

## STYRENIC COPOLYMERS

### Styrene Acrylonitrile and Acrylonitrile Butadiene Styrene

*Note: This product safety overview summarizes information on a group of products, their use, their potential hazards, and the management of any risk(s) associated with exposure. This overview is NOT intended to provide emergency response information, medical information, or treatment information. In-depth safety and health information can be found in the safety data sheet (SDS) for the specific product of interest.*

#### Product Summary

Styrene acrylonitrile (SAN) and acrylonitrile butadiene styrene (ABS) polymers are hard, usually colorless, thermoplastic resins. SAN and ABS products are available with various physical and mechanical properties. Many of the products have additives blended into the formulations to affect processability, color, or other characteristics. (See also the “Physical/Chemical Properties” section of this document.)

Trinseo does not sell ABS or SAN for direct consumer use; rather, these resins are molded into articles used by consumers. SAN and ABS are used in injection-molding and extrusion applications and for plastic parts and enclosures. (See also the “Uses and Applications” section of this document.)

Repeated exposure to SAN or ABS is not anticipated to cause any adverse health effects. Additives that are encapsulated in the product are not expected to be released under normal processing conditions. (See also the “Health and Environmental Information” section of this document.)

Some SAN and ABS products are approved for food-contact applications. SAN and ABS are thermally stable at typical-use temperatures. However, exposure to elevated temperatures can cause the product to decompose. (See also the “Human and Environmental Exposure” section of this document.)

#### Product Description/Chemical Identity

##### **SAN**

Styrene and acrylonitrile monomers can be copolymerized to form a random, amorphous copolymer with select properties superior to the homopolymer of polystyrene. The SAN copolymer generally contains 70 to 80% styrene and 20 to 30% acrylonitrile. This combination provides higher strength, rigidity, and chemical resistance than polystyrene, but it is not quite as clear as crystal polystyrene.

##### **ABS**

Acrylonitrile butadiene styrene is a terpolymer made by polymerizing styrene and acrylonitrile in the presence of polybutadiene. The proportions can vary from 15 to 35% acrylonitrile, 5 to 30% butadiene, and 40 to 60% styrene. The result is a long chain of polybutadiene crisscrossed with shorter chains of poly(styrene-co-acrylonitrile). Being polar, the nitrile groups from the neighboring chains attract each other, bind the chains together, and make ABS stronger than pure polystyrene.

	Styrene Acrylonitrile Resins	Acrylonitrile Butadiene Styrene Resins
Abbreviation:	SAN	ABS
CAS Number:	9003-54-7	26657-42-1
Trinseo Products:	SAN 110 SAN 124 SAN 140 TYRIL™ 790 TYRIL™ 867E TYRIL™ 867E UV TYRIL™ 875 TYRIL™ 905 TYRIL™ 905 UV	MAGNUM™ 3325 MAGNUM™ 3404 Smooth MAGNUM™ 3404 MAGNUM™ 3416 SC MAGNUM™ 3416 SLG MAGNUM™ 3452 MAGNUM™ 3504 MAGNUM™ 3513 MAGNUM™ 3525 MAGNUM™ 3616 MAGNUM™ 3904 MAGNUM™ 3904 Smooth LP MAGNUM™ 8391 MAGNUM™ 8391 MED MAGNUM™ 8434

## Uses and Applications

Typical SAN Applications	Typical ABS Applications
<ul style="list-style-type: none"> <li>• Automotive: taillight lenses and reflectors</li> <li>• Building &amp; construction</li> <li>• Consumer goods: <ul style="list-style-type: none"> <li>- Furniture</li> <li>- Toys</li> <li>- Tableware: airline service ware, other multi-cavity applications</li> <li>- Personal care: combs, toothbrushes</li> </ul> </li> <li>• Electronics: dust covers and display screens</li> <li>• Home appliances</li> <li>• Medical devices</li> <li>• Large appliances: transparent refrigerator parts</li> <li>• Lighting applications: louvers and covers</li> <li>• Packaging</li> </ul>	<ul style="list-style-type: none"> <li>• Automotive applications</li> <li>• Automotive exterior and interior parts</li> <li>• Automotive trim components</li> <li>• Building &amp; construction</li> <li>• Consumer electronics</li> <li>• Consumer goods: <ul style="list-style-type: none"> <li>- Luggage and protective carrying cases</li> <li>- Small kitchen appliances</li> <li>- Toys</li> </ul> </li> <li>• Enclosures for electrical and electronic assemblies and housings</li> <li>• Home appliances</li> <li>• Medical devices</li> <li>• Packaging</li> </ul>

## Benefits

TYRIL™ Styrene-acrylonitrile (SAN) Resins are designed to offer transparency, superior chemical resistance, strength, hardness, and dimensional stability in a broad range of product applications. The UV-stabilized versions exhibit excellent weatherability and are suitable, in particular, for extruded sheet and thermoforming applications.

MAGNUM™ ABS Resins combine the strength and rigidity of acrylonitrile and styrene polymers (SAN) with the toughness of polybutadiene rubber. MAGNUM resins provide processability, impact resistance, and heat resistance.

## Physical/Chemical Properties

SAN and ABS are sold as small plastic pellets and are used by product manufacturers to create injection-molded or extruded plastic parts. These resins are inert and chemically neutral.

The following data represent typical values from products classified as generic SAN and ABS.

Physical State	SAN	ABS		
	Granules/Pellets	Granules/Pellets		
Typical Physical Properties	Nominal Value	Nominal Value	Unit	Test Method
Specific Gravity, 73°F (23°C)	1.04 to 1.09	1.03 to 1.11	%	ASTM D792
Water Absorption, 73°F (23°C), 24 hours	0.29 to 0.30	0.20 to 0.31	%	ASTM D570

This information is provided for comparative purposes only.

**Notes**

<sup>1</sup>Typical properties: these are not to be construed as specifications.

<sup>2</sup>Tested in accordance with ISO 10350. 23°C/50% RH unless otherwise noted.

## Health and Environmental Information

### Human Health

Based upon the thorough evaluation of human toxicological data associated with ABS and SAN polymers, these products pose very low risks under intended use conditions. Styrenic copolymers are essentially non-irritating to skin at normal temperatures. In workplace processing of resins, contact with fine dusts and heated fumes may cause eye, skin, and respiratory irritation. Contact with hot molten material may cause thermal burns. Inhalation of smoke under fire conditions is considered hazardous. Additives are encapsulated within the resin matrix and are not expected to be released under normal processing conditions.

Styrenic copolymers have very low toxicity if swallowed. However, swallowing the granules may present a potential choking hazard.

### Environmental Health

These high-molecular-weight polymers are considered nontoxic in land and water systems. SAN and ABS polymers are not readily digestible and may accumulate in the digestive systems of some sea birds and marine life, potentially causing possible negative impact to health. These polymers do not readily degrade in soil or landfill and should be fully recovered from land spills.

## Human and Environmental Exposure

### Workplace Processing Exposure

Although these resins are considered nontoxic, workers producing and processing these products can be exposed to resin dusts and vapors. Good equipment design, adequate ventilation, proper handling, and personal hygiene procedures should be utilized to minimize workplace exposures.

### Public Exposure

Due to the use of these polymers in commercial products, the general public is exposed to finished products based upon these plastics. Consumers using plastic articles made from SAN or ABS are not at risk to any negative health effects.

### Environmental Exposure

The presence of plastic articles in the environment or resin pellets in the industrial workplace (or during transport) may be due to improper disposal or poor housekeeping. Once in the environment, resins are persistent in land and water systems. Resins will not readily biodegrade. Exposure to sunlight will produce polymer degradation causing the plastic to break down slowly over time. Plastic products can be collected and recycled. **PLASTICS SHOULD NEVER BE DUMPED INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER.** All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. These waste resins can also be recovered and used as high-energy fuel in industrial thermal energy recovery systems.

## Risk Management/Product Stewardship Recommendations

Trinseo and its affiliated companies have a fundamental concern for all who make, distribute and use their products and for the environment in which we live. This concern is the basis for our Product Stewardship philosophy by which we assess the safety, health, and environmental information on our products so that appropriate steps may be taken to protect employee and public health and our environment. The success of our Product Stewardship program rests with each and every individual involved with Trinseo products – from the initial concept and research to manufacture, use, sale, disposal, and recycle of each product.

Trinseo carefully reviews all relevant information on the safety and suitability of our products for their known and intended uses.

Some SAN and ABS products are compliant to specific food contact regulations, such as Europe Commission Regulation (EU) No 10/2011 and U.S. FDA 21 CFR 181.32(a)(3)(i). Please contact Trinseo for more details.

Trinseo is committed to sharing information on the safe handling and end-use of our products with customers and other interested parties. Safety data sheets (SDSs) are provided to our customers and can be accessed through our customer information group (CIG). Many of our products have storage, handling, and safety guides, along with technical processing information (refer to [www.trinseo.com](http://www.trinseo.com)).

## Responsible Care®

Trinseo is a certified Responsible Care® company and a member of the American Chemistry Council and Plastic Europe. Through these and other industry associations, we actively monitor and participate in public regulatory processes impacting our products. We seek to support sustainable solutions for plastic recycling and other health and environmental challenges. We actively support industry sponsored product testing initiatives supporting responsible actions, sound science, and life cycle stewardship of our products.

## References

- [Trinseo Web Product Finder](#)
- [UL Prospector Web](#)
- [Trinseo Safety Data Sheets](#)
- Harper C.A. (1975) Handbook of Plastic, Elastomers, and Composites McGraw-Hill, New York, pp. 1–3, 1–62, 2–42, 3–1, ISBN 0070266816

For more detailed information on products from this family, please refer to the specific safety data sheet for the product of interest. For more information, visit [www.trinseo.com](http://www.trinseo.com), or contact us as indicated below.

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