

MATERIAL SAFETY DATA SHEET
POLYSTYRENE

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Revision Date:

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Section 1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name:	DENKA STYROL MW-1-301
Product Code :	0001
Molecular Formula:	$\left(\begin{array}{c} \text{CH}-\text{CH}_2 \\ \\ \text{C}_6\text{H}_5 \end{array} \right)_n$
Chemical Name:	Polystyrene (CAS No.9003-53-6)
Molecular Weight:	Not Applicable.
Manufacturer:	DENKA SINGAPORE PRIVATE LIMITED(DSPL)
Address:	16 Raffles Quay #18-03 HONG LEONG Building, Singapore Postal Code: 048581
Emergency Telephone:	(65) 6867 6089
DENKA Hot Line:	(65) 6867 5015- Hot Line is available days, nights, weekends and holidays.

Section 2 – COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	wt. %	CAS No.	PEL/TLV Data
Polystyrene	>95%	9003-53-6	Not identified as Toxic substance.
White Mineral Oil	<5%	8042-47-5	OSHA Permissible Exposure Limit (PEL): 5 mg/m ³ (as oil mist) ACGIH Threshold Limit Value (TLV): 5 mg/m ³ (as oil mist) ACGIH Short Term Exposure Limit (STEL): 10 mg/m ³ (as oil mist)

Section 3 – HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

Clear solid. Odorless. No significant immediate hazards for emergency response are known. Toxic fumes are released in fire situation.

Acute Overexposure Effect:

Polystyrene made by polymerization of styrene monomer is not expected to be chemically and biologically active against human body. Some traces of styrene monomer and possible traces of additives may be volatilized under normal processing conditions. Adequate ventilation is needed to avoid exposing person to above-mentioned substance.

Inhalation of styrene vapors and dust may cause severe irritation to the upper respiratory tract, depression, and loss of balance. An ingestion result makes irritation to the mouth, esophagus and stomach.

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Product may cause irritation or injury due to mechanical action.

Skin:

Product is not likely to cause skin irritation.

Ingestion:

Product ingestion is unlikely due to physical form. If swallowing, it may cause choking.

Inhalation:

Product inhalation is unlikely due to physical form.

Chemical substance by thermal decomposition:

In case of excess heat and incomplete combustion, trace amounts of styrene monomer and additives will be volatilized, and carbon monoxide, black smoke, and carbon dioxide will be generate and it makes carbon monoxide poisoning, suffocation.

Section 4 – FIRST AID MEASURES**Skin:**

If burned by contact with molten polystyrene, cool molten material adhering to skin as quick as possible with water, and get medical assistance for removal of adhering material and treatment of burns.

Eyes:

Immediately flush eyes with running water for over 15 minutes. If irritation develops, get medical attention.

Ingestion:

If swallowed, dilute with water and immediately induce vomiting. Never give fluids or induce vomiting if the patient is unconscious or having convulsions. Get immediate medical attention.

Inhalation:

Remove to fresh air. Aid in breathing, if necessary, and get immediate medical attention.

Section 5 – FIRE FIGHTING MEASURES

Items	Typical
Flash Point	>550°C (Polystyrene) 296 ~ 360°C (Under condition of decomposition) Excess heating decompose polystyrene and decomposed materials makes flash point lower.
Flammability Limits	LEL = Not Applicable, UEL = Not Applicable.
Auto Ignition Point	488 ~ 496°C
Calorific Value	9,620 Kcal/kg
Extinguishing Media	Water, CO ₂ , Dry Chemical
Minimum ignition energy	40 mJ (milli-Joule)
Maximum explosion pressure	7.0 kg/cm ² (at gate)
Minimum oxygen content for ignition	14% of Oxygen

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Fire Fighting Procedure:

Water or foam may cause frothing. Use water to keep fire exposed containers cool.
Water spray may be used to flush spills away from exposure.
For fires in enclosed areas, firefighters must use self-contained breathing apparatus.
Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.

Unusual Fire and Explosion Hazards:

This material burns vigorously and generates a dense, black, toxic smoke. It may include black particles, carbon monoxide and styrene vapor that are generated by decomposition and imperfect combustion. High dust level of polystyrene may create a potential for explosion.

Fires are difficult to control.

Fire - Fighting Equipment:

Wear positive-pressure self-contained breathing apparatus(SCBA) and protective fire-fighting clothing(includes fire-fighting helmet, coat, pants, boots, and gloves).
If protective clothing is not available or not used, fight fire from a protected location or safe distance.

Section 6 – ACCIDENTAL RELEASE MEASURES**General:**

Spills should be contained, solidified and placed in suitable containers for disposal.

Waste Disposal:

Incineration of large amount of polystyrene makes incomplete combustion and generates black smoke and styrene vapor. Waste disposal of large amount should be done by licensed agent and facilities.

Disposal of Packing materials:

Crushing or cutting to prevent unauthorized reuse.

Section 7 – HANDLING AND STORAGE**General:**

Keep in a cool and dry place.

Handling:

1. This material burns vigorously and generates a dense, black, toxic smoke. Fires are difficult to control. Therefore, working area should be kept clean and well ordered.
Recommended, should not use near open flame.
2. Avoid accumulating polystyrene powder because there is potential for powder explosion in conditions of high density of fine powder. Grounding should be taken in air conveyer line, bag filters, hoppers, silos, and others for removing static electricity.
3. Spilled pellets should be cleared as soon as possible. Slipping hazards will exist on spilled pellets.
4. Adequate ventilation should be used at injection molding process to prevent hydrocarbon fumes.
5. If fine polystyrene dust and powder are generated by handling, proper ventilation should be available and dust mask must be needed.
6. Safety goggle is needed to wear in case of handling powder.
7. Antipollution control measures against odors should be taken in molding process and other heating process. Heating process will generate styrene monomer.
8. Adequate measures against noise should be taken so that hearing may not be damaged in molding process.

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Storage:

1. Adequate fire fighting equipments are needed in case of storage. Fire fighting equipment must be in compliance with government, local laws and regulations.
2. Don't use open flame in storage and handling area without any reason. If hot works are needed, work permission should be required and proper protection should be taken.
3. Supersacks should be stored under cool, dry conditions. If supersack is kept in sunlight, the materials in supersack could be degraded. Degraded supersack could disintegrate during handling.

Section 8 – EXPOSURE CONTROLS/PERSONAL PROTECTION**Eyes:**

Use safety goggles.

Skin:

Wear clean body-covering clothing and put on gloves.

Respiration:

Use appropriate respiratory protective equipment during heating operations. Dust respirators should be used for dusty conditions. No special requirements under normal conditions.

Ventilation:

Use local exhaust to control dust.

Explosion proofing:

Not required.

Section 9 – PHYSICAL AND CHEMICAL PROPERTIES

Items	Typical	Range
Color:	Clear solid.	
Form/Appearance:	Pellet form.	
Odor:	Odorless.	
Specific Gravity:	1.05	1.0 to 1.1
Bulk Density:	0.63	0.58 to 0.67
Boiling Point:	Not Applicable.	
Decomposition temp:	Equilibrium point between polymerization and de-polymerization is around 250°C.	
Solubility in Water:	None.	

Section 10 – STABILITY AND REACTIVITY**Stability:**

Stable.

Conditions and Hazards to avoid:

Excessive temperature.

Hazardous decomposition/polymerization:

Hazardous decomposition product: Carbon monoxide, Hydrocarbons, Styrene monomer, Carbon dioxide.

Polymerization:

Not occur.

Corrosive properties:

No data.

Oxidizer properties:

No data.

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Section 11 – TOXICOLOGICAL INFORMATION		
No information available.		
Section 12 – ECOLOGICAL INFORMATION		
Chronic Overexposure Effect: Referring following reports, there are no reports about chronic overexposure effect by polystyrene.		
Route of entry	animal	Result
Oral	Rat	Add 4% of polystyrene in feed, no influence after 55 weeks. ¹⁾
Oral	Rat	Add 5% of polystyrene in feed, no influence after 2 years. ²⁾
Oral	Rat	Add 10% of polystyrene in bread for feed, no influence after 830 days. ³⁾
Section 13 – DISPOSAL CONSIDERATIONS		
Disposal: Do not dump into any sewers, on the ground, or into any body of water. All disposal methods must be in compliance regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator.		
Section 14 – TRANSPORT INFORMATION		
Transportation:		
1. PP/PE woven cross paper bags, PE bags, supersacks are standard packaging.		
2. Air conveyer systems are should be made by metal so that static electricity is released. Adequate measures against static electricity accident should be taken. All pipes and equipment should be grounded.		
3. In case of spillage on the road, local authorities must be notified. Areas affected by spillage must be isolated from traffic because polystyrene pellets can cause loss of control in brakes and handling. Note : Avoid water and careless handling to prevent damage to the container.		
UN Class: Not applicable.		
UN Number: Not applicable.		
DOT(Department of Transportation): Not applicable.		
Proper Shipping Name : Not applicable.		
Hazard Class : Not applicable.		
Identification Number : Not applicable.		
Packing Group : Not applicable.		
Section 15 – REGULATORY INFORMATION		
U.S. Federal Regulations:		
TSCA(Toxic Substance control Act) : CAS#9003-53-6 and #8042-47-5 are listed on the TSCA inventory.		
CERCLA:(Comprehensive Response Compensation, And Liability Act): Not applicable.		
SARA TITLE III:(Superfund Amendments And Reauthorization Act): Not applicable.		

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Section 16 – OTHER INFORMATION**Reference data:**

- 1) I. Phillips and G. C. Marks : British Plastics, July 1961 P.385-390
- 2) A. M. Thiess, N. Friedheim and H. Rossmann : Polymer Preprint 17, 35-39 (1976)
- 3) B. Hunter et al, : Huntingdon Res. Cent. Rep. Feb. 13, 1-318 (1976)

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