER MODIFIED STYRENE RESINS

Otsuzuki S; Iwamoto M; Nakajima A; Takaku M;
Morita H; Kobayashi T; Ando T
Mitsui Toatsu Chemicals Inc.

These resins, which have remarkably improved impact resistance and surface gloss, are prepared from styrene monomers and acrylonitrile monomers in the presence of a rubbery polymer by a continuous mass and/or solution

polymerisation procedure using a serial polymerisation device comprising two or more reactors. The process involves a first step of feeding polymeric materials to the first reactor to carry out the polymerisation of monomers in a condition where the rubbery polymer is not inverted to the dispersed phase and a second step of adding polymeric materials to second reactors to carry out polymerisation of the monomers and to thus invert the rubbery polymer to the dispersed phase. The ratio of the added materials to the materials used in the first step is in the range of from 10 to 220 wt.%.
JAPAN

JAPAN

Accession no.610417

Item 385

150th ACS Rubber Division Meeting. Fall 1996.
Conference Preprints.

Louisville, Ky., 8th-11th Oct.1996, Paper 40, pp.14. 012

ELASTOMERIC ACRYLATE TERPOLYMER FOR TPE MODIFICATION

Stockdale M; Horvath J; Laurich J
Goodyear Tire & Rubber Co., Chemicals Div.
(ACS, Rubber Div.)

An examination is made of the properties and applications of Sunigum (Goodyear), an elastomeric acrylate terpolymer with small amounts of styrene and acrylonitrile. Results are presented of experiments in its use as a modifier in thermoplastic resins. Blends with PVC, PU and ASA were investigated. 1 ref.

USA

Accession no.609339

Item 386

Plastiques Modernes et Elastomeres

47, No.4, May 1995, p.60-1

French

BASF PLAYS THE AUTOMOTIVE CARD

Vasselle J B

A survey is made of plastics materials produced by BASF for use in a range of automotive applications. These include Lupolen HDPE, Ultramid polyamides, Luran S ASA, Elastonat PU systems (Elastogran), and glass fibre-reinforced unsaturated polyesters, polyamides and other thermoplastics.

BASF AG; BASF FRANCE SA; ELASTOGRAN
GMBH

EUROPEAN COMMUNITY; EUROPEAN UNION; FRANCE;
GERMANY; WESTERN EUROPE

Accession no.609290

Item 387

Antec '96. Vol.I. Conference Proceedings.

Indianapolis, 5th-10th May 1996, p.1292-6. 012

PROBLEM OF STRESS CRACKING IN HEATED TOOL BUTT WELDED TAIL LIGHTS MADE OF PMMA AND ABS

Potente H; Bruessel A
Paderborn, Universitat
(SPE)

Stress cracking was investigated in vehicle tail lights consisting of a PMMA cover joined to an ABS housing by heated tool butt welding. Specimens were examined to localise the point where stress cracks were generated. The way in which the welding process influenced sensitivity to stress cracking was evaluated by welding tests on PMMA and ABS sheets. Measurements were made of the temperature profile during the heating phase, allowing thermomechanical analysis of the materials, and PMMA sheets were annealed in order to reveal the origins of stress build-up. Evidence of stress build-up and cracking effects observed in the test sheets was also found in tail lights. 2 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
USA; WESTERN EUROPE

Accession no.609275

Item 388

Antec '96. Volume III. Conference proceedings.
Indianapolis, 5th-10th May 1996, p.2988-91

**ACRYLONITRILE-BUTADIENE-STYRENE
RESIN MODIFICATION WITH POLYBUTENE**

Vitands E

Amoco Chemicals Corp.
(SPE)

Polybutenes are viscous, non-drying liquid polymers which can impart improved properties such as impact, flexibility, melt flow, and tear strength to rubber and thermoplastic polymers. The modification of two types of ABS, an emulsion and a bulk/mass process product, is described. The results indicate that polybutene modification increases both room temperature and low temperature impact strength, while maintaining or increasing the melt flow rate. There is no effect on heat distortion temperature, but a modest decrease in tensile and flexural properties is observed. The compounding and testing methods are described, as well as the effect of polybutene concentration and molecular weight on the blend properties. 8 refs.

USA

Accession no.609077

Item 389

Modern Plastics International

26, No.11, Nov.1996, p.94

**WEATHER-RESISTANT PBTP BLEND IS USED
FOR CAR MIRROR HOUSINGS**

It is briefly reported that frames for external mirrors on the Rover 600 are injection moulded in BASF's Ultradur S 4090 G6, a semi-crystalline PBTP modified with ASA and reinforced with glass fibres. Its high stiffness means that metal stiffening plates normally used in such parts can be dispensed with. The non-structural cover of the

housing is moulded in Luran S, an ASA. This polymer is highly resistant to ageing and weathering, so parts do not need to be painted.

BASF AG

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.608973

Item 390

Antec '96. Volume III. Conference proceedings.
Indianapolis, 5th-10th May 1996, p.3571-6

**MELTING OF HOMOPOLYMERS IN CO-
ROTATING, INTERMESHING TWIN-SCREW
EXTRUDERS**

Busby F; McCullough T W; Hughes K R; Kirk R O
Dow Chemical Co.
(SPE)

Melting is a critical, but poorly understood process in the compounding of polymers with co-rotating, intermeshing twin-screw extruders. Efforts to describe the melting mechanisms are hampered by a lack of experimental evidence. The results of flow visualisation experiments on polycarbonate (PC) and ABS are presented for melting using a 30 mm diameter, co-rotating twin-screw extruder. Experiments were performed under conditions which accurately reflect those used for PC/ABS blends processing. 11 refs.

USA

Accession no.608852

Item 391

Modern Plastics International

26, No.10, Oct.1996, p.148

ELECTROPLATING ABS

It is briefly reported that the Futuron direct electroplating system for ABS from Atotech Deutschland eliminates autocatalytic chemical baths. It is typically for automotive parts which require a chrome-like finish. Palladium and tin are first absorbed onto a pretreated, etched ABS surface. In a second step, the tin ions are replaced by copper ions. This accumulation of copper on the palladium clusters forms a thin, electrically conductive film which is stable enough to withstand subsequent direct electrolytic plating.

ATOTECH DEUTSCHLAND GMBH

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.607723

Item 392

Plastics World

54, No.10, Oct.1996, p.71

MODELLING-GRADE ABS

Stratasys has added a new methyl methacrylate ABS to its family of modeling materials available for use with

the FDM 1600 rapid prototyping system. The material, aimed at medical applications, is FDA compliant, can be gamma sterilised and offers chemical resistance. MABS models made with the supplier's FDM 1600 system are said to offer high impact strength, allowing functional testing of many medical products and design iterations. This abstract includes all the information contained in the original article.

STRATASYS INC.
USA

Accession no.607631

Item 393

Plastics and Rubber Weekly

1659, 25th Oct.1996, p.7

ETP FOR ADVANCED CHRYSLER PROJECT

Dow Automotive has been working with teams from Chrysler and Textron Automotive on the development programme for a fully integrated instrument panel for Chrysler's 1997 Dodge Dakota. The engineers selected an instrument panel design based on a three-piece vibration welded structure moulded from Dow's Pulse polycarbonate/ABS resin. The finished assembly functions as both the structural retainer and heating, ventilation and air conditioning distribution network.

DOW AUTOMOTIVE DEVELOPMENT CENTRE
USA

Accession no.606754

Item 394

Automotive Interiors International

Suppl., Autumn 1996, p.36/40

IMPACT OF IMPACT

Murphy J

US safety specifications FMVSS 201 and 208 are having wide-ranging effects on materials and constructions inside the automobile. Different levels of energy absorption capability are required, while the material and part still contributes to the overall aesthetics and cost targets of the vehicle interior. Chrysler's Minivan Platform Engineering group developed an instrument panel for a 1996 model. This incorporates a passenger airbag door which is virtually invisible and a glove box which combines a honeycomb ribbed construction to provide energy absorption, with a one-time living hinge on the glove box door. The material selected was Dow's Pulse polycarbonate/ABS blend.

DOW AUTOMOTIVE DEVELOPMENT CENTRE;
CHRYSLER CORP.
USA

Accession no.605938

Item 395

Journal of Applied Polymer Science

61, No.13, 26th Sept.1996, p.2285-96

SELF-COMPATIBILISATION OF POLYBUTYL METHACRYLATE/ACRYLONITRILE-STYRENE COPOLYMER BLENDS VIA CONCENTRATED EMULSION POLYMERISATION

Li H; Ruckenstein E

New York,State University

Details are given of the emulsion polymerisation of polybutyl methacrylate and acrylonitrile-styrene copolymer blends. The emulsions contained small amounts of vinyl-terminated macromonomer which were used as compatibilisers between the blend components. The generation of the compatibilisers and the compatibilisation mechanism were investigated via kinetic studies. 18 refs.

USA

Accession no.605107

Item 396

International Polymer Science and Technology

23, No.4, 1996, p.T/80-6

DEVELOPING PLASTIC SYSTEMS MADE FROM HUNGARIAN RAW MATERIALS FOR SHIELDING ELECTROMAGNETIC RADIATION

Macskasi L; Lehoczki L; Sztaniszlav D; Pauer M; Konczos G; Lovas A; van de Leur R

Details are given of the mechanical properties of materials used in electromagnetic radiation shielding applications. Data are given for nylon 6, PP, and ABS with and without fillers.

EASTERN EUROPE; HUNGARY

Accession no.605012

Item 397

Journal of Polymer Science : Polymer Physics Edition

32, No.15, 30th Nov.1994, p.2491-8

EXPERIMENTAL STUDY ON SATURATION SWELLING OF STYRENE-ACRYLONITRILE COPOLYMER PARTICLES WITH STYRENE AND ACRYLONITRILE MONOMERS

Nomura M; Lu X; Ishitani K; Fujita K

Fukui,University

The saturation swelling behaviour of styrene-acrylonitrile (SAN) copolymer particles was studied. The copolymer composition and compositional inhomogeneity of SAN copolymer particles had little or no effect on the swellability of the copolymer particles with a styrene and acrylonitrile comonomer mixture, so long as the weight fraction of acrylonitrile monomer units in the copolymer particles was less than 0.6-0.8. When the acrylonitrile content of the copolymer particles increased beyond this value, the swellability of the copolymer particles gradually decreased. Semi-empirical equations correlated the saturation content of each monomer in SAN copolymer particles as a function of the comonomer composition in the monomer droplets and the overall copolymer composition in SAN particles. 6 refs.

JAPAN

Accession no.604871

Item 398

Polymer Engineering and Science

36, No.11, Mid-June 1996, p.1489-94

DEVELOPMENT OF FLOW INSTABILITIES DURING THE INJECTION MOULDING OF MULTI-COMPONENT RESINS

Hobbs S Y

General Electric Co.,Corporate R & D

Several blends of bisphenol A polycarbonate and ABS resins having different gloss levels and microscopic surface roughness values were injection moulded over a range of injection rates. Changes in surface appearance were monitored by visual observation, optical microscopy, and electron microscopy. 18 refs.

USA

Accession no.604649

Item 399

Modern Plastics International

26, No.9, Sept.1996, p.90

MODIFIERS CREATE NOVEL CHLORINATED PE/ABS OPTION

Leaversuch R D

A thermoplastic elastomer made by blending chlorinated PE with ABS impact modifiers yields elevated elasticity, good tear and abrasion resistance and increased Shore A hardness. The material is made feasible by precise matching, compatibilisation and blending of readily available CPE and ABS modifier resins, plus use of other additives. GE Plastics is testing CPE and ABS formulations in various combinations and loadings, but the company anticipates potential users tailoring materials to match their own end-market needs. Brief property data are presented.

GE SPECIALTY CHEMICALS

USA

Accession no.604051

Item 400

International Polymer Processing

11, No.2, July 1996, p.179-87

ASSESSMENT OF THERMAL STRESSES IN INJECTION MOULDED ABS COPOLYMER

Akay M; Ozden S

Ulster,University

Thermal residual stresses in injection mouldings result from the non-uniform cooling of the melt in the mould. Normally, compressive stresses develop at the surface and tensile ones within the core of the mouldings. The magnitude of these residual stresses is examined for ABS under various injection moulding conditions. Although the occurrences of thermal stresses are inevitable, warpage results only when the residual stresses are out of balance. The imbalance of the residual stresses is caused by the non-uniform temperature distribution through the thickness of the mouldings which may be caused by variation in cross

section, part geometry and temperature difference between the two surfaces. The magnitudes of thermal residual stresses in injection moulded ABS flat plaques are determined using a layer removal technique. The development of warpage in a 3D component (an L-shaped bracket) is modelled using the residual stresses obtained for the flat plaques and the predictions are compared with the experimental warpage measurements. 24 refs.

EIRE

Accession no.603557

Item 401

Patent Number: US 5491194 A 19960213

THERMALLY PROCESSABLE BLENDS OF HIGH MODULUS POLYURETHANES AND MASS POLYMERISED ABS RESINS

Henton D E; Chen A; Moses P J; Ehrlich B S; Beyer D E
Dow Chemical Co.

The toughness of a thermoplastic, rigid PU is markedly improved by incorporating a mass ABS resin, such as styrene/butadiene rubber grafted with a copolymer of styrene and acrylonitrile. The toughened PU is particularly useful in making structural automotive body parts and housings for electrical appliances.

USA

Accession no.603298

Item 402

Polymer Engineering and Science

36, No.13, July 1996, p.1839-46

PREDICTION OF PROCESS-INDUCED WARPAGE IN INJECTION MOULDED THERMOPLASTICS

Akay M; Ozden S; Tansey T

Ulster,University; Dublin,University College

The relationship between the temperature difference of two halves of an injection mould and warpage for a flat plate was measured and predicted using a finite element technique. The development of warpage in an ABS and polycarbonate component was also measured and results compared with computer predictions. 7 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; IRELAND; UK; WESTERN EUROPE

Accession no.603278

Item 403

Antec '96. Vol.I. Conference Proceedings.

Indianapolis, 5th-10th May 1996, p.69-83. 012

PROCESSING OF THERMOPLASTIC ELASTOMERS AND RUBBER-MODIFIED POLYMERS ON CONTINUOUS OPERATING COMPOUNDING MACHINES

Siegenthaler H U; Stropoli T

Buss AG; Buss (America) Inc.

(SPE)

The use of extruders in the compounding of thermoplastic elastomers, rubber-modified polymers and polymer blends is discussed. Compounding requirements are examined for blends of PP and EPDM, high-impact PS and a styrene-butadiene-styrene block copolymer and PVC and EVA and for rubber-modified styrene-maleic anhydride copolymers. 21 refs.

SWITZERLAND; USA; WESTERN EUROPE

Accession no.602895

Item 404

Polymers for Advanced Technologies

7, No.7, July 1996, p.577-88

STRUCTURED LATEX PARTICLES AS IMPACT MODIFIERS FOR POLY(STYRENE-CO-ACRYLONITRILE) BLENDS

Schneider M; Pith T; Lambla M

Institut Charles Sadron

The influence of the morphology of composite NR-based particles (coated with a shell of crosslinked PMMA) on the toughness of SAN blends was studied. Furthermore, PS subinclusions were introduced into the NR rubber core. The SAN blends were prepared by adding the wet latex directly into a twin-screw extruder. This method allowed even tacky pure rubber particles to be dispersed, as shown by TEM, which confirmed the integrity of the soft particles after mixing. Solid NR particles or NR-based latex particles containing rigid PS subinclusions and no hard shell did not provide any impact improvement for SAN. Only NR-based core-shell particles containing at least 25% PMMA in the shell toughened the brittle matrix. Prevulcanised NR-based latex particles which did not cavitate easily were less effective. Core-shell particles containing PS subinclusions within a NR core allowed more effective use of the rubber phase. 53 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; FRANCE; WESTERN EUROPE

Accession no.602785

Item 405

Plastics and Rubber Weekly

No.1653, 13th Sept.1996, p.5

TV PARTNERSHIP PAYS DIVIDENDS

The successful development of a paint-free TV cabinet design for Lowestoft-based Sanyo involved Dow Chemical, Morning Plastics and Incoe. Dow's ABS, Magnum 3391, provided a wider choice of colours and finishes. A reduction of 40% in weight was called for with typical wall thickness cut from 4mm to 2.5mm. Morning Plastics suggested the use of a sequential hot runner gating system. Hot runner specialist, Incoe, was chosen to meet the specification partly because of its ability to provide a full turnkey package.

SANYO; DOW CHEMICAL CO.; MORNING PLASTICS LTD.; INCOE CORP.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK; WESTERN EUROPE

Accession no.602634

Item 406

International Polymer Science and Technology

23, No.3, 1996, p.T/88-9

USE OF ABS PLASTIC PRODUCTION WASTE IN THE MOTOR INDUSTRY

Artemenko S E; Ovchinnikova G P; Kononenko S G; Mikhel A I; Plykin A V

An assessment was made as to the suitability of ABS production waste from the automotive industry for recycling. Processing and physicommechanical properties are given. 5 refs.

Accession no.602139

Item 407

Patent Number: US 5470915 A 19951128

ABS RESINS HAVING IMPACT RESISTANCE AND LOW-GLOSS PROPERTIES AND PROCESSES FOR PREPARING THEM

Cha J Y; Kim K Y

Miwon Petrochemical Corp.

Between 5-20 wt.% butadiene rubber having double bonds is dissolved in between 30-70 wt.% graft copolymerising aromatic vinyl monomer and between 10-50 wt.% cyanised vinyl monomer. Polymerisation controller and radical initiator are added, and the mixture is polymerised in a first step of bulk polymerisation at a temperature of 80-120C while stirring until polymerisation proceeds to between 20-50% of completion. Between 40-70% alpha-styrene monomer, between 10-40 wt.% unsaturated nitrile and between 5-15 wt.% butadiene rubber are then added to the polymerised mixture and the resulting mixture stirred for 30-60 minutes in a second step of bulk polymerisation. Finally, distilled water and a suspending agent are added to disperse the mixture, which is then polymerised with a radical catalyst in a final step of suspension polymerisation.

KOREA

Accession no.599591

Item 408

Patent Number: WO 9522570 A1 19950824

PROCESS FOR THE PREPARATION OF MULTIMODAL ABS POLYMERS

Dion R P; Leng P B; Mitchell D W

Dow Chemical Co.

Rubber-modified monovinylidene aromatic copolymers having an enhanced combination of gloss, toughness and melt flow characteristics are produced by partially agglomerating a rubber latex having a specified particle size, emulsion graft polymerising the latex to a specified graft copolymer to rubber ratio and a specified graft copolymer molec.wt. and further agglomerating the latex during subsequent dewatering and/or melt compounding operations.

USA

Accession no.599221

Item 409

Journal of Applied Polymer Science

61, No.6, 8th Aug. 1996, p.1003-10

RUBBER PARTICLE AGGLOMERATION PHENOMENA IN ACRYLONITRILE-BUTADIENE-STYRENE (ABS) POLYMERS. I. STRUCTURE-PROPERTY RELATIONSHIPS STUDY ON RUBBER PARTICLE AGGLOMERATION AND MOULDED SURFACE APPEARANCE

Chang M C O; Nemeth R L
Monsanto Co.

The effects of molecular structure of ABS fabricated under severe moulding conditions on rubber particle agglomeration and moulded specular gloss were studied. An agglomeration index obtained by measuring particle size was used to determine the degree of rubber particle agglomeration. It was found that, as graft level decreased, agglomeration increased. The rubber particle agglomeration also increased when graft molec.wt. was increased. Lowering the particle size also led to a higher degree of agglomeration. Increasing the compositional acrylonitrile mismatch between the grafted and matrix styrene-acrylonitrile copolymers also increased the rubber particle agglomeration. Molecular structures that increased rubber particle agglomeration decreased the moulded gloss. 14 refs.

USA

Accession no.598685

Item 410

Revista de Plasticos Modernos

69, No.466, April 1995, p.347-9

Spanish

BONDING WITH ADHESIVES: SOME INTERESTING EXAMPLES

Jacobs H H
IPS Jacobs H.

Three examples are presented of the application of adhesive bonding techniques and equipment in industrial processes. These include the use of PU adhesives for bonding PU foam covered fabrics to ABS mouldings in the manufacture of vehicle doors and for the installation of PS foam roof panels, and the application of an adhesive in an automatic process for packaging delicate profiles in cardboard boxes.

STEINMEYER H., KLEBETECHNIK
EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.598453

Item 411

Plastiques Flash

Nos.280/1, May 1995, p.52-6

French

NEW MATERIALS FOR VEHICLE CONSTRUCTION

A survey is made of some plastics materials developed by BASF for use in the automotive industry. These include Lupolen 4261 A HDPE for use in fuel tanks, Ultramid glass fibre-reinforced nylon 6 for brake and accelerator pedals, Ultramid A 3HG 7Q17 glass fibre-reinforced nylon 66 for under-the-bonnet components, Elastopreg glass mat reinforced thermoplastics for semi-structural components, and Luran S ASA for external parts.

BASF AG
EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.598402

Item 412

Polyurethanes '95. Conference Proceedings.
Chicago, Il., 26th-29th Sept. 1995, p.459-63. 43C6

ADVANCES IN FOAM ADHESION TO REFRIGERATOR LINERS AND OTHER SUBSTRATES

Nichols J B; Bonekamp J; Miller R C
Dow Chemical Co.
(SPI, Polyurethane Div.)

A study was made of the effects of foam formulation and process conditions and liner composition on the adhesion of HCFC-141b blown rigid PU foam thermal insulation to refrigerator liner protective layers made of ABS, high-impact PS (HIPS), PE and blends of HIPS and PE containing a compatibiliser and adhesion promoter. A tensile test was used to quantify the level of adhesion before and after thermal cycling, and the Brett mould was used for laboratory simulations of foam adhesion within a refrigerator. Loss of adhesion was shown to occur after samples were repeatedly thermally cycled from a cold to a hot environment for several days. Levels of adhesion were found to vary in different parts of a refrigerator cabinet, but these variations could be minimised by the use of an adhesion promoter in the liner protective layer. 7 refs.

USA

Accession no.592109

Item 413

Polyurethanes '95. Conference Proceedings.
Chicago, Il., 26th-29th Sept. 1995, p.448-53. 43C6

ISO-/N-PENTANE BLOWN RIGID POLYURETHANE FOAM FOR APPLIANCES: A REALISTIC AND ECONOMICALLY ATTRACTIVE ALTERNATIVE TO CYCLOPENTANE

Birch A J; Parenti V; van Duin K J; Smits G F; Clavel P
Dow Europe SA; Dow Benelux NV
(SPI, Polyurethane Div.)

Mixtures of isopentane and n-pentane were used as blowing agents for rigid PU foams for use as thermal insulation in refrigerators. The density, compression strength, dimensional stability, thermal conductivity and demould expansion characteristics of the foams

were examined in comparison with foams blown with cyclopentane and a 50% reduced CFC-11 system. The compatibility of the blowing agents with high-impact PS and ABS refrigerator liners was also investigated. 9 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION;
NETHERLANDS; SWITZERLAND; USA; WESTERN EUROPE
Accession no.592107

Item 414

Polyurethanes '95. Conference Proceedings.
Chicago, Il., 26th-29th Sept.1995, p.443-7. 43C6
**HCFC-141B, CYCLOPENTANE OR ALL WATER
BLOWN? A COMPARISON STUDY IN VIEW OF
A REFRIGERATOR MANUFACTURER IN THE
PACIFIC**

Lee K B; Suk S J; Kim J S
L.G. Electronics Inc.
(SPI,Polyurethane Div.)

Results are presented of a study undertaken by Korean refrigerator manufacturer L.G. Electronics to evaluate the properties of PU thermal insulation foams blown with HCFC-141b, cyclopentane and carbon dioxide (all water) in comparison with foams produced using a CFC reduced system. Measurements were made of foam density, thermal conductivity, compression strength and dimensional stability, and tests were carried out to compare the energy consumption performance of refrigerator cabinets filled with the different foams. The resistance of ABS liners to environmental stress cracking by the blowing agents was also investigated. Production costs were analysed on the basis of costs for PU foam, ABS resin and capital investment.

KOREA; USA
Accession no.592106

Item 415

Plastics News(USA)
8, No.7, 15th April 1996, p.26/9
**GAS-ASSIST HELPS MOTOROLA REPLACE
METAL**
Grace R

The substitution of die cast aluminium with ABS/polycarbonate in the design of a power amplifier used in base stations for cellular telephone networks, is described. Motorola and Sajar Plastics have completed a two-year development project in which gas-assisted injection moulding was used. Details are given of the project, its prototyping, and through its success, the expectations of the company to adopt an increasing amount of plastics in applications currently using metals.

MOTOROLA INC.; SAJAR PLASTICS INC.;
NITROJECTION INC.
USA
Accession no.591141

Item 416

Plastics World
54, No.5, May 1996, p.33-41
**READY FOR THE NEW WAVE OF SUPER-
THINWALL PARTS?**
Miller B

Cellular phones, personal information technology devices and notebook computers have begun to require thin wall/long flow length combinations that are challenging the state-of-the-art in precision, high speed injection moulding. New approaches to moulding are needed when the wall thickness is 0.040 inch and the melt-flow distance is 3.5 inch from the gate. This article focuses on what moulders should know about the new and growing technology for moulding thin-wall parts from amorphous engineering resins, such as ABS and PC, and how the requirements differ from those of traditional moulding techniques.

USA
Accession no.589661

Item 417

Deformation, Yield and Fracture of Polymers.
Conference proceedings.
Cambridge, 11th-14th April 1994, p.P117/1-P117/4.
951
**EFFECT OF STRAIN RATE ON THE UNSTABLE
FRACTURE OF ABS**
Steenbrink A C; Gaymans R J; Van Der Giessen E
Twente,University; Delft,University
(Institute of Materials)

Extrusion blends of a polystyrene-acrylonitrile copolymer (SAN) and a SAN-grafted polybutadiene (PB) are prepared to obtain ABS materials. The PB content is varied between 15 and 30%. Fracture toughness in ABS is studied by means of a notched Izod test in a temperature range from -45 to +80 deg C. A notched tensile test with a speed range of 10-5 -101 m/s is used to study the influence of deformation rate. Over the whole speed range the propagation energy is low, so that crack propagation is unstable. In the impact regime, above loading rates of around 1 m/s, the energy dissipation shows a marked increase. This is caused firstly by a sudden increase of the maximum load. Secondly, the energy dissipation during crack propagation is somewhat enhanced. 12 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION;
NETHERLANDS; WESTERN EUROPE
Accession no.589306

Item 418

Modern Plastics International
26, No.4, April 1996, p.93
HIGH HEAT MODIFIED ABS

It is briefly reported that a high heat modified ABS grade from Denki Kagaku Kogyo has a heat deflection temperature under 1.82 MPa load of 139C. Grade Malecca

K-800 is modified with a styrene-N-phenyl-maleimide copolymer and can be compounded with standard ABS in a single-screw extruder. A 25% loading of K-800, for example, results in a compound with a heat deflection temperature under load of 99C, compared to 88C for straight ABS.

DENKI KAGAKU KOGYO KK

JAPAN

Accession no.587323

Item 419

Journal of Environmental Polymer Degradation

4, No.1, Jan.1996, p.65-9

CHEMILUMINESCENCE IN EVALUATING THERMAL OXIDATIVE STABILITY OF ACRYLONITRILE-BUTADIENE-STYRENE (ABS) COPOLYMERS. IV. COMPARATIVE STUDY OF VARIOUS STABILISERS IN MASS POLYMERISATION AND EMULSION RESINS

Parikh S S; Zlatkevich L

Monsanto Chemical Co.; Custom Scientific Instruments Inc.

The thermal oxidative stability of ionic and emulsion ABS with various antioxidants and UV stabilisers was studied. It was found that Santonox R provided better protection than Irganox 1076 to both resins. It was also the case in formulations with Tinuvin 770 and Tinuvin 328. 2 refs.

USA

Accession no.587202

Item 420

Polymer Testing

15, No.3, 1996, p.281-9

MECHANICAL AND OPTICAL INVESTIGATIONS OF SOME POLYMER BLENDS CONTAINING PVC

Bakr N A; El-Kady M

Mansoura, University

Dynamic and static mechanical spectra of PVC/acrylonitrile-butadiene rubber, PVC/SBR and PVC/ABS blends were studied. The constituent compounding conditions were held constant. 15 refs.

EGYPT

Accession no.587187

Item 421

Journal of Applied Polymer Science

60, No.3, 18th April 1996, p.353-62

CORRELATION BETWEEN FLOW MARK AND INTERNAL STRUCTURE OF THIN PC/ABS BLEND INJECTION MOULDINGS

Hamada H; Tsunasawa H

Kyoto, Institute of Technology

Clarification is given of a mechanism of the flow mark that appears on the surface of thin polycarbonate/ABS blend

injection mouldings through the observation of the internal structure at various processing conditions. The flow mark had two different constitutions, such as a lustre part and a cloud part, alternately on the both surfaces. 9 refs.

JAPAN

Accession no.586932

Item 422

Patent Number: US 5446103 A 19950829

MALEIMIDE-MODIFIED HIGH HEAT ABS RESINS

Traugott T D; Workentine S L

Dow Chemical Co.

Graft copolymerised maleimide-modified, impact resistant monovinylidene aromatic copolymer compositions have improved impact strength and fatigue resistance when the swelling index thereof is 12 or greater and when the numerical difference in maleimide monomer content as between the grafted copolymer and matrix copolymer portions thereof differ by no more than 9 percentage points from each other. Such compositions are prepared by mass, solution or mass/suspension graft copolymerisation processes and by deferring the addition of at least about 30% of the maleimide monomer ingredient to a point in the process after (and preferably only shortly after) phase inversion of the dissolved impact modifying rubbery polymer ingredient.

USA

Accession no.585624

Item 423

Revue Generale des Caoutchoucs et Plastiques

No.737, Dec.1994, p.60-6

French

PP AND ABS: BETWEEN COMPETITION AND PARTNERSHIP

Lafond E

Bayer France SA

A comparative study is made of the properties, costs and recyclability of PP and ABS in relation to their use in automotive parts. A cost analysis is presented for a dashboard which indicates an economic advantage for ABS when the total materials and production costs are taken into account.

EUROPEAN COMMUNITY; EUROPEAN UNION; FRANCE; WESTERN EUROPE

Accession no.583077

Item 424

Kunststoffe Plast Europe

86, No.1, Jan.1996, p.30-2

English; German

ABS/POLYAMIDE-6 BLENDS. PERFORMANCE PROFILE OF MATERIALS FOR APPLICATIONS IN THE SPORTS AND LEISURE SECTORS

Dunning L

DSM

A combination of high toughness, dimensional stability and resistance to extreme operating conditions is shown to make ABS/polyamide-6 blends suitable materials for sports and leisure applications. The further improvement of low-temp. impact strength, coupled with adequate rigidity and tracking resistance, opening up applications in winter sports and motorcycle racing, is discussed.

EUROPEAN COMMUNITY; EUROPEAN UNION;
NETHERLANDS; WESTERN EUROPE

Accession no.582481

Item 425

Modern Plastics International

26, No.2, Feb.1996, p.32-3

GM VANS ARE FIRST TO FEATURE A BLOW MOULDED KNEE BOLSTER

Gabriele M C

LCF Manufacturing is underway with commercial production of the first blow moulded automotive knee bolsters. Parts are being manufactured for General Motors' 1996 M-Van vehicle platform. Blow moulded knee bolsters provide a 40% weight saving and a unit cost saving of 4 US dollars per vehicle, compared with steel-reinforced injection moulded parts. Technical innovations include the cosmetic and functional design of parts, flexible tooling that adjusts to accommodate various part weights and the integration of an automated blow moulding production cell. Parts, which incorporate both a single and double wall design, are moulded from Dow's Pulse 880BG PC/ABS blend. This grade contains no glass or mineral fillers.

LCF MANUFACTURING LTD.
CANADA

Accession no.579869

Item 426

Polymat '94 - Polymer Blends II. Conference proceedings.

London, 19th-22nd Sept.1994, p.513-6. 6125

**YIELD BEHAVIOUR OF POLYCARBONATE/
POLYSTYRENE-CO-ACRYLONITRILE BLENDS**

Rink M; Frassine R; Pavan A

Milano, Politecnico

(Institute of Materials)

Yielding of polycarbonate/SAN blends is studied under five different biaxial stress states. A suitable testing procedure for determining the onset of yielding in these viscoelastic materials is set up. Applicability of the modified von Mises yield criterion to all the materials examined is assessed, and the values of the parameters defined by the criterion are determined as a function of blend composition. Yield behaviour of the material that constitutes the continuous matrix is studied. 5 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY;
WESTERN EUROPE

Accession no.579708

Item 427

Macromolecular Symposia

Vol.102, Jan.1996, p.337-45

**PRESSURE DEPENDENCE OF THE DEMIXING
BEHAVIOUR IN POLYMER BLENDS. I.
EXPERIMENTAL PROCEDURE**

Zeuner V; Lentz H; Kleintjens L A

Siegen, Universitat; DSM

Details are given of the development of equipment and experimental procedures to study the pressure dependence of the liquid-liquid demixing behaviour of high-viscous polymer blends under equilibrium conditions. The phase behaviour of the blends as a function of temperature and pressure was studied by laser light scattering. Data are given for a PMMA/SAN blend. 10 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
NETHERLANDS; WESTERN EUROPE

Accession no.579303

Item 428

Plastics and Rubber Weekly

No.1620, 26th Jan.1996, p.16

BESPOKE PLATING FROM BOROUGH

Borough Plating, a plastic moulder and finisher, is a leading participant in the move to return the classic look to cars by bringing back chrome. The initial advantages of plating plastic components include a non-corrosive base for the coating, weight reduction, design flexibility and high quality finish. Electroplating is more acceptable than vacuum deposition for products which need a high degree of surface durability, the company claims. The coating is chemically and physically bonded to the substrate, usually a high grade ABS.

BOROUGH PLATING LTD.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.578152

Item 429

Antec 95. Volume III. Conference proceedings.

Boston, Ma., 7th-11th May 1995, p.4319-23. 012

**INJECTION MOULDING STUDY OF
AUTOMOTIVE INTERIOR TRIM
THERMOPLASTIC RESINS**

Jones T P

Drexel, University

(SPE)

Injection moulded ABS and PP parts make up a large market share of thermoplastics used in automotive interior trim applications. There are attempts made in the moulding industry to minimise the number and size of gates in the mould cavities used to produce these parts. This has led to an increased interest in the effects that high gate-induced shearing has on the physical properties of these thermoplastics. The effects of shear rate and flow length on the impact strength and stiffness of ABS and

PP. While shear rate and flow length show no effects on the stiffness of each material, it does affect the impact strength. 9 refs.

USA

Accession no.577979

Item 430

International Journal of Polymeric Materials

30, Nos. 3-4, 1995, p.167-79

COMPARISON OF EMULSION AND MICROEMULSION COPOLYMERISATION OF STYRENE AND ACRYLONITRILE

Mendizabal E; Rodriguez-Ruvalcaba R; Rabelero V; Puig J E; Velazquez R; Castano V
Guadalajara, University; Mexico, Universidad Nacional Autonoma

The synthesis of SAN by emulsion or microemulsion polymerisation using either a water-soluble or a water-insoluble initiator is presented. The surfactant used was dodecyltrimethylammonium bromide or sodium dodecylbenzenesulphonate. 25 refs.

MEXICO

Accession no.575455

Item 431

Injection Molding

3, No.11, Nov.1995, p.50

REDUCED-VISCOSITY ABS GRADES

Three new grades of Magnum ABS from Dow Plastics are reported to offer reduced viscosities without sacrificing toughness, heat resistance or chemical resistance. Magnum 9015, 9025 and 9035 have melt flow rates of 12, 9 and 6.5 g/10 minute at 238C/3.8 Kg respectively; these lower viscosities fill complex parts more effectively, use fewer gates and produce less moulded-in stress. Details are given.

DOW PLASTICS

USA

Accession no.573482

Item 432

Patent Number: US 5414045 A 19950509

GRAFTING, PHASE-INVERSION AND CROSSLINKING CONTROLLED MULTI-STAGE BULK PROCESS FOR MAKING ABS GRAFT COPOLYMERS

Sue C-Y; Koch R; Pace J E; Prince G R
General Electric Co.

A liquid feed comprising a vinylidene aromatic monomer, an unsaturated vinyl nitrile monomer and a synthetic butadiene polymer dissolved therein is charged into a grafting reactor to pre-react the liquid mass to form a grafted rubber continuous phase polymeric product. This product is then charged to a phase inversion reactor where free rigid copolymer in monomer is the only continuous

phase and where dispersed particles of grafted rubber with occluded rigid copolymer and monomer are immediately formed. The second polymerisation product, which comes out from the phase inversion reactor, is then charged to a finishing reactor where it is further polymerised to form a third polymerisation product, which can be devolatilised. The process provides unique capacity and flexibility in controlling and adjusting rubber grafting and rubber particle morphology. Process conditions can be controlled to produce a high gloss or a low gloss resin product.

USA

Accession no.571041

Item 433

Modern Plastics International

25, No.11, Nov.1995, p.32/5

MULTI-LAYER MATERIALS PROCESS USED IN BOAT HULL AND DECK

Gordon J

BASF Corp. is offering a process and materials for cost effective thermoforming of boat hulls and accessories. The system was developed with JY Sailboats to produce a high-performance composite, offering design flexibility and weatherability. The patented process, glass on one side of the mould and a thermoformed shell, was used to make the hulls and decks of a two-person sailboat. The materials are multilayer structures that consist of an outer layer of unpainted, white, weather-resistant Luran S ASA. The outer layer is backed by a layer of ABS, a flotation layer of rigid PU foam and a rigid inner layer of urethane-impregnated glass fibre cloth.

BASF CORP.; JY SAILBOATS

USA

Accession no.570892

Item 434

Modern Plastics International

25, No.11, Nov.1995, p.29/31

COMPUTER MANUFACTURERS MAKE IN-ROADS IN USE OF RECYCLATE

Grande J A

Computer and business equipment suppliers are making steady progress in using recycle-content resins in new products they sell. Hewlett-Packard has introduced its new DeskJet 850 series printers with up to 25% recycled ABS in the housing. GE Plastics' Cylolac REC 550 was used. The recycle content is sourced from post-consumer telephones and plant scrap from vehicle interiors and business machines. At Xerox, a closed loop recycling process will yield 100% recycle content PC/ABS and ABS resin for commercial applications in 1996. IBM has undertaken successful closed loop recycling of PVC keyboard covers in the UK. PVC keyboards are reclaimed and recycled into new keyboards with 100% recycle content.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK; USA; WESTERN EUROPE

Accession no.570890

Item 435

Patent Number: US 5416161 A 19950516

**PRODUCTION OF BLEND SYSTEMS BY THE
CONDENSATION OF OLIGOCARBONATES IN
THE PRESENCE OF MASS-POLYMERISED ABS**

Nielinger W; Kauth H; Wittmann D; Freitag D; Idel K-J
Bayer AG

Polycarbonate/ABS blends are disclosed.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.568792

Item 436

Plastics and Rubber Weekly

No.1611, 10th Nov.1995, p.8

ABS MODIFIED BY AMOCO

It is briefly reported that Amoco Chemicals has found that modifying ABS with 10% polybutene can double the impact performance and lower the cost of the engineering resin. A further benefit is that the polybutene maintains or increases the melt flow rate of the resins, while heat deflection temperature remains virtually unaffected. The company says as polybutene is used to modify the rubber phase of ABS, producers may reduce the amount of more costly rubber required to achieve desired levels of impact strength.

AMOCO CHEMICALS CO.

USA

Accession no.568259

Item 437

Antec '95. Vol.II. Conference Proceedings.

Boston, Ma., 7th-11th May 1995, p.1884-9. 012

**DELAMINATION FAILURE MECHANISMS OF
MICROLAYERED PC/SAN COMPOSITES**

Ebeling T; Hiltner A; Baer E

Case Western Reserve University

(SPE)

The modes of delamination failure and corresponding critical loads of coextruded microlayer sheets consisting of alternating layers of polycarbonate and SAN of varying thickness were studied with the T-peel test. Four delamination modes were observed, and it was found that the layer thicknesses controlled which failure mode was observed. The failure mode controlled the resistance to delamination. The influence of layer thickness on crazing and crack propagation was investigated. 14 refs.

USA

Accession no.568192

Item 438

Antec '95. Vol.II. Conference Proceedings.

Boston, Ma., 7th-11th May 1995, p.1838-42. 012

**REACTIVE EXTRUSION OF BLENDS WITH
INTERFACIAL REACTIONS**

Curry J

Werner & Pfleiderer Corp.

(SPE)

Blends of an ethylene-vinyl alcohol copolymer (EVOH) and a styrene-maleic anhydride copolymer were produced by reactive extrusion in a twin-screw extruder and characterised in terms of their rheology, phase morphology and degree of covalent bonding. All blends displayed a synergy in shear viscosity and modulus and a measurable increase in crosslink density. The synergy was dominated by formulation, with maximum effects at 50-60% EVOH despite a poor stoichiometric balance in this range. Screw speed, feed rate and component viscosity also had measurable effects. The source of the synergy seemed to lie in the relative efficiency of macromixing. 9 refs.

USA

Accession no.568183

Item 439

Plastics World

53, No.10, Oct.1995, p.66

**WEATHERABLE ALLOYS ELIMINATE
PAINTING**

It is briefly reported that weatherable alloys are being increasingly used in exterior car parts. The cowl vent grille on the Ford Contour has been made from Gelyo acrylic-styrene-acrylonitrile polycarbonate from GE Plastics. Another new application is the B-pillar trim on the Honda Civic. The primary advantage in using weatherable alloys on exterior applications is the elimination of painting. Moulded-in colour also eliminates solvent emissions.

GE PLASTICS

USA

Accession no.567535

Item 440

Patent Number: US 5412036 A 19950502

**MALEIMIDE-MODIFIED HIGH HEAT ABS
RESINS**

Traugott T D; Workentine S L

Dow Chemical Co.

Graft copolymerised maleimide-modified, impact resistant monovinylidene aromatic copolymer compositions exhibit improved impact strength and fatigue resistance when the swelling index thereof is 12 or greater and when the numerical difference in maleimide monomer content as between the grafted copolymer and matrix copolymer portions thereof differ by no more than 9 percentage points from each other. Such compositions are prepared by mass, solution or mass/suspension graft copolymerisation processes and by deferring the addition of at least about 30% of the maleimide monomer ingredient to a point in the process after (and preferably only shortly after) phase inversion of the dissolved impact modifying rubbery polymer ingredient.

USA

Accession no.564970

Item 441

Antec '95. Vol.II. Conference Proceedings.
Boston, Ma., 7th-11th May 1995, p.1358-61. 012
**ELECTROSTATIC DISSIPATING COMPOSITES
CONTAINING GRAPHITE MICROFIBRES**
Schwartz K K; Bryant E W S
Hyperion Catalysis International Inc.
(SPE)

Electrostatic dissipating composites were prepared by incorporating graphite microfibrils into nylon 12 and a polycarbonate/ABS blend. Injection moulded specimens were characterised for mechanical properties, volume resistivity and static decay time. The test results indicated that both composites rapidly dissipated static charge while retaining mechanical properties approaching those of the neat materials. 11 refs.

USA

Accession no.563578

Item 442

Property Enhancement with Modifiers and Additives.
Retec proceedings.
New Brunswick, N.J., 18th-19th Oct.1994, p.5-14. 5
**TYPICAL FLAME RETARDANT/ADDITIVE
CHEMICALS FOR COMMERCIAL FR-HIPS
AND FR-ABS RESINS**

Song J H
BASF Corp.
(SPE,Palisades Section; SPE,Polymer Modifiers &
Additives Div.)

Over the last two decades, flame retardant high-impact PS and ABS have been the main plastics materials used for the housings of a variety of electrical and electronic equipment, appliances and tools. An overall review of commercially-available flame retardant additives used in these materials is presented, including typical formulations and performances in view of cost effectiveness and environmental compatibility.

USA

Accession no.563464

Item 443

Plastics World
53, No.9, Sept.1995, p.90
UNPAINTED PLASTIC DOOR PANELS

It is briefly reported that Ford Motor Co. is now using weather-resistant Luran S acrylonitrile styrene acrylate terpolymer for inner and outer rear door panels on the 1995 Contour and Mercury Mystique. The black triangular-shaped panels fill the rear corner of the windows on both rear doors. The ASA provides a long-lasting black colour, excellent resistance to stress cracking, high impact strength and good resistance to chemicals.

FORD MOTOR CO.
USA

Accession no.563343

Item 444

Plastics World
53, No.9, Sept.1995, p.25-6
**SUPPLIERS HELP AMANA EASE INTO COEX
DOOR LINERS**
Callari J

Amana Refrigeration had been running monolayer ABS refrigerator liners for years until the phase-out of CFC-based blowing agents. The company wished to stay with ABS, but realised it could not make the transition to new HCFC systems without making fundamental changes in its current production system. Amana opted to coextrude a new HCFC-resistant ABS system offered by Monsanto on a two-layer line supplied by Battenfeld Gloucester Engineering. The Lustran Guardian System comprises of a high-gloss ABS cap layer extruded over a low-gloss ABS substrate. The substrate layer, which is in contact with the PUR insulation, resists the chemical degradation caused by HCFC-141b. The thin capstock layer, meanwhile, provides the strength, rigidity and impact resistance needed for the application, plus the durability and appearance required of liners.

AMANA REFRIGERATION INC.; MONSANTO
CHEMICAL CO.
USA

Accession no.563338

Item 445

Plastics News(USA)
7, No.23, 7th Aug.1995, p.40
**HEWLETT-PACKARD PRINTERS USE
RECYCLED ABS**

Ford T

Hewlett-Packard's use of 25% recycled ABS in its line of Deskjet 850 printers is discussed. The printer features an outer casing made from a minimum of 25% recycled material, and also features a thin-walled design. The material has been developed to very rigorous specifications, it is reported, using mainly recycled ABS from the company's own take-back programme in which about 9.6 million pounds of used equipment is redeemed at its Grenoble plant.

HEWLETT-PACKARD CO.; TRIQUEST PRECISION
PLASTICS INC.
USA

Accession no.562509

Item 446

Patent Number: US 5399644 A 19950321
**SULPHUR DIOXIDE FOR VAPOUR PHASE
ELIMINATION OF STYRENE AND
ACRYLONITRILE POPCORN POLYMER IN
BULK SAN PRODUCTION**
Wozny J C; Sue C-Y; Pace J E
General Electric Co.

A bulk or mass polymerisation process is described which involves bulk polymerisation of vinyl monomers in a

liquid phase in the presence of a nitrogen rich vapour phase containing amounts of sulphur dioxide effective to inhibit formation of popcorn polymer during the reaction. The process may be used as a step in the formation of polymer or may be used as the entire reaction process.

USA

Accession no.562395

Item 447

Patent Number: EP 673971 A1 19950927

REDUCED GLOSS, HIGH IMPACT COMPOSITIONS OF POLYCARBONATE AND ACRYLONITRILE-BUTADIENE-STYRENE

Bhatia Q S; Howe R L

General Electric Co.

Disclosed are a reduced gloss polycarbonate, a rubber graft copolymer and ungrafted copolymer blend composition. The graft copolymer is a low graft deficiency unsaturated nitrile-vinyl aromatic-diene rubber graft copolymer, e.g. ABS graft copolymer. The ungrafted copolymer is a vinyl aromatic-unsaturated nitrile copolymer, e.g. SAN. The compositions preferably contain a flame retardant, more preferably a phosphate flame retardant, and an antidrip agent, e.g. PTFE. The composition is a melt blended composition, which contains agglomerated rubber particles, exhibits reduced gloss and is useful for making moulded articles, such as business equipment, specifically computer housings.

USA

Accession no.561771

Item 448

Polymer Engineering and Science

35, No.15, Mid-Aug.1995, p.1252-9

PREDICTING MECHANICAL PROPERTIES OF ACRYLONITRILE-BUTADIENE-STYRENE TERPOLYMER IN INJECTION MOULDED PLAQUE AND BOX

Kim B H; Hwang T W; Hern Jin Park

Massachusetts,University; Sunkyong Industries Inc.

A methodology to predict mechanical properties in injection moulded parts was developed. An outline is given of the proposed methodology and details of the experimental work, followed by an outline of the injection moulding simulations done on the computer and the actual training of the neural network. A description is given of the single hidden layer neural network in predicting the part properties at randomly selected locations of the plaque and box given the thermomechanical process histories at these locations. An analysis is presented of the results obtained supporting the prediction methodology which is to accurately predict the part properties without geometrical dependency. 37 refs.

USA

Accession no.561480

Item 449

Polymer Engineering and Science

35, No.14, July 1995, p.1191-5

BALLISTIC PERFORMANCE OF POLYCARBONATE/POLYESTER AND POLYCARBONATE/STYRENE-ACRYLONITRILE MICROLAYER SHEETS

Kohlman W G

US,Army Natick Res.Dev.& Engng.Center

Extruded microlayer sheets of polycarbonate/polyester and polycarbonate/styrene-acrylonitrile copolymer were tested for ballistic performance. Composition of the microlayer sheets ranged from 60 to 100% polycarbonate. Some samples performed as well as and slightly better than injection moulded polycarbonate samples. The failure mechanism was affected by the composition and the number of layers. Increasing composition of polycarbonate and number of layers decreased the percent of brittle failures. 10 refs.

USA

Accession no.561431

Item 450

Plastics News(USA)

7, No.17, 26th June 1995, p.9

MONSANTO UNIT'S CLEAR ABS TARGETED FOR MEDICAL USE

Lustran ABS 266 Mediclear is targeted at medical applications requiring chemical resistance, clarity and good processability at a lower cost than polycarbonate. The material was launched at the Medical Design and Manufacturing Show by Monsanto. Brief details are given of properties.

MONSANTO PLASTICS & RESINS CO.

USA

Accession no.559758

Item 451

Modern Plastics International

25, No.8, Aug.1995, p.92

ENGINEERED THERMOPLASTICS

It is briefly reported that BASF has developed a modified ABS, Terluran KR 2876, for smart card applications. The engineering thermoplastic has an optimal balance of processability, stiffness, dimensional stability and printability. The resin also bonds well to the adhesive used to bond the microchip in place after moulding. Several German companies are now using Eastman's Eastar PETG copolyester to make health insurance cards, which soon all German citizens will carry.

BASF AG

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.559654

Item 452

Plastics and Rubber Weekly

No.1601, 1st Sept.1995, p.1

FLYMO MOWER A WINNER

It is briefly reported that the Flymo 350 Turbo Compact Lawnmower has won the 1995 Horner Award for Plastics. The mower is injection moulded in ABS. A Highly Commended Certificate was awarded to the UPM Group's Dyna-Con all-plastic conveyor belt system. This injection moulded modular plastics system can be adapted by adding or taking off modules. As all contact surfaces are non-metallic, they do not rust or corrode, so catering for a wide variety of applications.

FLYMO; UPM LTD.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.559481

Item 453

Antec 95. Volume I. Conference proceedings.

Boston, Ma., 7th-11th May 1995, p.722-7. 012

HETEROGENEOUS STRUCTURES THROUGH THICKNESS DIRECTION OF POLYMER ALLOY INJECTION MOULDINGS

Hamada H; Tsunasawa H

Kyoto, Institute of Technology

(SPE)

Scanning electron microscopy examination of polycarbonate/ABS blend articles shows that the polycarbonate phase dimension and content change through the thickness dimension. The heterogeneity is enhanced by injection speed. 2 refs.

JAPAN

Accession no.558966

Item 454

Antec 95. Volume I. Conference proceedings.

Boston, Ma., 7th-11th May 1995, p.602-7. 012

EFFECT OF RUBBER PARTICLE AGGLOMERATION PHENOMENA IN ACRYLONITRILE-BUTADIENE-STYRENE (ABS) POLYMERS ON MOULDED SURFACE APPEARANCE

Chang M C O; Nemeth R L

Monsanto Chemical Co.

(SPE)

An agglomeration index which is defined as the number of primary particles in the rubber particle agglomerate is used to quantify the level of rubber particle agglomeration in ABS. Factors such as the compositional difference between the acrylonitrile of grafted and matrix SAN, the level of grafted SAN on dispersed rubber, the molecular weight of grafted SAN and rubber particle size have been studied. The effect of rubber particle agglomeration in ABS melt on the specular gloss of moulded chips is examined in detail. 11 refs.

USA

Accession no.558948

Item 455

Antec 95. Volume I. Conference proceedings.

Boston, Ma., 7th-11th May 1995, p.586-9. 012

EFFECTS OF VENTED AND NON-VENTED PLASTICATION SYSTEMS ON COLOUR AND SPECIFIC GRAVITY

Brown C; Vander Kooi M; Ramrattan S

Western Michigan, University

(SPE)

Within the injection moulding industry, uncertainties exist as to how the processing of hygroscopic materials affects product characteristics. Focusing on colour and specific gravity (relative density) of ABS, the differences resulting from using vented and non-vented moulding systems are determined. 6 refs.

USA

Accession no.558945

Item 456

Antec 95. Volume I. Conference proceedings.

Boston, Ma., 7th-11th May 1995, p.357-65. 012

CRITICAL SHEAR RATE FOR THE INJECTION MOULDING OF POLYCARBONATE, POLYSTYRENE AND STYRENE ACRYLONITRILE

Serrano M; Little J; Chilcoat T

Dow Chemical Co.; Ohio, University

(SPE)

An experimental evaluation of the critical shear rate guideline for the injection moulding of polycarbonate, PS and SAN using a series of dies with fixed geometry to control shear rates from subcritical to above critical conditions is presented. The effect of shear rate on physical properties, the rheology and the flow development is studied to analyse critical shear rate at the gate. 6 refs.

USA

Accession no.558850

Item 457

Antec '94. Conference Proceedings.

San Francisco, Ca., 1st-5th May 1994, Vol.III, p.3464-8. 012

ANALYSIS OF RIGID PVC-STYRENIC COPOLYMER BLEND SYSTEMS

D'Souza N P; Letton A; Asay R E

Texas A & M University; Vista Chemical Co.

(SPE)

Data obtained through the dynamic mechanical testing of blends of rigid PVC with SAN or an alpha-methylstyrene-acrylonitrile copolymer were used to determine the compatibility of the systems and to evaluate a correlation between dynamic testing and deflection temperature under load. Viscosity was determined in the low and high shear ranges and the results were related to phase morphology. 19 refs.

USA

Accession no.557814

Item 458

Antec '94. Conference Proceedings.
San Francisco, Ca., 1st-5th May 1994, Vol.III, p.3266-70. 012

EMBRITTLMENT OF RUBBER-MODIFIED STYRENIC POLYMERS UNDER LONG-TERM, LOW LEVEL STRESS

Dave R S; Chen C J; Smith D A; Chang M C O
Monsanto Co.,Plastics Div.
(SPE)

The pre-stress ageing and embrittlement phenomenon in ABS and ABS-type rubber-modified styrene copolymers was investigated by studies on blends of SAN with SAN grafted polybutadiene, EPDM and EPDM/polybutyl acrylate. The role of the molecular weight of the SAN matrix in stress embrittlement and the molecular mechanism of the process were studied. The results suggested that the phenomenon is universal among all ABS and ABS-type rubber-modified copolymers. The propensity for pre-stress embrittlement could be diminished by increasing the molecular weight of the SAN matrix and decreasing the temperature at pre-stress. 12 refs.

USA

Accession no.557785

Item 459

Antec '94. Conference Proceedings.
San Francisco, Ca., 1st-5th May 1994, Vol.III, p.3185-9. 012

MIXTURE EXPERIMENTS FOR MULTI-COMPONENT POLYMER BLEND DEVELOPMENT: A CASE STUDY

McElhaney R; Obermiller D
Dow Chemical Co.
(SPE)

A mixture experiment was conducted on blends of polycarbonate (PC), SAN and a grafted rubber concentrate using the blend components as dependent variables and PC molecular weight as an independent variable. Regression of property data using a Scheffe cubic model was carried out to develop composition-property relationships for PC/emulsion ABS blends. The melt flow rate and room temperature Izod impact energy were strongly dependent on the rubber/SAN ratio, while low temperature Izod impact energy had an optimum with respect to all three components. Heat distortion temperature was dictated almost solely by the amount of PC in the final blend. 2 refs.

USA

Accession no.557773

Item 460

Antec '94. Conference Proceedings.
San Francisco, Ca., 1st-5th May 1994, Vol.III, p.3176-84. 012

SUCCESSFULLY DESIGNING A STRUCTURAL PLASTICS DURABLES PRODUCT

Egan C E
Dow Plastics
(SPE)

A simultaneous engineering approach was used by Dow Plastics in the design of a battery powered vehicle for people with limited mobility, developed by Amigo International. The material selected was a high gloss ABS, and an injection moulding process was selected since it could easily handle the large free-form shapes while providing a low cost part.

AMIGO INTERNATIONAL
USA

Accession no.557772

Item 461

Antec '94. Conference Proceedings.
San Francisco, Ca., 1st-5th May 1994, Vol.III, p.2994-7. 012

RECYCLING OF ABS INJECTION MOULDED HOUSINGS AFTER USE

Michaeli W; Dassow J
IKV
(SPE)

Injection moulded ABS control boxes for boilers were recycled and a study was made of the density, colour and rheological, thermal, mechanical and morphological properties of injection moulded specimens consisting of virgin ABS and different amounts of cleaned or uncleaned regrind. The influence of printing ink contamination and other impurities, ageing during service and cleaning of the regrind on the properties of the specimens was evaluated. 7 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; USA; WESTERN EUROPE

Accession no.557741

Item 462

Antec '94. Conference Proceedings.
San Francisco, Ca., 1st-5th May 1994, Vol.III, p.2935-8. 012

DETECTION AND QUANTITATION OF DEGRADATION IN RECYCLED THERMOPLASTICS USING THE STA/FTIR TECHNIQUE

Mason J W
SEAL Laboratories
(SPE)

A technique is described for detecting and quantifying degradation in recycled thermoplastics, and its application to the study of pipe resins based on blends of virgin and recycled ABS is illustrated. The method combines simultaneous thermal analysis in which DSC and TGA data are obtained simultaneously for a single sample under identical experimental conditions, and Fourier transform IR spectroscopic analysis of the evolved gases. 5 refs.

USA

Accession no.557734

Item 463

Chemical Marketing Reporter

248, No.3, 17th July 1995, p.4/21

STYRENIC PLASTIC MAKERS VIE FOR REFRIGERATOR LINER SALES

Shearer B

High-impact PS and ABS are battling for a share in the refrigerator liner business. BASF Corp., Dow Chemical and Monsanto are vying to supply the five or six major US appliance manufacturers with the raw materials for the current and successive generations of refrigerator liners. Refrigerator manufacturers have adopted HCFC 141b, a blowing agent that is substantially less damaging to the ozone layer than CFCs. However, HCFC 141b chemically attacks conventional refrigerator liners, both HIPS and ABS. Monsanto has developed the Lustran system, a coextruded ABS consisting of two layers: a high gloss ABS cap layer and a low gloss ABS substrate layer that resists 141b attack. The two companies that offer HIPS refrigerator liner resins employ a layer of barrier resin to prevent HCFC 141b invasion.

USA

Accession no.556684

Item 464

Plastics and Rubber Asia

10, No.58, June 1995, p.12

ABS/PVC/RUBBER ALLOY FROM SHANGHAI

Brief details are given of the recently developed Type PAR9101 and 9102 ABS/PVC/rubber resin alloy for use on the surface of instrument panels. Based on medium modulus ABS resin with a certain proportion of bulk PVC and NBR as well as additives, they are formed by pre-compounding and twin-screw extrusion. Properties are briefly outlined and an indication of other applications is given.

SHANGHAI GAOQIAO PETROCHEMICAL CORP.
MALAYSIA

Accession no.555698

Item 465

Antec '94. Conference Proceedings.

San Francisco, Ca., 1st-5th May 1994, Vol.III, p.2546-9. 012

CHEMILUMINESCENCE IN EVALUATING THE THERMAL OXIDATIVE STABILITY OF ABS AND ABS/POLYCARBONATE BLENDS

Parikh S S; Zlatkevich L

Monsanto Chemical Co.; Custom Scientific Instruments Inc.

(SPE)

A chemiluminescence technique was used to study the resistance to thermal oxidation of ABS and ABS/polycarbonate blends containing various additives, including phenolic and phosphite antioxidants, light stabilisers and an organometallic salt lubricant. The data were used to evaluate the induction period and oxidation

rate constant, and the influence of different additives on these parameters was investigated. 1 ref.

USA

Accession no.555571

Item 466

Antec '94. Conference Proceedings.

San Francisco, Ca., 1st-5th May 1994, Vol.III, p.2537-41. 012

KNIT LINES IN AESTHETIC OUTDOOR ACRYLONITRILE-STYRENE-ACRYLATE APPLICATIONS

McGuire J; Azzopardi C

BASF Corp.

(SPE)

Techniques for minimising the number and appearance of knit lines on injection moulded ASA parts for outdoor application are examined. The use of gating and mould filling analyses for the preferential location of knit lines is illustrated for an automotive cowl vent grille. 9 refs.

USA

Accession no.555569

Item 467

Antec '94. Conference Proceedings.

San Francisco, Ca., 1st-5th May 1994, Vol.III, p.2524-8. 012

EFFECT OF CARBON BLACK MORPHOLOGY ON THE VISCOSITY AND LETDOWN PERFORMANCE OF THE CARBON BLACK MASTERBATCH

Yu M C; Menashi J; Kaul D J

Cabot Corp.

(SPE)

Masterbatches containing 20-50% carbon black were prepared from ABS and SAN and carbon blacks of different surface area and structure. The masterbatches were then let down to a 1% loading of carbon black in ABS. The effects of carbon black morphology, different carrier resins and polymer-carbon black interaction on masterbatch performance were investigated. A general trend of decreasing jetness (blackness) with increasing viscosity was observed. The melt viscosity model for carbon blacks in ABS and SAN was derived. Even though SAN was higher in melt viscosity than ABS, a highly loaded SAN masterbatch was less viscous than its ABS counterpart for high surface area, low structure carbon blacks. This could be explained by bound rubber interactions between ABS and carbon blacks. 7 refs.

USA

Accession no.555567

Item 468

Macromolecular Symposia

Vol.92, April 1995, p.233-42

KINETICS AND MECHANISMS OF THE SEEDED EMULSION COPOLYMERISATION OF STYRENE AND ACRYLONITRILE

Nomura M; Liu X; Mizutani F; Sato S; Fujita K
Fukui, University

Effects of various operating variables (residence time, number of seed particles, initial initiator concentration, monomer feed composition) on the kinetic behaviour of the seeded emulsion copolymerisation of styrene and acrylonitrile and on the monomer concentration in the copolymer particles were examined. 7 refs. (Presented at International Symposium on Radical Copolymers in Dispersed Media, CNRS/Group Francais d'Etudes et d'Applications de Polymeres, Lyon, France, 17th-22nd April 1994)

JAPAN

Accession no.553212

Item 469

Macromolecular Symposia

Vol.92, April 1995, p.133-56

EFFECT OF COMPOSITION DRIFT AND COPOLYMER MICROSTRUCTURE ON MECHANICAL BULK PROPERTIES OF STYRENE-METHYL ACRYLATE EMULSION COPOLYMERS

Schoonbrood H A S; Brouns H M G; Thijssen H A; Van Herk A M; German A L
Eindhoven, University of Technology

By performing copolymerisations under batch and semicontinuous conditions with two different monomer addition strategies (starved conditions and optimal addition), it was possible to control composition drift and to produce copolymers with different microstructures (chemical composition distributions). Three different average compositions were used. All these copolymers were processed in a way that ensured that the original particle structure was lost before the polymers were tested. Composition drift had an influence on mechanical properties (Young's modulus, maximum stress, EB). This influence could be understood on the basis of present knowledge about structure-mechanical property relationships. In the case of homogeneous copolymers, maximum stress and EB were dependent on molecular weight, and only weakly dependent on the chemical composition, while Young's modulus was independent of chemical composition and molecular weight. In the case of heterogeneous copolymers, the influence of copolymer microstructure on Young's modulus, maximum stress and EB were very large. Phase separation depended on the control of drift during polymerisation. The presence of a rubber phase affected the properties profoundly. Mechanical properties depended strongly on T_g. Fracture toughness was also tested. 29 refs. (Presented at International Symposium on Radical Copolymers in Dispersed Media, CNRS/Group Francais d'Etudes et d'Applications de Polymeres, Lyon, France, 17th-22nd April 1994)

EUROPEAN COMMUNITY; EUROPEAN UNION;
NETHERLANDS; WESTERN EUROPE

Accession no.553205

Item 470

Patent Number: US 5376717 A 19941227

LOW VOC (VOLATILE ORGANIC COMPOUNDS), SOLVENT-BASED ABS ADHESIVES

Patel N D; Brown M W
IPS Corp.

An ABS adhesive for joining ABS articles, such as pipes, comprises (a) about 10-35 wt.% ABS resin; and (b) about 40-60 wt.% dibasic esters and, optionally, at least one solvent selected from the group consisting of 0-30 wt.% methyl ethyl ketone and 0-10 wt.% acetone. The VOC level of the ABS adhesive composition is at or below the allowed maximum value of 350 g/l. The lap shear strength ranges from about 400-700 psi, which is deemed adequate for most non-pressure applications, such as drain, waste and vent uses, and pool and spa applications.

USA

Accession no.553145

Item 471

Modern Plastics International

25, No.6, June 1995, p.98

PACKAGE FOR GAS METER

It is briefly reported that Ultem polyetherimide is being used for the measuring tube in the world's first solid state, ultrasonic domestic gas meter. Valox PBTP is being used for the less critical outlet box. The cover is made in Cycloy polycarbonate/ABS blend and the meter viewing window is made of Lexan polycarbonate. All materials come from GE Plastics.

GE PLASTICS BV

EUROPEAN COMMUNITY; EUROPEAN UNION;
NETHERLANDS; WESTERN EUROPE

Accession no.552758

Item 472

Plastics World

53, No.6, June 1995, p.15

CANNON BUILDS ITS FIRST US FORMER

Schut J H

Cannon Shelley's first American-sized and built thermoforming machine, LF9648 (Linearform) with an 80x48 inch forming area and 30 inch draw, has just been completed and shipped from Cannon USA's plant. An enormous, specialised pressure former for refrigerator cabinets, it has a loading station, two ovens and a separate forming station with simplified chain transfers for faster cycling. At 28ft tall and 65ft long, it is the biggest thermoformer Cannon Shelley has ever built. The Linearform model can mould a typical refrigerator cabinet from 0.200 inch ABS in less than 70 seconds. Refrigerator doors, which are shallower, have been made on a similar machine at 140/hour.

CANNON SHELLEY

USA

Accession no.552692

Item 473

Plastics World

53, No.5, May 1995, p.85

PCR IN PC/ABS

Dow Plastics has developed a new glass-filled PC/ABS resin with 25% post-consumer recycle (PCR) content to meet the enhanced toughness criteria of the glass-filled instrument panel market. The recycled content for Retain 8209 will come from a range of finished goods. The new grade can meet or exceed all performance standards for existing materials-of-choice for glass-filled retainers. This abstract includes all the information contained in the original article.

DOW PLASTICS

USA

Accession no.552067

Item 474

Patent Number: EP 657479 A1 19950614

**GRAFTING, PHASE INVERSION AND
CROSSLINKING CONTROLLED MULTI-STAGE
BULK PROCESS FOR MAKING ABS GRAFT
COPOLYMERS**

Sue C-Y; Koch R; Pace J E; Prince G R

General Electric Co.

A process is disclosed for the continuous mass polymerisation of acrylonitrile-butadiene-styrene type thermoplastics. It involves charging a liquid feed comprising a vinylidene aromatic monomer, an unsaturated vinyl nitrile monomer and a synthetic butadiene polymer dissolved therein into a grafting reactor to prereact the liquid mass to form grafted rubber continuous phase polymeric product. This product is then charged to a phase inversion reactor where free rigid copolymer in monomer is the only continuous phase and where dispersed particles of grafted rubber with occluded rigid copolymer and monomer are immediately formed from the product of the grafting reactor. The second polymerisation product from the phase inversion reactor is then charged to a finishing reactor where the material is further polymerised to form a third polymerisation product, which can be devolatilised to produce the thermoplastic composition. The process provides unique capacity and flexibility in controlling and adjusting rubber grafting and rubber particle morphology. Process conditions can be controlled to produce a high gloss or low gloss resin product.

USA

Accession no.551935

Item 475

Antec '94. Conference Proceedings.

San Francisco, Ca., 1st-5th May 1994, Vol.II, p.2503-6.
012

**ROLE OF RUBBER PARTICLES AND
INTERNAL INTERFACES ON THE FRACTURE
RESISTANCE OF UNREINFORCED AND GLASS
FIBRE-REINFORCED PC/ABS BLENDS**

Vestergaard L H; Nair S V; Shiao M L; Goettler L A;
Gustafson L A

Massachusetts,University; Monsanto Co.

(SPE)

The combined effect of rubber particles and internal interfaces on fracture resistance was studied for 80/20 wt% polycarbonate (PC)/ABS and PC/SAN blends, both unreinforced and glass fibre-reinforced. The effect of rubber particles was found to be critical in the toughening of PC/ABS blends. The ABS phase underwent a volumetric expansion in front of the crack tip and therefore negated the triaxial stress state at the crack tip. The oligomer content had a strong effect on the fracture resistance of PC/SAN blends but a small effect on PC/ABS blends. The magnitude of rubber toughening, however, was sensitive to the polymer/polymer interface in the blend. Addition of glass fibres to a toughened PC/ABS blend lowered the fracture properties due to a weak fibre/matrix interface. However, significant ABS phase toughening was observed in the composites. Results are not presented for reinforced PC/SAN blends. 17 refs.

USA

Accession no.549493

Item 476

Antec '94. Conference Proceedings.

San Francisco, Ca., 1st-5th May 1994, Vol.II, p.2499-
502. 012

**FRACTURE RESISTANCE OF UNREINFORCED
AND GLASS FIBRE-REINFORCED NYLON/ABS
ALLOYS**

Wong S C; Nair S V; Vestergaard L H; Goettler L A;
Gustafson L A

Massachusetts,University; Monsanto Co.

(SPE)

A fracture mechanics approach was used to investigate the fracture resistance of unreinforced and glass fibre-reinforced nylon 66/ABS blends. The tensile strength of the blends followed an additive law, whereas tensile ductility was largest for a 50/50 blend. Tensile ductility was considerably reduced by reinforcement, but tensile strength showed a maximum at the intermediate blend composition. Addition of ABS decreased the initiation toughness of nylon 66 but greatly increased the crack propagation toughness. Addition of glass fibres increased the initiation toughness of the blends but reduced that of pure nylon 66. 25 refs.

USA

Accession no.549492

Item 477

Journal of Vinyl and Additive Technology

1, No.1, March 1995, p.46-50

**TYPICAL FLAME RETARDANT/ADDITIVE
CHEMICALS FOR COMMERCIAL FLAME
RETARDANT HIGH-IMPACT
POLYSTYRENE(FR-HIPS) AND FLAME**

RETARDANT ACRYLONITRILE-BUTADIENE-STYRENE TERPOLYMER(FR-ABS) RESINS

Song J H
BASF Corp.

An overall review is presented of the performance, cost, compoundability and environmental compatibility of flame retardant chemicals used for commercial FR-HIPS and FR-ABS resins. Commercially-available key bromine and chlorine chemicals, together with antimony oxide, are discussed with typical formulations and with emphasis on the advantages and disadvantages of each chemical. 5 refs.

USA

Accession no.549093

Item 478

Rubber World

211, No.6, March 1995, p.66

POLYMER BLEND

SEAT has selected the polymer blend Stapron N from DSM for the instrument surrounds of its Ibiza and Cordoba models. Stapron N, a blend of ABS and nylon-6, was chosen because of its attractive matt surface which eliminated the need for costly painting. Due to its excellent processability, Stapron N is said to be easily processed in existing moulds. Stapron N meets all SEAT's relevant specifications for scratch resistance, thermal cycling, toughness, heat resistance and colour stability. The blend also combines high impact strength and high temperature resistance with good acoustic properties.

DSM NV

EUROPEAN COMMUNITY; EUROPEAN UNION;
NETHERLANDS; WESTERN EUROPE

Accession no.548228

Item 479

Advances in Polymer Science

Vol.121, 1995, p.123-54

THERMAL DISCOLOURATION CHEMISTRY OF STYRENE-CO-ACRYLONITRILE

Priddy D B

Dow Plastics

A review is presented of the literature on the microstructure of the SAN backbone, the oligomers formed during its manufacture and their possible roles in SAN thermal discolouration. The recent application of GPC-UV/visible analysis to the SAN discolouration problem showed that both monomer sequence distribution in the backbone and small molecules are involved in the formation of chromophores and indicated that the main backbone chromophore resided on the chain end. The product of reactivity ratios of commercially-produced SAN copolymers is shown to be much higher than reported in the literature. Possible mechanisms for this observation and for SAN backbone discolouration are discussed. 90 refs.

USA

Accession no.548015

Item 480

Journal of Elastomers & Plastics

27, No.2, April 1995, p.115

TWO NEW PC/ABS RESINS FOR E/E AND COMPUTER APPLICATIONS AMONG WIDE RANGE OF CELSTRAN APPLICATIONS EXHIBITED AT PCI'S BOOTH

Polymer Composites Inc.

Brief details are given of the introduction of two new Celstran reinforced thermoplastics for use in electronic and computer parts. The materials are polycarbonate/ABS blends with 25% and 40% long glass fibre reinforcement.

USA

Accession no.547872

Item 481

European Plastics News

22, No.4, April 1995, p.23

FORD SOLVES ITS FASCIA PROBLEM

It is briefly reported that Ford's plastic trim moulding facility in Berlin has installed an automatic 16-point grille fascia welding unit custom designed by Herfurth. The equipment is being used to ultrasonically stake-weld an ABS grille moulding into place within a painted ABS full-width fascia panel. In addition, the equipment locates the Ford badge onto the grille moulding to an accuracy of +/-0.1mm. The Herfurth system is able to complete the task in around 30 seconds.

FORD MOTOR CO.; HERFURTH GMBH
EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY;
WESTERN EUROPE

Accession no.546830

Item 482

Antec '94. Conference Proceedings.

San Francisco, Ca., 1st-5th May 1994, Vol.II, p.1908-10. 012

EFFECTS OF DRYING TIME ON HYDROSCOPIC POLYMERS

Dunham J

Massachusetts, University

(SPE)

The effects of drying time on the impact strength and surface finish of injection moulded samples of virgin and regrind ABS and polycarbonate were investigated.

LOWELL, UNIVERSITY

USA

Accession no.546538

Item 483

Milton Keynes, 1994. 31/7/94. 6H21

94/341073 DC. EN 1455 PLASTICS PIPING SYSTEMS WITH STRUCTURED WALL PIPES FOR SOIL AND WASTE DISCHARGE (LOW AND HIGH TEMPERATURE) WITHIN THE

**BUILDING STRUCTURE - ACRYLONITRILE
BUTADIENE STYRENE (ABS) - (PREN 1455-5)**

British Standards Inst.
94/341073 DC

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EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.544753

Item 484

Milton Keynes, 1994. 31/7/94. 6H3

**94/341072 DC. EN 1455 PLASTICS PIPING
SYSTEMS WITH STRUCTURED WALL PIPES
FOR SOIL AND WASTE DISCHARGE (LOW AND
HIGH TEMPERATURE) WITHIN THE
BUILDING STRUCTURE - ACRYLONITRILE
BUTADIENE STYRENE (ABS) - PART 3:
FITTINGS (PREN 1455-3)**

British Standards Inst.
94/341072 DC

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EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.544752

Item 485

Milton Keynes, 1994. 31/7/94. 6H21

**94/341071 DC. EN 1455 PLASTICS PIPING
SYSTEMS WITH STRUCTURED WALL PIPES
FOR SOIL AND WASTE DISCHARGE (LOW AND
HIGH TEMPERATURE) WITHIN THE
BUILDING STRUCTURE - ACRYLONITRILE
BUTADIENE STYRENE (ABS) - PART 2: PIPES
(PREN 1455-2)**

British Standards Inst.
94/341071 DC

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EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.544751

Item 486

Milton Keynes, 1994. 31/7/94. 6H21

**94/341070 DC. EN 1455 PLASTICS PIPING
SYSTEMS WITH STRUCTURED WALL PIPES
FOR SOIL AND WASTE DISCHARGE (LOW AND
HIGH TEMPERATURE) WITHIN THE
BUILDING STRUCTURE - ACRYLONITRILE
BUTADIENE STYRENE (ABS) - GENERAL
(PREN 1453)**

British Standards Inst.
94/341070 DC

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EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.544750

Item 487

Antec '94. Conference Proceedings.

San Francisco, Ca., 1st-5th May 1994, Vol.II, p.1401-5.
012

**EFFECT OF EXTRUSION PARAMETERS ON
THE PHYSICAL AND ELECTRICAL
PROPERTIES OF STATIC DISSIPATIVE
POLYMER BLENDS**

Coots R J; Fahey T E; Giovannitti-Jensen A
Goodrich B.F.,Co.,Specialty Polymers & Chemicals
(SPE)

Statistically designed experiments were used to study the effects of a range of extrusion parameters on the surface and volume resistivities of static dissipating blends of ABS with an inherently dissipative polymer of unidentified composition. 15 refs.

MITECH CORP.
USA

Accession no.544329

Item 488

Revue Generale des Caoutchoucs et Plastiques

No.730, March 1994, p.39-40

French

WHEN S'PACE BUILDS THE ENVIRONMENT

Forest J P

Some building applications of plastics developed by French architects S'PACE are described. Particular attention is paid to a modular cladding system used in the renovation of an incineration plant, and which is produced by thermoforming PVDF/ABS sheets.

S'PACE; ELF ATOCHEM SA

EUROPEAN COMMUNITY; EUROPEAN UNION; FRANCE;
WESTERN EUROPE

Accession no.544282

Item 489

Reinforced Plastics

39, No.3, March 1995, p.14

**RECYCLATE-CONTAINING RESIN IS LESS
LIKELY TO BREAK**

It is briefly reported that a glass-filled polycarbonate/ABS resin which contains 25% post-consumer recyclate has been introduced by the Automotive Materials & Services Group of Dow Chemical. Retain PC/ABS 8209 was developed to meet the enhanced toughness criteria of the

glass-filled instrument panel market. The recycle-containing resin is less likely to break and, because its shrink rate is comparable with currently-used glass-filled materials, the new Retain resin can replace these materials without tooling modifications.

DOW CHEMICAL CO.,AUTOMOTIVE MATERIALS & SERVICES GROUP

USA

Accession no.544133

Item 490

Modern Plastics International

25, No.3, March 1995, p.78

FLAME RETARDANT BLENDS

Flame retardant blends of polycarbonate and ABS from Bayer can be used as computer and office machinery casings, as well as for electrical equipment. Bayblend FR 2000 and FR 2010 injection moulding grades contain neither halogens nor antimony. The company claims injection mouldings produced from these materials are thermally stable, heat resistant and lightfast. This abstract includes all the information contained in the original article.

BAYER AG

EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; WESTERN EUROPE

Accession no.544111

Item 491

Polymer Engineering and Science

35, No.2, Jan.1995, p.195-201

MONOMER CHAIN CROSS-TRANSFER CONSTANTS AND CROSS TERMINATION FACTOR EVALUATIONS ON STYRENE-ACRYLONITRILE COPOLYMERISATION

Mendizabal E; Velazquez S; Gonzalez V; Jasso C F
Guadalajara,University

Monomer chain cross-transfer rate constants and the cross-termination coefficient were evaluated using low conversion bulk copolymerisation experimental data and the apparent rate constant model. Data are given for the simulation and control of the SAN copolymerisation system. 22 refs.

MEXICO

Accession no.543331

Item 492

Philadelphia, Pa, 1993. 1/8/93. 6H21

ASTM F 628-. SPECIFICATION FOR ACRYLONITRILE-BUTADIENE-STYRENE (ABS) SCHEDULE 40 PLASTIC DRAIN, WASTE, AND VENT PIPE WITH A CELLULAR CORE

American Society for Testing & Materials

ASTM F 628-

Details are given of coextruded ABS waste, drain, and vent pipe, with outer and inner layers of solid ABS, and a core

of closed cell cellular ABS. Photocopies and loans of this document are not available from Rapra. It may be purchased from BSI. Please contact Rapra for further details.

USA

Accession no.542687

Item 493

Philadelphia, Pa, 1993. 1/7/93. 6H3

ASTM F 545-. SPECIFICATION FOR PVC AND ABS INJECTED SOLVENT CEMENTED PLASTIC PIPE JOINTS

American Society for Testing & Materials

ASTM F 545-

Details are given of PVC and ABS pipe joints, where the annular sealed space between pipe and socket surfaces are injected with solvent cement. Photocopies and loans of this document are not available from Rapra. It may be purchased from BSI. Please contact Rapra for further details.

USA

Accession no.542685

Item 494

Philadelphia, Pa, 1993. 1/7/93. 8(10)2

ASTM D 3138-. SPECIFICATION FOR SOLVENT CEMENTS FOR TRANSITION JOINTS BETWEEN ACRYLONITRILE-BUTADIENE-STYRENE (ABS) AND POLY(VINYL CHLORIDE) (PVC) NON-PRESSURE PIPING COMPONENTS

American Society for Testing & Materials

ASTM D 3138-

Details are given of the solvent cements for joining ABS pipe or fittings to PVC pipe or fittings. Photocopies and loans of this document are not available from Rapra. It may be purchased from BSI. Please contact Rapra for further details.

USA

Accession no.542623

Item 495

Philadelphia, Pa, 1993. 1/8/93. 6H21

ASTM D 2680-. SPECIFICATION FOR ACRYLONITRILE-BUTADIENE-STYRENE (ABS) & POLY(VINYL CHLORIDE) (PVC) COMPOSITE SEWER PIPING

American Society for Testing & Materials

ASTM D 2680-

Details ABS or PVC composite pipe, fittings and joining systems for gravity flow, non-pressure sanitary sewers, and storm drains. Photocopies and loans of this document are not available from Rapra. It may be purchased from BSI. Please contact Rapra for further details.

USA

Accession no.542609

Item 496

Philadelphia, Pa, 1993. 1/11/93. 6H21

ASTM D 2661-. SPECIFICATION FOR ACRYLONITRILE-BUTADIENE-STYRENE (ABS) SCHEDULE 40 PLASTIC DRAIN, WASTE, AND VENT PIPE AND FITTINGS

American Society for Testing & Materials
ASTM D 2661-

Details are given of single and coextruded ABS waste, drain and vent pipe. Photocopies and loans of this document are not available from Rapra. It may be purchased from BSI. Please contact Rapra for further details.

USA

Accession no.542605

Item 497

Philadelphia, Pa, 1993. 1/11/93. 6H21

ASTM D 2235-. SPECIFICATION FOR SOLVENT CEMENT FOR ACRYLONITRILE-BUTADIENE-STYRENE (ABS) PLASTIC PIPE & FITTINGS

American Society for Testing & Materials
ASTM D 2235-

Details are given of solvent cement for joining ABS pipe and fittings. Photocopies and loans of this document are not available from Rapra. It may be purchased from BSI. Please contact Rapra for further details.

USA

Accession no.542595

Item 498

Plastics in Building Construction

19, No.2, 1994, p.11-2

ABS: THE PIPE OF CHOICE FOR DWV APPLICATIONS

Brenier B; Marshall J

Colby Plastics; Dow Chemical

A brief history of the use of ABS for drain-waste-vent (DWV) plumbing applications is given. The subject is then further discussed under the headings: requirements for pipe manufacturing, chemical resistance, performance, ease of use, certification and quality control, and legislation.

INTERNATIONAL ASSOCIATION OF PLUMBING & MECHANICAL OFFICIALS; US,NATIONAL SANITATION FOUNDATION; ABS INDUSTRY GROUP

USA

Accession no.541983

Item 499

Patent Number: EP 632072 A2 19950104

PROCESS FOR CONTINUOUSLY PREPARING RUBBER MODIFIED STYRENE RESINS AND PRODUCTS THEREOF

Otsuzuki S; Iwamoto M; Nakajima A; Takaku M; Morita H; Kobayashi T; Ando T
Mitsui Toatsu Chemicals Inc.

These resins are prepared from styrene and acrylonitrile monomers in the presence of a rubbery polymer using a continuous mass and/or solution polymerisation procedure in a serial polymerisation device comprising two or more reactors. A polymeric material is fed to the first reactor to carry out polymerisation of the monomers in a condition where the rubbery polymer is not inverted to the dispersed phase. Polymeric materials are then added to second reactors to carry out polymerisation of the monomers and invert the rubbery polymer to the dispersed phase. The ratio of added materials to materials used in the first step is in the range of from 10 to 220 wt.%, giving rise to improved impact resistance and surface gloss.

JAPAN

Accession no.540548

Item 500

European Plastics News

22, No.2, Feb.1995, p.25

KEEPING UP APPEARANCES

Guyot H

A coextruded ABS/PVDF composite has been chosen to clad the exterior of an incineration plant at the refurbished Ivry waste treatment plant, situated on the outskirts of Paris. The cladding is based on 1.4m side modules, made by thermoforming ABS/PVDF sheets with three simple geometric elements in relief. The assembly allows the cladding to catch the light and to enhance colours in a dynamic way. The adhesion between ABS and PVDF is obtained via tri-material extrusion with a thermoplastic adhesive being used for the intermediate layer. The PVDF film is resistant to UV, oxygen and ozone, water, solvents, corrosive agents and thermal shocks.

IVRY

EUROPEAN COMMUNITY; EUROPEAN UNION; FRANCE;
WESTERN EUROPE

Accession no.540129

Item 501

New Materials/Japan

Feb.1995, p.8-9

PC/ABS ALLOY DEVELOPED FOR ELECTRONIC HOUSINGS

GE Plastics Japan has introduced a polycarbonate/ABS alloy resin that it claims will cut production costs for the housings of portable telephones and laptop personal computers. It is claimed the material can be moulded at thicknesses down to 2.3mm without affecting its physical properties. This compares with the 2.5mm thickness limit of existing PC/ABS resins. The savings in resin used lead to lower production costs. The in-house developed material retains the shock resistance of PC and the versatility of ABS. It has the same flame resistance of

conventional products, while its fluidity is 10% higher. This abstract includes all the information contained in the original article.

GE PLASTICS JAPAN LTD.
JAPAN

Accession no.540106

Item 502

Philadelphia, Pa, 1993. 1/8/93. 6E48

**ASTM D 2750-. SPECIFICATION FOR
ACRYLONITRILE-BUTADIENE-STYRENE
(ABS) PLASTICS UTILITIES CONDUIT AND
FITTINGS**

American Society for Testing & Materials
ASTM D 2750-

Details are given of ABS conduit produced by single extrusion or simultaneous multiple coextrusion and fittings, for underground communication and electrical cables and wires. Photocopies and loans of this document are not available from Rapra. It may be purchased from BSI. Please contact Rapra for further details.

USA

Accession no.538885

Item 503

Antec '94. Conference Proceedings.

San Francisco, Ca., 1st-5th May 1994, Vol.I, p.151-5.
012

EXTRUDING HIPS ON ABS SCREWS

Powers J R; Spalding M A; Hyun K S
Dow Plastics
(SPE)

Problems associated with the extrusion of high-impact PS (HIPS) using extruders designed for ABS processing were investigated. Changing materials from ABS to HIPS caused reduced output at higher screw speeds due to differences in dynamic friction coefficients leading to reduced solids conveying with HIPS, and screw geometry at the start of a barrier flight which restricted flow. The use of single-flight screws minimised this problem, allowing HIPS to be processed at higher rates. 6 refs.

DOW CHEMICAL CO.

USA

Accession no.537951

Item 504

Journal of Applied Polymer Science

54, No.11, 12th Dec.1994, p.1697-720

**INFLUENCE OF ABS TYPE ON MORPHOLOGY
AND MECHANICAL PROPERTIES OF
POLYCARBONATE(PC)/ABS BLENDS**

Lombardo B S; Keskkula H; Paul D R
Texas,University

The morphology and mechanical properties of PC-ABS blends based on different types of ABS materials were

investigated. Firstly, binary blends of PC with SAN 25 and two ABS materials representing extremes in rubber content and rubber particle type were examined, i.e. a bulk-made ABS with 16% rubber and an emulsion-made ABS with 50% rubber. PC-SAN 25 blends showed the limiting case of 0% rubber content in the ABS. The effect of rubber particle type in ABS was examined by comparing blends of PC with three different materials where the rubber contents had been made equal by dilution with SAN 25. At each PC-ABS blend ratio, the mechanical properties were determined as a function of rubber content in the ABS phase. This approach permitted some comparisons to be made between different rubber particle sizes and distributions. 64 refs.

USA

Accession no.537835

Item 505

Patent Number: EP 629498 A1 19941221

**MULTI LAYERED PRODUCT COMPRISING AN
ABS LAYER WITH A LOW RUBBER CONTENT
AND AN ABS LAYER WITH A HIGH RUBBER
CONTENT**

Noell J L W; Gaggar S K; McCarty G P; Miller K F
General Electric Co.

Multilayer sheets of an acrylonitrile-butadiene-styrene resin layer and a relatively high rubber ABS resin layer are described which are thermoformable. The multilayer sheets exhibit resistance to halogenated blowing agents which escape from foamed-in-place insulation. They can be thermoformed to provide equipment liners such as refrigerator liners, dishwasher liners, car interior panels, and appliance housings.

USA

Accession no.537761

Item 506

Pittsfield, Ma., c.1994, pp.7. 11ins. 42C21C391D11-9

CYCOLAC. PROPERTIES GUIDE

GE Plastics

Mechanical, impact, thermal, physical, and optical properties, and flame class rating data are tabulated for grades of Cycolac ABS. Grades include extrusion grades, flame retardant grades, electroplating grades, blow moulding grades, high heat grades and general purpose grades.

USA

Accession no.537612

Item 507

Patent Number: EP 614945 A2 19940914

**IMPROVEMENTS OF SURFACE APPEARANCE
IN PBT/SAN/ABS BLENDS**

Kuruganti V K; Angeli S R; Wozny J C
General Electric Co.

Blends, useful for making moulded articles, contain PBTP, a rubber modified graft copolymer and a rigid vinyl

aromatic vinyl cyanide copolymer. The melt viscosity of the PBTP resin is lower than that of a blend consisting of the rigid copolymer and rubber modified graft copolymer to improve the surface appearance of the composition upon injection moulding thereof.

USA

Accession no.534573

Item 508

Patent Number: EP 614943 A2 19940914

ABS/PBT BLENDS EXHIBITING IMPROVED SURFACE APPEARANCE

Kuruganti V K; Angeli S R; Wozny J C

General Electric Co.

These contain PBTP, a rubber modified graft copolymer and an amount of a metal salt of a monocarboxylic acid sufficient to improve the surface appearance of the composition upon injection moulding thereof. They are useful for making moulded articles.

USA

Accession no.534572

Item 509

Plastics and Rubber Weekly

No.1561, 11th Nov.1994, p.8

PLASTICS TO GROW IN SHIELDING JOBS

Electronic shielding is a market that is growing in importance with increasingly sophisticated electronic equipment needing increasingly sophisticated shielding. A report by Freedonia Group claims this situation will lead to US growth of 5.8% a year. Stricter regulations reducing levels of electromagnetic noise will drive growth for EMI/RFI shielding to about 115 million lb. ABS, PVC, polyphenylene-based alloys, polycarbonate and PE will account for about 70% of demand by 1998, it is claimed. DSM and Philips Consumer Electronics have teamed up to develop an enclosure for the electronic circuitry of Philips CDi players. The 350g part is one of the largest applications for the flame retarded ABS Faradex from DSM.

FREEDONIA GROUP INC.; DSM NV; PHILIPS CONSUMER ELECTRONICS

EUROPEAN COMMUNITY; EUROPEAN UNION; NETHERLANDS; USA; WESTERN EUROPE

Accession no.533874

Item 510

Advances in Polymer Technology

13, No.4, Winter 1994, p.259-74

POLYCARBONATE/ABS BLENDS: PROCESSABILITY, THERMAL PROPERTIES, AND MECHANICAL AND IMPACT BEHAVIOUR

Greco R; Astarita M F; Dong L; Sorrentino A

CNR

Polycarbonate/ABS blends of varying composition were prepared and compression moulded in sheets. An analysis

of processability, thermal properties, impact properties and general mechanical properties are discussed. Comparisons between experimental data and theoretical results are described for Young's modulus. 31 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY; WESTERN EUROPE

Accession no.533557

Item 511

Advances in Polymer Technology

13, No.4, Winter 1994, p.249-58

POLYCARBONATE/ABS BLENDS: A LITERATURE REVIEW

Greco R; Sorrentino A

CNR

A literature review concerning polycarbonate/ABS blends is presented with the aim of providing a background suitable for a systematic investigation on the properties of these materials undertaken at the Italian National Research Council. The behaviour of polycarbonate/SAN blends is also included. 58 refs.

EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY; WESTERN EUROPE

Accession no.533556

Item 512

Polymer

35, No.20, 1994, p.4263-79

CONTROL OF THE MORPHOLOGY OF POLYAMIDE/STYRENE-ACRYLONITRILE COPOLYMER BLENDS VIA REACTIVE COMPATIBILISERS

Majumdar B; Keskkula H; Paul D R; Harvey N G Austin, University of Texas; Rohm & Haas Co.

The effects of compatibilisers having reactive functional groups (acid and/or anhydride) on the morphology of blends consisting of SAN in polyamide matrices were investigated by transmission electron microscopy. Particular attention was paid to the use of a series of imidised acrylic polymers and how the morphology of nylon 6/SAN blends was affected by their functionality for reaction with nylon 6 and their miscibility with SAN copolymers. 72 refs.

USA

Accession no.532002

Item 513

Midland, Mi., 1993, pp. 7. 1ins. 5/8/94.

42C21C391D11-6E4(15)-9

MAGNUM 4425 ABS RESIN FOR COMPUTER AND BUSINESS EQUIPMENT

Dow Chemical Co.

Properties, processing conditions and applications are discussed for Magnum 4425, an ignition resistant, UV stable ABS resin, characterised by good processability

and toughness. It has been specifically engineered for injection moulded computer and business machine enclosure and housing applications.

USA

Accession no.530629

Item 514

Midland, Mi., c.1993, pp.5. 11ins. 3/6/94. 42C12-6125-6E4(15)

PULSE 1745 POLYCARBONATE/ABS RESIN FOR COMPUTER AND BUSINESS EQUIPMENT. TECHNICAL INFORMATION

Dow Chemical Co.

Pulse 1745 is a polycarbonate/ABS blend which has been developed for use in applications such as computers and business machines. It is characterised by UV stability, ignition resistance, toughness and claimed outstanding heat distortion characteristics. Comprehensive property data are tabulated and processing conditions are examined.

USA

Accession no.530621

Item 515

Midland, Mi., 1993, pp.2. 10ins. 3/6/94. 43C12-6125-968

PULSE 1745 ENGINEERING RESIN

Dow Chemical Co.

Product information is presented for Pulse 1745 engineering resin from Dow. It is an ignition resistant PC/ABS blend which is characterised by good heat distortion resistance, UV stability, toughness and processability. Injection moulding considerations and properties are detailed.

USA

Accession no.530615

Item 516

Patent Number: EP 605937 A1 19940713

ANTISTATIC RESIN COMPOSITION

Matoaba Y; Shimizu Y; Miura K; Kitano S; Sakashita T; Tanaka H
Daiso Co.Ltd.

This comprises 100 pbw of an ABS graft copolymer composed of an acrylonitrile compound and a vinyl aromatic compound in a weight ratio of 10:90 to 50:50 and 5 to 30 pbw of an ethylene oxide copolymer admixed with the graft copolymer and containing at least 50 wt.% of ethylene oxide. The ethylene oxide copolymer has a refractive index of at least 1.50 and the composition is useful for injection moulding to give mouldings with excellent surface appearance.

JAPAN

Accession no.530366

Item 517

Asian Plastics News

Jan/Feb.1994, p.18

INJECTION MOULDING TROUBLESHOOTING GUIDE. V. ABS

The fifth part of a troubleshooting guide for injection moulding, with emphasis on problems encountered when processing ABS. Problems covered include: short shots; trapped gas, bubbles, burn spots; surface imperfections, poor weld lines, sink spots or shrinkage, mould flashing, sticking in the sprue or cavity; and black streaking.

ASHLAND PLASTICS AUSTRALIA
AUSTRALIA

Accession no.529967

Item 518

Geneva, 1993. 1/12/93. 42C21C391D11

ISO 10366/1-. PLASTICS - METHYL METHACRYLATE/ACRYLONITRILE/BUTADIENE STYRENE (MABS) MOULDING AND EXTRUSION MATERIALS - DESIGNATION SYSTEM AND BASIS FOR SPECIFICATIONS

International Organisation for Standardisation
ISO 10366/1-

Photocopies and loans of this document are not available from Rapra. It may be purchased from BSI. Please contact Rapra for further details.

SWITZERLAND; WESTERN EUROPE

Accession no.529671

Item 519

European Plastics News

21, No.9, Oct.1994, p.44

PC/ABS REPLACES STEEL IN DASHBOARD

General Motors has used an engineering thermoplastic in the fully-integrated instrument panel of its 1994 Buick Roadmaster. Because of its ductility, Dow's Pulse 830 PC/ABS resin was selected for a project that was initiated in response to Federal safety requirements. Passenger side airbag modules needed to be accommodated and knee bolsters were necessary to prevent an occupant from "submarining" when an airbag inflated. The final design uses a ribbed approach to structural support, with a moulded cross-car beam/duct replacing a steel cross-car beam, HVAC duct and passenger airbag support. This abstract includes all the information contained in the original article.

GENERAL MOTORS CORP.; DOW CHEMICAL CO.
USA

Accession no.529236

Item 520

European Plastics News

21, No.9, Oct.1994, p.44

ABS RESISTS VANDALS

It is briefly reported that DSM has supplied its Ronfalin ABS for use in the housing of ticket validation equipment being used on the Brussels public transport system. The manufacturer, AES Prodata, chose Ronfalin grade VE-30 for its vandal-proof qualities, impact resistance, flame retardancy and ability to withstand the sort of chemical detergents used to remove graffiti.

DSM BV; AES PRODATA
BELGIUM; EUROPEAN COMMUNITY; EUROPEAN UNION;
WESTERN EUROPE

Accession no.529235

Item 521

European Plastics News

21, No.9, Oct.1994, p.41

SPEEDY COMMUNICATIONS

Peterson P

In order to speed up the design of a new telephone system for Deutsche Telekom, Philips Business Communications Systems decided to adopt a concurrent engineering approach. It also invested in an I-DEAS three-dimensional computer aided design modelling system from SDRC and exploited rapid prototyping technology. The complex executive telecommunications system, Octophon, includes two main terminal and two extension units. The toolmakers, Sanko Gosei of Japan, used the software to simulate the moulding process and identified several design improvements early on. Redesign and tool modifications were virtually eliminated.

PHILIPS BUSINESS COMMUNICATIONS SYSTEMS

EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.529225

Item 522

Antec '93. Conference Proceedings.

New Orleans, La., 9th-13th May 1993, Vol.III, p.3380-5. 012

EFFECTS OF POLYMER VISCOELASTICITY ON FIBRE GLASS ATTRITION WHEN COMPOUNDING FIBRE GLASS STRAND ON THE CO-ROTATING INTERMESHING TWIN-SCREW EXTRUDER

Grillo J; Papazoglou E; Petrie S
Werner & Pfleiderer Corp.; Arco Chemical Co.;
Massachusetts,University
(SPE)

Glass fibres were compounded into nylon 6 and styrene-maleic anhydride copolymers using a co-rotating intermeshing twin-screw extruder. Measurements of viscoelasticity by dynamic mechanical spectroscopy were correlated with fibre attrition and the mechanical properties of the composites. Optimum fibre lengths were favoured at low viscosity and high elasticity. The rate of increase of strength with glass concentration depended

on the efficiency of fibre incorporation and wetting, increasing as the elastic component of the matrix increased. The rate of change in flexural modulus with glass concentration depended on fibre wetting and fibre-matrix adhesion. 3 refs.

LOWELL,UNIVERSITY
USA

Accession no.528917

Item 523

Antec '93. Conference Proceedings.

New Orleans, La., 9th-13th May 1993, Vol.III, p.3279-82. 012

FRACTURE RESISTANCE OF UNREINFORCED AND GLASS FIBRE-REINFORCED PC/ABS BLENDS

Nair S V; Vestergaard L; Shiao M L; Goettler L A;
Henry W D
Massachusetts,University; Monsanto Co.
(SPE)

A study was made of the fracture toughness, tensile properties and impact strength of unreinforced and glass fibre-reinforced blends of polycarbonate (PC) and ABS. Blending with ABS gave substantial toughness enhancement of PC with respect to both slow and fast crack propagation. Positively synergistic behaviour in mechanical properties was observed in a wide blend composition range between 30 and 80 wt% PC. One component of toughening appeared to operate around 50 wt% PC and another around 70-80 wt% PC, and each of these components could be related to different toughening mechanisms. Substantial strengthening due to glass fibres was observed in positively synergistic blends, although with respect to ductility the sharp drop as a result of glass fibre addition overwhelmed the role of blend composition. 10 refs.

USA

Accession no.528896

Item 524

Antec '93. Conference Proceedings.

New Orleans, La., 9th-13th May 1993, Vol.III, p.2956-62. 012

EFFECT OF THERMAL AGEING ON PHYSICAL PROPERTIES OF IMPACT MODIFIED VINYL

Einhorn R A; Stevenson J C
Rohm & Haas Co.
(SPE)

The effects of heat ageing at 100, 120 and 130C on the impact retention of PVC compounds containing butyl acrylate/methyl methacrylate (BA/MMA), MBS and ABS impact modifiers were investigated. The BA/MMA modified compound showed excellent impact retention after ageing at all three temperatures. Formulations modified with MBS and ABS did not retain their impact properties as long, and showed evidence of changes in

their physical and chemical states. Vicat softening temperature, DMTA and Fourier transform IR spectroscopy measurements confirmed that the BA/MMA modified PVC was not significantly affected by heat ageing for the duration of the experiments at the test temperatures used. 14 refs.

USA

Accession no.528836

Item 525

Antec '93. Conference Proceedings.
New Orleans, La., 9th-13th May 1993, Vol.III, p.2914-20. 012

**SIMULTANEOUS THERMAL ANALYSIS
COMBINED WITH FOURIER TRANSFORM
INFRARED SPECTROPHOTOMETRY: A
POWERFUL NEW TOOL FOR PLASTICS
FAILURE ANALYSIS**

Mason J W
SEAL Laboratories
(SPE)

Simultaneous thermal analysis, a technique in which DSC and TGA data are obtained simultaneously on a single sample under the same experimental conditions, was used in combination with Fourier transform IR spectrophotometry to identify and quantify the presence of cyclohexanone in the fracture zone of failed ABS pipes bonded with "hot" ABS solvent cements. The information obtained, coupled with fractography of the failures, proved the adverse effects on such pipe joints of the cyclohexanone used in these cements.

USA

Accession no.528830

Item 526

Plastics Compounding

17, No.6, Sept/Oct.1994, p.48-50

**SOLVING THE UV-RESISTANCE PROBLEM IN
FLAME-RETARDED HIPS**

Landry S D
Albemarle Corp.

Information is presented in some detail on the use of two flame retardants which are reported to exhibit limited contribution to polymer discolouration when properly stabilised in high-impact PS and ABS computer and business machine housings. The flame retardants - Saytex BT-93 and Saytex 8010 - are compared with other flame retardants for high-impact PS and ABS used commercially. 6 refs.

USA

Accession no.528033

Item 527

Japan Chemical Week

35, No.1793, 22nd Sept.1994, p.3

**PP OVERTAKING ABS RESIN IN AUTOMOTIVE
USE DEMAND**

Trends in the use of PP in place of ABS in automotive applications are discussed, with statistics to demonstrate the demand for each. The switch to PP is claimed to be cost related, and as such ABS manufacturers are making efforts to reduce costs. In addition, weight reduction is achieved by the use of PP, although ABS has better mouldability, processability and appearance.

JAPAN

Accession no.527543

Item 528

Plastics Technology

40, No.6, June 1994, p.31/5

HOW ABS WINDOWS MAY CHALLENGE PVC

Ogando J

This comprehensive article describes how recent materials and equipment advances may see ABS challenge PVC as the preferred material for extruded window profiles. The article includes property and colour retention comparison between PVC and ABS and describes the productivity advantages and processing developments which means extrusion grade ABS can be processed with conventional PVC tooling.

GE PLASTICS; DAVIS-STANDARD CORP.
USA

Accession no.525572

Item 529

Plastics and Rubber Weekly

No.1551, 2nd Sept.1994, p.8

HERFURTH PUTS FORD IN PLACE

Herfurth UK has installed a custom-designed automatic 16-point grille fascia welding unit at Ford's plastics trim moulding facility in Berlin. The equipment is being used to ultrasonically stake-weld an ABS grille moulding into place within a painted ABS full-width fascia panel and to locate the Ford badge onto the grille moulding to an accuracy of +/-0.1mm. The system completes the task in around 30 seconds, although unit output is limited by the rate at which the component parts can be moulded. Herfurth has developed a similar machine which will be delivered to a UK-based contract moulder producing door liners in October.

HERFURTH UK LTD.
EUROPEAN COMMUNITY; EUROPEAN UNION; UK;
WESTERN EUROPE

Accession no.524990

Item 530

Modern Plastics International

24, No.8, Aug.1994, p.16-7

**EUROPEAN REGULATIONS TO REQUIRE EMI
SHIELDING ON ALL ELECTRONICS**

Myers J

Conventional conductive resin systems are being pushed by increasing demands on electronic producers to shield the EMI generated by the growing number of consumer products. By the beginning of 1996, all electronic goods marketed within the European Union will be required to meet stringent EMI susceptibility and emission restrictions. DSM and Cabot Plastics have recently introduced conductive PP, ABS, PC and ABS/PC compounds that use a metal filling to achieve an extremely low volume resistivity. With only 1% loading level of stainless steel fibres in DSM's Faradex family of conductive polymers, an optimum trade-off between dispersion and fibre breakage is reached.

DSM POLYMERS INTERNATIONAL; CABOT PLASTICS INTERNATIONAL
WESTERN EUROPE; WESTERN EUROPE-GENERAL
Accession no.524419

*Item 531***Polymer Degradation and Stability**

45, No.1, 1994, p.1-10

PHOTOACOUSTIC INFRARED SPECTROSCOPY FOR EVALUATION OF AN ABS AS AN AUTOMOTIVE INTERIOR MATERIAL

Carter R O; McCallum J B
Ford Motor Co.

Photoacoustic FTIR spectroscopy was shown to be a suitable chemical diagnostic tool for monitoring the degradation of a commercial, fully formulated, moulded ABS material without special sample preparation. Samples obtained from plaques undergoing standard, natural and accelerated exposure as part of an on-going engineering study were examined. In addition, a series of xenon arc-exposed samples with exposures according to the SAE J-1885 protocol were also examined to follow the relative rates of reaction for the changes observed. Five days of xenon arc exposure were approximately equal to 12 months exposure in Florida for this material. The decomposition process resulted in the formation of a brittle top layer similar to that seen in exterior exposure of this material. Photochemical oxidation was the cause of the decomposition and not heat. The decomposition was colour-independent for the three colours examined. A pigmented paint layer was found to protect this material from the photochemical process. 26 refs.

USA

*Accession no.524143**Item 532***Reuse/Recycle**

24, No.7, July 1994, p.52

COMPUTER COVERS NOW CONTAIN POSTCONSUMER POLYCARBONATE/ABS ALLOY

This reports on the use of recycled post-consumer polycarbonate/ABS (primarily from used computer components) in plastic covers for personal desktop computers. Brief details are given.

MILES; IBM

EUROPE-GENERAL; EUROPEAN COMMUNITY; EUROPEAN UNION; GERMANY; UK; USA; WESTERN EUROPE

*Accession no.524125**Item 533***Plastics News(USA)**

6, No.17, 27th June 1994, p.7

RECYCLED RESIN OK IN COMPUTERS

The use of recycled metallised polycarbonate material from computers and business machines was the subject of a study carried out by researchers at IBM. Blends of ABS and polycarbonate were investigated as well as a recycled content of 25% post consumer metallised polycarbonate to make housing for business machines and computers.

IBM

USA

*Accession no.523925**Item 534***Popular Plastics and Packaging**

39, No.4, April 1994, p.57-8

BEAD SIZE DISTRIBUTION AND THERMAL PROPERTIES OF SAN COPOLYMER PRODUCED BY SUSPENSION

Goel P K; Khan H U; Gupta V K
Indian Institute of Petroleum

It is stated that styrene acrylonitrile (SAN) copolymer produced by suspension polymerisation consists of different bead size products, and the distribution of bead size greatly influences the properties of the polymer. This paper considers the effects on thermal properties in particular, and explains experimentation carried out, with results and a discussion included.

INDIA

*Accession no.523226**Item 535***Plastics and Rubber Weekly**

No.1546, 29th July 1994, p.1

HORNERS AWARD TO BIOTRACE UNI-LITE

It is briefly reported that the Biotrace Uni-Lite Hygiene Testing System, designed by Kinneir Dufort Design, has won the 1994 Horners Award. The Uni-Lite is injection moulded in ABS and is used to assess hygiene status in the food industry by identifying the presence of organic matters on food contact surfaces. A Highly Commended certificate was also awarded to Marley Extrusions for the manufacturing process used to make the Quantum twin-wall PVC-U pipe. This uses a continuous twin-head

extruder process, with the outer wall being formed by recirculating corrugated moulds.

BIOTRACE; KINNEIR DUFORT DESIGN; MARLEY EXTRUSIONS LTD.

EUROPEAN COMMUNITY; EUROPEAN UNION; UK; WESTERN EUROPE

Accession no.522950

Item 536

Plastics and Rubber Weekly

No.1544, 15th July 1994, p.6

DOW AIMS 3 ABS GRADES AT CARS

It is briefly reported that Dow Automotive Materials & Services Group has recently launched three new polymers for the automotive industry. Two high flow ABS resins, Magnum 347 EZ and Magnum 358 HP, and a new Retain ABS grade featuring 25% recycled ABS, are offered. All three of the grades are aimed at applications in car interiors. Brief property data are given.

DOW CHEMICAL CO.

USA

Accession no.522166

Item 537

Florence, Ky., 1993, pp.4. 11ins. 21/4/94. Tech.Bull

#191.42C3511-6125-624

ARISTECH X-TEND THERMOPLASTIC SHEET

Aristech Chemical Corp.

Aristech's X-Tend thermoplastic sheet is a blend of continuous cast acrylic and ABS as a 100% recycled sheet. It is thermoformable and is characterised by good surface aesthetics. Finishing information, dimensions and typical applications are described, and physical properties are tabulated.

USA

Accession no.521798

Item 538

Pittsfield, Ma., 1993, pp.2. 11ins. 28/3/94.

42C21C391D11-968

CYCOLAC V100. PRODUCT DATA SHEET

General Electric Co.

Mechanical, physical, and thermal properties are detailed for Cycolac V100 a flame retardant compound based upon non-PPBE additives. It is claimed to possess good properties and toughness and excellent mouldability. In addition to the property data, injection moulding characteristics are also included.

USA

Accession no.521792

Item 539

Pittsfield, Ma., 1993, pp.2. 11ins. 28/3/94.

42C21C391D11-968

CYCOLAC V200. PRODUCT DATA SHEET

General Electric Co.

Mechanical, physical, and thermal properties are detailed for Cycolac V200 a flame retardant compound based upon non-PPBE additives. It is claimed to possess good indoor UV properties and excellent mouldability. In addition to the property data, injection moulding characteristics are also included.

USA

Accession no.521791

Item 540

Pittsfield, Ma., 1993, pp.2. 11ins. 28/3/94.

42C21C391D11-968

CYCOLAC VW300. PRODUCT DATA SHEET

General Electric Co.

Properties and processing characteristics are detailed for Cycolac VW300 flame retardant compound based upon non-PBBE additives. The material is characterised by good indoor UV properties and mouldability.

USA

Accession no.521790

Item 541

International Polymer Processing

9, No.2, June 1994, p.184-92

SHORT GLASS FIBRE REINFORCED PA6 AND ABS BLENDS

Kannan K; Mistra A

Indian Institute of Technology

A 70:30 blend of polyamide 6 and ABS, with and without a compatibiliser, was used as the matrix for reinforcement with short glass fibres. The compatibiliser was a copolymer of styrene maleic anhydride and its level was kept at 5 wt% of the blend. The glass fibre content was varied from 10 to 30 wt%. The blends and corresponding composites were compounded using a single screw extruder and test samples were prepared by injection moulding. Tensile, flexural and impact properties were determined using the injection moulded test samples according to ASTM standards. Morphological studies were carried out on fractured tensile test specimens using SEM. The morphological properties were correlated with mechanical properties. 18 refs.

INDIA

Accession no.521522

Item 542

Fire & Flammability Bulletin

Aug. 1994, p.5

NEW ABS BLEND FOR BLOW MOULDING

It is announced that Miles Inc. of the USA has introduced a blow moulding and extrusion grade of flame-retardant polycarbonate/ABS blend. Brief details of the properties of "Bayblend DPS-1500" are provided.

MILES INC.

USA

Accession no.521440

Item 543

Modern Plastics International

24, No.6, June 1994, p.97

FAST CYCLE TIME

It is briefly reported that Jinhwa Machinery claims a fast cycle time of 3.5 seconds is possible for production of PP food containers (shot weight 8g, four cavities) moulded on a 1500-kN toggle press. Four-cavity moulding of ABS floppy disk housings (shot weight equals 7.2g) is put at 3.8 seconds. The Korean company uses Vickers hydraulics and Barber Colman controls on its VDC II-HS machine which also features closed-loop control.

JINHWA MACHINERY CO.

KOREA

Accession no.519543

Item 544

Plastics World

52, No.6, June 1994, Part I, p.62-4

ABC'S OF PROCESSING ABS

Pettit R

GE Plastics

The problems of injection moulding ABS and possible ways of overcoming them are discussed. The most likely troublespots of drying, screw design, non-return valves or check rings, gate design, mould temperatures and ejector pins/draft are examined. It is claimed that the vast majority of troubleshooting calls can probably be resolved more by referring to the supplier's processing guide, calling the local technical service representative or by following these basic guidelines.

USA

Accession no.519435

Item 545

Polymers for Advanced Technologies

5, No.6, June 1994, p.327-32

**ABS BLENDS WITH PHENOXY:
MORPHOLOGY, THERMAL, MECHANICAL
AND RHEOLOGICAL PROPERTIES**

Chi Hoon Choi; Soo Min Lee; Byung Kyu Kim
Pusan,National University

Blends of ABS with phenoxy(poly(hydroxyether bisphenol A)) were prepared using a Brabender single-screw extruder. SEM and TEM showed a typical two-phase morphology. The Tg of SAN was almost unchanged in the blends, while the Tg of phenoxy increased by about 5% in the blends. The synergistic effect of tensile modulus and strength was noted in ABS-rich blends, where a drastic drop of ductility was seen, and the results were interpreted in terms of rubber particle migration from SAN to phenoxy phase, which was visualised by TEM. Melt viscosity showed yield in ABS-rich blends, and generally followed the log additivity. 25 refs.

SOUTH KOREA

Accession no.518793

Item 546

Modern Plastics International

24, No.4, April 1994, p.80-2

STYRENIC TERPOLYMERS

The article supplies brief details of a styrenic terpolymer, extrusion grade SD120 marketed as a substitute for PVC by Asahi Chemical Industry Co. of Japan. The article briefly describes the advantages and properties of SD120 and also of injection grade ST030.

ASAHI CHEMICAL INDUSTRY CO.

JAPAN

Accession no.517418

Item 547

Injection Molding Outlook. Retec Proceedings.

Dallas,Tx., 11th-13th Oct.1993, Paper Q. 831

**IMPROVING THE PRECISION OF INJECTION
MOULDING OF ABS RESINS**

Furches B J; Bujanowski R

Dow Chemical Co.

(SPE,North Texas Section; SPE,Injection Molding Div.)

This paper discusses some ways to improve precision during injection moulding of ABS. Reproducibility of polymer processing conditions is assessed using rheological properties of ABS and variation of shear rates through changes in injection speed. 2 refs.

USA

Accession no.516095

Item 548

Plastics World

52, No.4, April 1994, p.63

NON-GLOSS ABS RESINS

This briefly reports on new grades of non-gloss ABS resin, for automotive applications, produced by Miwon Petrochemical Corp., of the USA.

MIWON PETROCHEMICAL CORP.

USA

Accession no.513716

Item 549

Plastics Design Forum

18, No.3, May/June 1993, p.27/30

ABS

Information is presented on ABS, part of a series which is intended to serve as a guide in assisting designers with materials selection for part and product design. The material is said to be especially suitable where toughness and rigidity are necessary over a wide range of temperatures, where hardness and dimensional stability must not change appreciably, and where the ability to mould, extrude, postform or decorate are of significant importance.

USA

Accession no.513046

Item 550

Plastverarbeiter

45, No.4, April 1994, p.64

German

UNMANNED PAINTING OF CAR HEADLIGHT REFLECTOR HOUSINGS FROM ABS

A report is presented on the injection moulding and coating with metallic lacquer of ABS car headlight reflector housings in a manufacturing island consisting of two injection moulding machines and an automated lacquering unit including drier.

EUROPEAN COMMUNITY; GERMANY; WESTERN EUROPE

Accession no.512952

Item 551

European Plastics News

21, No.5, May 1994, p.26

EMI SHIELDED ABS COMPOUNDS FOR INJECTION MOULDING

Cabot Plastics has developed a range of conductive compounds, including a number of ABS-based products, which has been designed to provide cost effective EMI shielding in complex moulded parts and provide an alternative to secondary treatments such as conductive painting. The metal-filled compound range includes a white ABS-based product and a black ABS/PC alloy-based grade. The materials can be processed on standard moulding equipment. Flame retarded versions are also available. This abstract includes all the information contained in the original article.

CABOT PLASTICS LTD.

EUROPEAN COMMUNITY; UK; WESTERN EUROPE

Accession no.512702

Item 552

Plastics and Rubber Weekly

No.1532, 22nd April 1994, p.10

CONDUCTIVE POLYMERS ARE NEW FROM CABOT

It is briefly reported that Cabot Plastics has introduced Cabelec 3371 which permanently dissipates static electricity and is designed to meet CECC 00015 for safe handling areas. The company has also launched a material designed to give EMI shielding within complex injection moulded shapes. There are eight new materials in the range including black and white ABS-based, a natural PP and a black ABS/PC blend. Flame retardant versions are also available.

CABOT PLASTICS LTD.

EUROPEAN COMMUNITY; UK; WESTERN EUROPE

Accession no.511117

Item 553

Plastverarbeiter

45, No.3, March 1994, p.63/6

German

INJECTION MOULDING OF CAR WHEELCAPS

At the International Automobile Fair (AA) in Frankfurt in September 1993, car manufacturer Fiat presented its new compact model, the Punto. The company Componenti Zanini of Paruzzaro, Novara, succeeded in qualifying as supplier of wheelcaps made from a polycarbonate/ABS blend and a number of other plastics parts.

FIAT SPA; COMPONENTI ZANINI SRL

EUROPEAN COMMUNITY; GERMANY; ITALY; WESTERN EUROPE

Accession no.511068

Item 554

Patent Number: US 5286792 A 19940215

ABS WITH NOVEL MORPHOLOGY

Wu W C; Aliberti V A

Monsanto Co.

Acrylonitrile-butadiene-styrene-ester compositions having a unique rubber phase morphology are prepared by a continuous mass polymerisation process. The compositions have an improved balance between impact and tensile strengths and gloss.

USA

Accession no.510940

Item 555

Antec '93. Conference Proceedings.

New Orleans, La., 9th-13th May 1993, Vol.I, p.877-81. 012

MELT FILTRATION, CHARACTERISATION, PRODUCT SELECTION AND DESIGN FROM PAINTED/PLATED RECYCLED COMPUTER CASINGS

Borkar P; Lai F

Massachusetts, University

(SPE)

Optimum melt filtration conditions were determined for the recycling of copper/nickel plated polycarbonate/ABS computer casings. The tensile and flexural properties, impact strength and heat deflection temperature of the melt filtered materials were examined in comparison with plated virgin polycarbonate/ABS, unfiltered recycled plated polycarbonate/ABS and a 50/50 blend of virgin and melt filtered plated polycarbonate/ABS. The application of the recycled material in a boiler control box housing was investigated. 11 refs.

LOWELL, UNIVERSITY

USA

Accession no.510882

Item 556

Antec '93. Conference Proceedings.

New Orleans, La., 9th-13th May 1993, Vol.I, p.875-6. 012

UTILISATION OF FIRST GENERATION 100% REGRIND FOR BUSINESS MACHINE APPLICATIONS

Adams J A; Phillips E
International Business Machines Corp.
(SPE)

Internal components for business machines were produced from polycarbonate/ABS regrind obtained by recycling a business machine front cover. Samples were tested for tensile and impact strength, pull-out force/torque and flammability in comparison with virgin polycarbonate/ABS blends.

IBM CORP.
USA

Accession no.510881

Item 557

Plastics News(USA)

5, No.52, 28th Feb.1994, p.1/11

MOULDED DASHBOARD YIELDS BIG SAVINGS
Couretas J

It is reported that, in a major advance for automotive structural plastics, General Motors and two suppliers say that they have developed an injection moulded instrument panel offering exceptional stability and big savings in cost and weight. Dow Plastics and Aeroquip have been involved in the project from its conception; details are given.

GENERAL MOTORS CORP.; DOW PLASTICS;
AEROQUIP CORP.
USA

Accession no.509999

Item 558

Journal of Applied Polymer Science

52, No.2, 11th April 1994, p.121-33

CRAZING PHENOMENA IN POLYCARBONATE(PC)/SAN MICROLAYER COMPOSITES

Haderski D; Sung K; Im J; Hiltner A; Baer E
Case Western Reserve University; Dow Chemical Co.

The crazing behaviour of coextruded microlayer sheets consisting of alternating layers of PC and SAN was investigated as a function of PC and SAN layer thicknesses. Three different types of crazing behaviour were identified, i.e. single crazes randomly distributed in the SAN layers, doublets consisting of two aligned crazes in neighbouring SAN layers and craze arrays with many aligned crazes in neighbouring SAN layers. The transition from single crazes to doublets was observed when the PC layer thickness was decreased to 6 microns. Craze array development was prevalent in composites with PC layer thickness less than 1.3 microns. It was concluded that SAN layer thickness was not a factor in formation of arrays and doublets, such formation being dependent only upon PC layer thickness. 8 refs.

USA

Accession no.509606

Item 559

Engineering Plastics

7, No.1, 1994, p.45-55

NEW DESIGNER PLASTICS FOR COLLECTION LINE MOBILE TELEPHONES

Rademacher K H
Philips Kommunikations Industrie AG

The use of Terblend S from BASF, a mixture of Luran S acrylonitrile/styrene/acrylate polymer with a polycarbonate, and of masterbatches thereof containing metal particles in the manufacture of housings for mobile telephones is discussed. The processability of the materials is considered, together with results of tests of their properties, surface quality, and colour matching.

BASF AG
EUROPEAN COMMUNITY; GERMANY; WESTERN EUROPE

Accession no.508848

Item 560

Macromolecules

27, No.6, 14th March 1994, p.1529-34

EFFECT OF SOLVENT ON THE COPOLYMERISATION OF STYRENE AND ACRYLONITRILE. APPLICATION OF THE BOOTSTRAP EFFECT TO THE PENULTIMATE UNIT MODEL

Klumperman B; Kraeger I R
DSM Research BV

The copolymerisation of styrene and acrylonitrile was investigated in bulk and in the solvents toluene, butanone and DMF. The comparison of the copolymers prepared in the bulk system with copolymers obtained from copolymerisations in the various solvents reveals a relatively small, but noticeable, solvent effect. All the systems display a significant penultimate unit effect. It is concluded that the copolymerisation in the above solvents can be explained by the qualitative description of the bootstrap model. The comparison of the bulk with the toluene system shows that the bootstrap model is not accurate if the distribution coefficient is assumed to be constant and so a modification is proposed. 14 refs.

EUROPEAN COMMUNITY; NETHERLANDS; WESTERN EUROPE

Accession no.508607

Item 561

Injection Molding

2, No.2, Feb.1994, p.39

RECYCLING SATURN

Saturn and the Automotive Materials Group of Dow are reported to have co-operated to implement a method for recycling Pulse B-250 polycarbonate/ABS scrap from exterior door panels and other applications into rocker panel support brackets for Saturn vehicles. The objective of the programme, initiated in 1991, was to create an outlet

for reclamation of painted and unpainted scrap generated during production. Details are given.

SATURN CORP.; DOW AUTOMOTIVE
DEVELOPMENT CENTRE
USA

Accession no.508076

Item 562

Modern Plastics International

24, No.3, March 1994, p.66/8

LOW-GLOSS ABS

It is briefly reported that Hannam Chemical Corp. has introduced low-gloss ABS grades that have good physical properties. Grade HU-2938Z has gloss of 6%, MFI of 10 g/10 min, tensile strength of 44.1 MPa, heat deflection temperature of 97C and impact strength of 177 J/m. Brief property data for other grades are given. The main target application is automobile interiors.

HANNAM CHEMICAL CORP.
KOREA

Accession no.507577

Item 563

Modern Plastics International

24, No.3, March 1994, p.16-7

INSERT BLOW MOULDING CREATES ONE-PIECE REFRIGERATOR DOOR

Toensmeier P A

A technique for blow moulding hollow refrigerator doors in one piece reduces the assembly and finishing steps associated with conventional metal fabrication. The process, developed and patented by James Karlin Design and Papago Plastics, involves the manual placement of inserts that will become shelves, door dams and other inner-door features within one mould half. Blowing a parison encapsulates these inserts within the part, making them integral components of the door. Materials choice is another consideration. Since compatible resins are necessary, one solution may be to run an FDA-accepted ABS or PS on the inside surface and a modified PPO for flame resistance on the outside surface.

JAMES KARLIN DESIGN; PAPAGO PLASTICS
INC.
USA

Accession no.507561

Item 564

(Leverkusen), 1992, pp.4. 12ins. 23/8/93. ATI 854e.
43C12-6125-62(15)-951T

RECYCLING OF INJECTION MOULDED AND EXTRUDED PARTS IN BAYBLEND T AND BAYBLEND FR. APPLICATION TECHNOLOGY INFORMATION

Bayer AG,Plastics Busin.Gp.

Research was carried out which aimed at establishing the influence of reprocessing under constant process conditions on the physical properties of Bayblend T and Bayblend FR, using a telephone housing component as the test piece. Results of impact tests and tensile tests to DIN and ISO standards are given, demonstrating that the decline in values remained within warrantable limits and hence up to 20% regrind, added to virgin material results in the initial specifications being achieved in the majority of cases.

EUROPEAN COMMUNITY; GERMANY; WESTERN EUROPE

Accession no.507470

Item 565

Antec '93. Conference Proceedings.

New Orleans, La., 9th-13th May 1993, Vol.I, p.2-5. 012

PRECOLOURED PLASTICS FOR MEDICAL APPLICATIONS: MEETING FEDERAL AND STATE REGULATIONS

Parikh S; Muschick M

Monsanto Co.

(SPE)

The use by Monsanto of mixed metal oxide colourants in its Lustran ABS for medical applications is described. It is shown that such colourants comply with the requirements of environmental regulations, as demonstrated by the results of leaching tests. 3 refs.

USA

Accession no.507295

Item 566

Patent Number: US 5281648 A 19940125

FLAME-RETARDED ABS FORMULATIONS WITH HIGH IMPACT STRENGTH

Doucet D K; Jones J F; Landry S D; Pettigrew F A;

Reed J S; Torres J E

Ethyl Corp.

The impact strength of these formulations is increased by forming a concentrate or masterbatch containing the flame retardant and impact modifier, blending the concentrate with ABS and extruding the resulting blend.

USA

Accession no.506049

Item 567

Modern Plastics International

24, No.2, Feb.1994, p.36/41

BROMINE DEBATE COMPELS A RE-EXAMINATION OF FLAME-RETARDANT SYSTEMS

Lindsay K F

The market for flame-retarded business machine housings exceeds 228,000 tonnes worldwide, of which 50% is ABS and 25% is polycarbonate/ABS blend. It is estimated that up to 114,000 tonnes of brominated FR are used in

electronics applications alone every year. Efforts to restrict some brominated additives are forcing OEMs to consider using noncontroversial flame suppressants. Several years ago, German ABS and PC/ABS suppliers volunteered not to use PBDE in their formulations, but alternative systems have usually resulted in such problems as plate-out. GE Plastics' V series non-PBDE material is claimed to offer above-conventional performance in various areas. Sony is moving rapidly toward the elimination of PBDEs and PBBs in its television housings and Toshiba is offering televisions that do not use brominated FRs.

WORLD

Accession no.505104

Item 568

Journal of Applied Polymer Science

51, No.10, 7th March 1994, p.1765-70

EFFECT OF MATRIX SAN IN ABS/PMMA BLENDS

Lee S M; Choi C H; Kim B K

Pusan,National University

The effect of the molecular weight and acrylonitrile content of the styrene-acrylonitrile copolymers (SAN) on the morphology, mechanical properties, and rheological properties of ABS/PMMA blends were studied. When the acrylonitrile content of matrix SAN (32%) was close to that of graft SAN, rubber particles existed separately, but with matrix SAN having 35% acrylonitrile, rubber particles showed a tendency to agglomerate each other. With increasing molecular weight of matrix SAN, impact strength, ultimate elongation, and abrasion resistance of the blend generally increased. Yield strength increased with molecular weight at a constant acrylonitrile content of matrix SAN, and it decreased with the decrease of acrylonitrile content in spite of the increasing molecular weight of SAN. Melt properties, rather than the morphological and mechanical properties, were more sensitive to the acrylonitrile content, rather than the molecular weight of matrix SAN. 22 refs.

SOUTH KOREA

Accession no.504994

Item 569

International Journal of Polymeric Materials

23, Nos.1-2, 1993, p.109-13

ON THE PHASE STRUCTURE OF BLENDS OF POLYCARBONATE WITH POLY(ACRYLONITRILE-BUTADIENE-STYRENE)

Rong Jiang Yan; Wei Li; Changjiang Chen; Haoyu

Zhang; Bingzheng Jiang; Binxin Yang

Academia Sinica

Polycarbonate and ABS was co-extruded at different weight ratios by a single screw extruder. To obtain a finer blend, two times extrusion was carried out. In this case, a network structure with two continuous phases was

observed for the blends with two compositions of polycarbonate/ABS, being 80/20 and 70/30. It was found that the blends with these two compositions just have maximum values on the curves of notched Izod impact strength, flexural modulus and flexural strength versus composition, respectively. This was never observed in previous publications. 10 refs.

CHINA

Accession no.504018

Item 570

Polymer News

19, No.1, Jan.1994, p.22-3

DRIP RAILS FOR GENERAL MOTORS

BASF Structural Materials Inc.; General Motors Corp.

Drip rails, about 5 ft. long and weighing about 15 oz, keep water from getting inside vehicles through the spaces between the doors and the body. They are installed on the car using high speed, power driven fastening guns. They are made of Luran S acrylonitrile/styrene/acrylate resin. Brief details of cyclic door slam impact tests, outdoor panel tests (Florida and Arizona), accelerated Weatherometer tests, chemical resistance tests, and dimensional stability tests are given.

USA

Accession no.503841

Item 571

Polymer Degradation and Stability

43, No.2, 1994, p.285-91

PHYSICAL PROPERTY RETENTION OF POLYCARBONATE/ABS BLENDS

Kuczynski J; Snyder R W; Podolak P P

IBM Corp.

Polycarbonate/ABS blends were subjected to repeated injection moulding cycles, using regrind from the previous run. Physical property data (TS, tensile modulus, flexural strength and flexural modulus) collected after each moulding cycle indicated almost complete retention of mechanical properties. Fourier transform IR spectroscopy and transmission electron microscopy revealed that the polycarbonate/ABS blends did not undergo oxidative degradation or phase coarsening. 13 refs.

USA

Accession no.503672

Item 572

Dukinfield, 1993, pp.2. 12ins. 19/10/93. 43C12-6125-981

CABELEC 3719 CONDUCTIVE POLYCARBONATE/ABS COMPOUND FOR INJECTION MOULDING. PRODUCT INFORMATION

Cabot Plastics Ltd.

Cabelec 3719 is a conductive compound based on carbon black dispersed in a polycarbonate/ABS blend. Details

are given of typical applications; processing and physical properties. The compound is recommended in particular for use where freedom from electrostatic discharge is necessary.

EUROPEAN COMMUNITY; UK; WESTERN EUROPE

Accession no.503341

Item 573

Patent Number: EP 579588 A2 19940119

NOVEL COMPOSITE

Drenzek P J; Hilton G B; Pehlert C W

Monsanto Co.

The composite comprises a layer of a gas filled cellular insulation material combined with a layer of impact resistant thermoplastic sheet material. An ABS sheet with a substantial number of rubber particles in a range of from about 4 to 10 microns is interposed between the cellular material and the thermoplastic sheet.

USA

Accession no.503090

Item 574

Pittsfield, Ma., 1992, pp.2. 11ins. 8/10/93.

42C21C351C391-6125-63Tr.Ro

GELLOY XP4025. PRODUCT DATA SHEET

GE Plastics

Mechanical, impact, thermal, physical and optical properties are listed for Geloy grade XP4025. It is an ASA/PC blend for automotive applications, available in black only, for injection moulding. It is claimed to offer excellent weatherability for unpainted exterior parts. Injection moulding information is included.

USA

Accession no.502374

Item 575

Journal of Applied Polymer Science

51, No.4, 24th Jan.1994, p.593-604

STUDIES OF WATER-SOLUBLE OLIGOMERS FORMED IN EMULSION COPOLYMERISATION

Shou-Ting Wang; Poehlein G W

Georgia, Institute of Technology

A polymer chain transfer agent was synthesised by the reaction of poly(vinylbenzyl chloride) (containing a minor amount of sodium 4-vinyl benzene sulphonate comonomer) latex with 2-aminoethanethiol in a basic environment. In subsequent emulsion polymerisation reactions, low molecular weight species were formed when water-born oligomeric radicals diffused to the surface of these seed particles. These low molecular weight oligomers were separated by membrane filtration and their composition and molecular weight were analysed by FTIR and mass spectroscopy. The measured compositions were compared with those that were calculated from the copolymerisation equation. Three

seeded emulsion copolymerisation systems were studied, i.e. styrene-acrylic acid, styrene-methacrylic acid, and styrene-methyl methacrylate. The length of the oligomer particles formed depended on their composition and the properties of the polymer particles, e.g. surface charge, composition, size and concentration. 15 refs.

USA

Accession no.501964

Item 576

New Materials/Japan

Feb.1994, p.8

DENKI KAGAKU RELEASES ABS RESIN FOR REFRIGERATORS

Major Tokyo-based chemical producer Denki Kagaku Kogyo is soon to release an ABS material for use in the manufacture of refrigerators. It is claimed that the advantage of this material over conventional ABS resins is that it contains a special synthetic rubber, making it resistant to Freon substitutes. Matsushita Refrigeration, the largest manufacturer of domestic refrigerators in Japan, plan to use the resin in the near future. This abstract includes all the information contained in the original article.

DENKI KAGAKU KOGYO KK

JAPAN

Accession no.501898

Item 577

Modern Plastics International

24, No.1, Jan.1994, p.14-5

'SMART' CREDIT CARDS PROVIDE NEW AVENUES FOR INJECTION MOULDING

Mapleston P

It is reported that credit cards containing a single microchip, capable of storing data far more safely than is possible with a simple magnetic strip, are gaining popularity for a range of applications. The cards are made by several techniques, using chips varying in price, but a trend is developing away from the more traditional PVC sheet-based technologies towards injection moulding with ABS and, most recently, single-step manufacturing via insert moulding. Details are given.

ESEC SEMPAC SA; NETSTAL MACHINEN AG

SWITZERLAND; WESTERN EUROPE

Accession no.501850

Item 578

Plastics and Rubber Weekly

No.1518, 14th Jan.1994, p.6

ETP ON SATURN

It is briefly reported that engineering thermoplastics waste is being recycled from door panels into rocker panel support brackets for Saturn vehicles in the US. The project was started to create an outlet to reclaim painted and

unpainted scrap generated during production, focusing on Dow's Pulse B-250 ABS/polycarbonate blend material. The recycling process uses commercially available processing equipment and needs no special handling, it is claimed.

DOW CHEMICAL CO.
USA

Accession no.501779

Item 579

Plastics World

52, No.1, Jan.1994, p.67

BODY EXTERIOR AWARD

A specially modified grade of ABS, HIPP-140, is the key to the innovative front grille for Chrysler's LH series of cars. Based on Dow Chemical's Magnum ABS resin, the grille material has sufficient impact resistance to permit it to be mounted in the bumper-impact area without using hinged brackets to absorb the collision load. Lacks Industries developed the special ABS and tooled and moulded the grille. This abstract includes all the information contained in the original article.

DOW CHEMICAL CO.
USA

Accession no.501642

Item 580

(Leverkusen), 1992, pp.6. 12ins. 14/6/93. ATI 388e.
42C21C391D11-9

NOVODUR (ABS) PRODUCT RANGE.

APPLICATION TECHNOLOGY INFORMATION

Bayer AG,Plastics Busin.Gp.

Notched impact strength, Vicat softening temperature and flow properties are tabulated for grades of Novodur ABS. Included are standard injection moulding grades, injection moulding grades with increased heat resistance, extrusion and blow moulding grades, flame retardant injection moulding grades, special grades, and trial products.

EUROPEAN COMMUNITY; GERMANY; WESTERN EUROPE

Accession no.500952

Item 581

(Leverkusen), 1992, pp.2. 12ins. 14/6/93. ATI 732e.
43C12-6125-935

CHEMICAL RESISTANCE OF BAYBLEND.

APPLICATION TECHNOLOGY INFORMATION

Bayer AG,Plastics Busin.Gp.

Tests carried out on injection moulded Bayblend components are discussed. The tests were designed to ascertain the chemical resistance of Bayblend, and thus to provide guidance as to its suitability for various applications. Results are tabulated and discussed.

EUROPEAN COMMUNITY; GERMANY; WESTERN EUROPE

Accession no.500951

Item 582

Polymer

34, No.24, 1993, p.5038-47

ENTHALPIC EFFECTS ON INTERFACIAL ADHESION OF IMMISCIBLE POLYMERS COMPATIBILISED WITH BLOCK COPOLYMERS

Adedeji A; Jamieson A M

Case Western Reserve University

The influence of enthalpic interactions on interfacial adhesion between immiscible polymer matrices and reinforcing block copolymer segments was studied using TEM. The behaviour was examined of four statistical styrene-acrylonitrile (SAN) copolymers, each having different acrylonitrile content, blended with PS as the minor component, and reinforced by three different PMMA-PS block copolymers of differing molecular weights. These observations were compared with similar experiments on PMMA blended with PS and reinforced with PMMA-b-PS. Statistical analysis and visual observations of interfacial failure of PS inclusions within crazes and binary and ternary blends were made. 38 refs.

USA

Accession no.499758

Item 583

Plastics and Rubber Weekly

No.1515, 11th Dec.1993, p.14

BT HELPS BODDINGTON

It is briefly reported that W.H. Boddington is injection moulding a new combined telephone and digital answering machine for British Telecom. The units are produced in white and green ABS to give a high quality cosmetic appearance and to provide dimensional stability during component assembly, as well as providing good electrical, mechanical and impact resistance properties. Initial production of the competitively priced and reliable electronic telephone answering machine will be running at 2,500 units per week.

BRITISH TELECOM; BODDINGTON W.H.,&
CO.LTD.

EUROPEAN COMMUNITY; UK; WESTERN EUROPE

Accession no.499503

Item 584

Plastics Industry News (Japan)

39, No.11, Nov.1993, p.163

REFRIGERATOR USE ABS

It is briefly reported that Monsanto Kasei Co. has developed a special grade ABS resin for refrigerator use. Tuf-barrier is a special chemical resistant improved grade developed for use in refrigerator interiors. The fluoride substitute HCFC-141b requires chemical resistant material for the production of interior boxes.

MONSANTO KASEI CO.

JAPAN

Accession no.499420

Item 585

Plastics News(USA)

5, No.31, 27th Sept.1993, p.10

SMALL COMPUTERS OFFER OBSTACLES FOR RESINS

Goldsberry C

The trend in the computer industry is for cheaper and smaller products. This has led to a demand for increasingly thinner wall sections on housings to save weight and volume. This comprehensive article considers the problems posed for moulders of computer components and the demands being placed on engineering resins such as polycarbonate and ABS, being used for computer housings.

APPLE COMPUTER INC.; TREND PLASTICS
USA

Accession no.497729

Item 586

Macromolecules

26, No.22, 25th Oct.1993, p.6068-75

THERMAL STYRENE-CO-ACRYLONITRILE DISCOLOURATION PROBLEM. THE ROLE OF SEQUENCE DISTRIBUTION AND OLIGOMERS

Allan D S; Birchmeier M; Pribish J R; Priddy D B; Smith P B; Hermans C

Dow Plastics; Dow Plastics Europe

The discolouration that occurred during injection moulding of styrene-co-acrylonitrile resins was studied for samples of Tyril. GPC-UV/visible analysis of discoloured SAN indicated that both monomer sequence distribution in the backbone and small molecules were involved in the formation of chromophores and that the main backbone chromophore resided on the chain end. The product of reactivity ratios (calculated from monomer sequence distribution data) of high-temperature continuous stirred tank reactor-produced SAN copolymers was higher than typically reported for low-conversion batch polymerisation. Possible mechanisms are proposed for (i) a high reactivity ratio product, (ii) SAN polymer backbone discolouration, and (iii) the formation of small coloured molecules. 72 refs.

EUROPEAN COMMUNITY; NETHERLANDS; USA; WESTERN EUROPE

Accession no.497345

Item 587

Japan Chemical Week

34, No.1748, 28th Oct.1993, p.2

NEW ABS RESIN TO BE USED FOR FRIDGES USING CFC ALTERNATIVE

CFC-11 alternatives for use in refrigerators are briefly described. HCFC-141b has been chosen by Japanese consumer electronic appliance manufacturers. Brand names of refrigerator-use ABS resins are included which are suitable for use with the CFC alternative.

JAPAN

Accession no.496511

Item 588

Plastics in Telecommunications VI. Conference Proceedings.

London, 16th-18th Sept.1992, p.32/1-32/9. 6E
RECYCLED PLASTICS FOR PC-HOUSING - RESULTS AND CONCLUSION FOR FUTURE MATERIAL CHOICE

Nickel W
Siemens AG
(PRI)

The recycling possibilities for plastics collected from personal computer housings which were from two to five years old were investigated. The materials studied were ABS, ABS/polycarbonate and polyphenylene oxide-styrene copolymer (PPO-S). Compared with virgin material, polycarbonate and ABS/polycarbonate showed increased brittleness. Even after the colour of recycled PPO-S was renewed, its mechanical properties were substantially unchanged. These results show that it is necessary to carry out tests on a material prior to recycling and to check that all specifications are fulfilled before using recycled material in certified appliances. Some certifications are valid only for virgin material. 1 ref.

EUROPEAN COMMUNITY; GERMANY; WESTERN EUROPE

Accession no.496053

Item 589

Polymer Plastics Technology and Engineering

32, No.6, 1993, p.551-78

REVIEW OF POLYBLENDS BASED ON PVC, ABS AND POLYCARBONATE

Kulshreshtha A K
Indian Petrochemicals Corp.Ltd.

Information available from recent literature is presented on PVC-based, ABS-based and polycarbonate-based polyblends. Blend resin attributes which result in many property improvements in different polyblends are highlighted. A survey of commercially available polyblends is presented and their commercial utility is indicated. The discussion covers various compatibility criteria and the use of compatibilisation additives in plastic scrap recycling and to enhance the commercial utility of phase-separated blends. Ways of achieving optimum performance in polyblends are discussed. Various criteria for impact modification of PVC are laid out and the role of rubber morphology in polyblend toughening is pointed out. 35 refs.

INDIA

Accession no.495572

Item 590

British Plastics and Rubber

Sept.1993, p.5

THERMOFORMED ABS SUPPLANTS GRP FOR BUS WINDOW FRAMES

It is briefly reported that bus window frames thermoformed in ABS are being supplied by Royalite

Plastics to coach builder Alexander. The window frames were previously made in GRP. Royalite ABS sheet, R21, is being used by specialist thermoformer Plastics (Manchester) to make materials handling trays for Vauxhall Motors. Such trays, used for transporting seat belt components, have traditionally been made in wood.

ROYALITE PLASTICS LTD.

Accession no.494153

Item 591

Kunststoffe German Plastics

83, No.4, April 1993, p.3-7

**FLAME RETARDANTS DETERMINE
RECYCLABILITY**

Meyer H; Neupert M; Pump W; Willenberg B

The results are reported of a study of the recyclability of flame retardants in ABS and ABS/polycarbonate blends, particularly those used in office machine housings. Fractions studied included ABS with polybrominated diphenylethers and tetrabromobisphenol-A (TBBPA), ABS/polycarbonate blends with TBBPA/copolycarbonate and mixed shredded electronic scrap with and without shielding. Tests were carried out on samples for brominated dioxins and furanes.

EUROPEAN COMMUNITY; GERMANY; WESTERN EUROPE

Accession no.486104

Item 592

Angewandte Makromolekulare Chemie

Vol.132, June 1985, p.19-42

German

**STRUCTURE AND PROPERTIES OF
POLYPHASE PLASTICS. DEFORMATION AND
CRACKING BEHAVIOUR OF
POLYCARBONATE/ABS BLENDS**

Morbitzer L; Kress H J; Lindner C; Ott K H
BAYER AG

The results of a study on the influence of sample composition on phase behaviour, yielding and notched impact properties of blends containing different amounts of polycarbonate, SAN and PB grafted onto SAN are reported. The yielding behaviour and impact properties are discussed in terms of the deformation mechanisms.
11 refs.

WEST GERMANY

Accession no.279264

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