



Material Safety Data Sheet

Creation 2009.11.20

Revision 2022.04.01

Styrene Monomer

Rev. No. 4

Sheet 1/12

1. Chemical Product & Company Identification

A. Product Name : **Styrene Monomer**

B. Intended Use : Materials of PS, ABS and SBR

C. Manufacturer/Supplier :

1) Manufacturer :

| | | | |
|--|----------------|-------|----------------|
| HanwhaTotal Petrochemicals Co.,Ltd | | | |
| 103, Dokgot2-Ro, Daesan-Eup, Seosan-Si, Chungnam, 31900, Korea | | | |
| Telephone | 82-41-660-6415 | F a x | 82-41-660-6637 |

2) Supplier : (Product information: 041-660-6180)

| | | | |
|--|----------------|-------|----------------|
| HanwhaTotal Petrochemicals Co.,Ltd | | | |
| 17~20F Hanwha Finance Plaza, 92, Sejong-daero, Jung-gu, Seoul 04525, Korea | | | |
| Telephone | 82-2-3415-9363 | F a x | 82-2-3415-9370 |

2. Hazard Identification

A. GHS Classification:

1) Physicochemical Hazards - Flammable liquids: Category 3

2) Health Hazards - Acute toxicity (inhalation: vapor): Category 4

Skin corrosion/irritation: Category 2

Serious eye damage/irritation: Category 2A

Carcinogenicity: Category 2

Germ cell mutagenicity: Category 2

Reproductive toxicity: Category 2

Specific target organ toxicity(Single exposure): Category 3

(Respiratory tract irritation)

Specific target organ toxicity(Repeated exposure): Category 1

Aspiration hazard: Category 1

3) Environmental Hazards - Not Classified

B. GHS label elements

1) Symbol:





Material Safety Data Sheet

Creation 2009.11.20

Revision 2022.04.01

Styrene Monomer

Rev. No. 4

Sheet 2/12

2) Signal Word: Danger

3) Hazard Statement(s):

H226 Flammable liquid and vapour

H304 May be fatal if swallowed and enters airways

H315 Causes skin irritation

H319 Causes serious eye irritation

H332 Harmful if inhaled

H335 May cause respiratory irritation

H341 Suspected of causing genetic defects

H351 Suspected of causing cancer

H361 Suspected of damaging fertility or the unborn child

H372 Causes damage to organs through prolonged or repeated exposure (Refer Section SDS 11)

4) Precautionary Statement(s):

■ Prevention

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and understood.

P210 Keep away from heat/sparks/open flames/hot surfaces. ? No smoking.

P233 Keep container tightly closed.

P240 Ground/bond container and receiving equipment.

P241 Use explosion-proof electrical/ventilating/lighting/equipment.

P242 Use only non-sparking tools. Flammable liquids (chapter 2.6) 1, 2, 3

P243 Take precautionary measures against static discharge.

P260 Do not breathe dust/fume/gas/mist/vapours/spray.

P261 Avoid breathing dust/fume/gas/mist/vapours/spray.

P264 Wash hands thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P271 Use only outdoors or in a well-ventilated area.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

■ Response

P301+P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

P302+P352 IF ON SKIN: Wash with plenty of soap and water.

P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P308+P313 If exposed or concerned: Get medical advice/attention.



Material Safety Data Sheet

Creation 2009.11.20

Revision 2022.04.01

Styrene Monomer

Rev. No. 4

Sheet 3/12

P312 Call a POISON CENTER or doctor/physician if you feel unwell.

P314 Get medical advice/attention if you feel unwell.

P321 Specific treatment

P331 Do NOT induce vomiting.

P332+P313 If skin irritation occurs: Get medical advice/attention.

P337+P313 If eye irritation persists: Get medical advice/attention.

P362 Take off contaminated clothing and wash before reuse.

P370+P378 In case of fire: Use Suitable extinguishing media for extinction(Refer Section MSDS 5).

■ Storage

P403+P233 Store in a well-ventilated place. Keep container tightly closed.

P403+P235 Store in a well-ventilated place. Keep cool.

P405 Store locked up.

■ Disposal

P501 Dispose of contents/container in accordance with local/regional/national/international Regulation.

C. Other hazards which do not result in classification

Not available

3. Composition / Information on ingredients

| Chemical Name | Other Name | CAS No. or EU No. | Contents(%) |
|-----------------|-----------------|--------------------------------|-------------|
| Styrene Monomer | Phenyl ethylene | 100-42-5 (EC No. 202-851-5) | 99~100% |

4. First Aid Measures

A. Eye Contact:

Flush thoroughly with water at least 15minutes.

Get medical assistance. Get medical attention immediately.

Do not rub your eyes.

Go to the hospital immediately if symptoms(flare, irritate) occur.

Remove contact lenses if worn.

B. Skin Contact:

Remove contaminated clothing and shoes.

Get medical aid if irritation develops and persists. Wash clothing before reuse.



Material Safety Data Sheet

Creation 2009.11.20

Revision 2022.04.01

Styrene Monomer

Rev. No. 4

Sheet 4/12

Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.

Go to the hospital immediately if symptoms (flare, irritate) occur.

Wear gloves when washing the patient, and please avoid contact with contaminated clothing.

C. Inhalation:

If inhaled, remove to fresh air.

Get medical aid.

If breathing is stopped or irregular, give artificial respiration and supply oxygen.

D. Ingestion:

Potential for aspiration if swallowed. Get medical aid immediately.

Do not induce vomiting unless directed to do so by medical personnel.

Never give anything by mouth to an unconscious person.

If vomiting occurs naturally, have victim lean forward.

Rinse your mouth with water immediately.

E. Delayed and immediate effects and also chronic effects from short and long term exposure:

- Short term exposure: irritation, sleepiness, headache, vomiting, unconscious, coma
dizziness, stomachache, pleurodynia

- Long term exposure: irritation, sleepiness, headache, fatigue, nervous system disorder
irregular menstruation, cancer

F. Notes to physician:

Notify medical personnel of contaminated situations and have them take appropriate protective measures.

If exposed or concerned, get medical attention/advice.

5. Fire Fighting Measures

A. Extinguishing media:

1) Suitable extinguishing media

: Use dry chemical powder, carbon dioxide, or appropriate foam.

2) Unsuitable extinguishing media

: Avoid use of water jet for extinguishing

3) Unusual fire (big fire) : Do use extinguishing media with water spray or fog.

B. Specific hazards arising from the chemical:

1) Hazardous combustion product:

Carbon oxides (carbon monoxide (CO), carbon dioxide (CO₂))



Material Safety Data Sheet

Creation 2009.11.20

Revision 2022.04.01

Styrene Monomer

Rev. No. 4

Sheet 5/12

2) Fire & Explosion hazard:

Static electricity will cause to fire or explosion.

Vapor is more heavier than air

Vapor may travel considerable distance to source of ignition and flash back.

Container explosion may occur under fire conditions.

C. Special protective actions for firefighters:

Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Keep unauthorized personnel out.

Notify your local fire station and inform the location of the fire and characteristics hazard.

Using an unattended and water devices in case of large fire and leave alone to burn

Avoid inhalation of materials or combustion by-products.

Do not access if the tank on fire.

Vapor or gas is burned at distant ignition sources can be spread quickly.

Due to the extremely low flash point, irrigating fire extinguishing may be less effective when put out a fire.

If safe, switch off electrical equipment until vapour fire hazard removed.

Use water delivered as a fine spray to control fire and cool adjacent area.

6. Accidental Release Measures

A. Personal precautions, protective equipment and emergency procedures:

Shut off all sources of ignition.

Wear self-contained breathing apparatus.

Wear proper personal protective apparatus as indicated in Section 8 and avoid skin contact and inhalation.

Must work against the wind, let the upwind people to evacuate.

Handling the damaged containers or spilled material after wearing protective equipment.

Do not direct water at spill or source of leak.

Avoid skin contact and inhalation.

Cleanup and disposal under expert supervision is advised.

Keep unauthorized people away, isolate hazard area and deny entry.

B. Environmental precautions:

Prevent runoff and contact with waterways, drains or sewers.

If large amounts have been spilled, inform the relevant authorities.

C. Methods and materials for containment and cleaning up:

Large spill: Stay upwind and keep out of low areas. Dike for later disposal.

Notification to central and local government if the emissions reach the standard



Material Safety Data Sheet

Creation 2009.11.20

Revision 2022.04.01

Styrene Monomer

Rev. No. 4

Sheet 6/12

threshold.

Appropriate container for disposal of spilled material collected.

Small spill: Sand or other non-combustible material, please let use absorption.

Wipe off the solvent.

Do not use plastic containers.

7. Handling and Storage

A. Precautions for safe Handling:

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse.

Ground and bond containers when transferring material.

Avoid contact with eyes, skin, and clothing.

Empty containers retain product residue, (liquid and/or vapor), and can be dangerous.

Keep container tightly closed.

Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Avoid contact with incompatible materials.

Operators should wear antistatic footwear and clothing.

Do not inhale the steam prolonged or repeated.

Contaminated work clothing should not be allowed out of the workplace.

B. Conditions for safe storage, including any incompatibilities:

Store in a well-ventilated place.

Keep container tightly closed. Keep in dry place.

Store away from incompatible materials.

Monitor inhibitor content.

Do not use damaged containers. Save applicable laws and regulations.

Prevent static electricity and keep away from combustible materials or heat sources.

By specifying a storage area for carcinogenic substances.

Collected them in sealed containers.

8. Exposure Controls / Personal Protection

A. Exposure limit:

1) ACGIH TLV:

TWA: 20ppm, STEL: 40ppm

2) OSHA PEL:

100 ppm, C 200 ppm

B. Engineering control:



Material Safety Data Sheet

Creation 2009.11.20

Revision 2022.04.01

Styrene Monomer

Rev. No. 4

Sheet 7/12

Adequate ventilation(localize ventilation) should be provided in workplaces.

Use non sparking tools.

A system of local and/or general exhaust is recommended to keep employee exposures above the Exposure Limits.

Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area.

The use of local exhaust ventilation is commended to control emissions near the source.

C. Individual protection measures, such as personal protective equipment

1) Respiratory protection:

Prevent inhalation of the solvents.

If required to control exposure, use only suitable respirators and components tested and approved under appropriate government standards such as NIOSH.

Under conditions of frequent use or heavy exposure, Respiratory protection may be needed.

Respiratory protection is ranked in order from minimum to maximum.

Consider warning properties before use.

Any chemical cartridge respirator with organic vapor cartridge(s).

Any chemical cartridge respirator with a full facepiece and organic vaporcartridge(s).

Any air-purifying respirator with a full facepiece and an organic vapor canister.

For Unknown Concentration or Immediately Dangerous to Life or Health: Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. Any self-contained breathing apparatus with a full facepiece.

Under conditions of frequent use or heavy exposure, Respiratory protection may be needed.

2) Eye protection:

Wear approved chemical safety glasses or goggles where eye exposure is reasonably probable.

Eye wash fountain is recommended.

3) Hand protection

Wear appropriate chemical resistant glove.

4) Skin protection:

Wear appropriate chemical resistant protective clothing.

9. Physical and Chemical Properties

A. Appearance(physical state, color etc.) : Colorless to yellow, liquid

B. Odor: Sweet odor

C. Odor Threshold: Not available

D. pH: Not available



Material Safety Data Sheet

Creation 2009.11.20

Revision 2022.04.01

Styrene Monomer

Rev. No. 4

Sheet 8/12

- E. Melting point/Freezing point: -30.6°C
- F. Boiling point/range: 146°C
- G. Flash point: 31°C(c.c)
- H. Evaporation rate: Not available
- I. Flammability (solid, liquid): Not applicable
- J. Flammability Limit (lower/upper): 0.9~6.8%
- K. Vapor pressure: 0.7 kPa(@ 20°C)
- L. Solubility in water: 0.03 g/100mL(@ 25°C)
- M. Vapor density(Air=1): 3.59 (calculated value)
- N. Specific gravity: 0.911 (@ 20°C)
- O. Partition coefficient(n-Octanol/water): 2.96 (= log Pow) (measured)
- P. Auto-ignition temperature: 490°C
- Q. Thermal decomposition: Not available
- R. Viscosity: 0.696 cP(@ 25°C)
- S. Molecular weight: 104.1

10. Stability and Reactivity

A. Chemical stability:

May polymerize on exposure to heat, light or on contact with polymerization initiators such as peroxides etc.

Flammable liquid and vapor

B. Possibility of hazardous reaction: Yes(polymerization)

C. Conditions to avoid:

Ignition source, excess heat, confined spaces.

Avoid contact with incompatible materials and condition.

C. Incompatible material:

Oxidizing agents, acid, oxygen, copper, combustible materials, peroxides.

D. Hazardous decomposition products:

Hydrocarbon compounds, Carbon oxides

(Carbon monoxide (CO), carbon dioxide (CO₂))

11. Toxicological Information

A. Information on the likely route of exposure

- 1) Respiratory tracts



Material Safety Data Sheet

Creation 2009.11.20

Revision 2022.04.01

Styrene Monomer

Rev. No. 4

Sheet 9/12

May be fatal if swallowed and enters airways.

May cause respiratory irritation.

2) Oral

Not available

3) Eye/Skin

Causes serious eye irritation

Causes skin irritation

B. Delayed and immediate effects and also chronic effects from short and long term exposure

1) Acute toxicity:

- Oral: LD50 >6000 mg/kg Rat(male)(ECHA)

- Dermal: LD50 > 2000 mg/kg Rat(ECHA)

- Inhalation: LC50 11.8 mg/l 4hr Rat(ECHA)

2) Skin corrosion/irritation:

- Moderate irritant (rabbit)

3) Serious eye damage/irritation:

- In a study conducting with rabbits and epidemiologic case to human, eye irritation causes to human, cause moderate irritant.

4) Respiratory sensitization: Not available

5) Skin sensitization: Not classified

- Guinea pig test: not sensitizing (ECHA)

6) Carcinogenicity:

- OSHA: Not available

- MOL Notice: 2

- NTP: R

- IARC: Group 2A

- ACGIH: A3

- EU CLP: Not available

7) Germ cell mutagenicity:

- Chromosomal aberration test: positive, Micronucleus Test: positive. (ECHA)

8) Reproductive toxicity:

- Pregnant hamster oral: 23, 58, 80, 90, 100, 110 $\mu\text{mol/kg}$ (3.98 to 19.0 mg/kg), intravenous: 11, 17, 23 $\mu\text{mol/kg}$ (1.90 to 3.98 mg/kg) As a result of developmental toxicity/teratogenicity test (oral and intravenous injection) at a concentration, maternal toxicity such as death/coma/weight loss was observed at high concentrations only once for 8 days, and malformed fetal proportions at concentrations above 90 $\mu\text{mol/kg}$ increased.

9) STOT-single exposure:

- Respiratory tracts irritation, central nervous system effect and lung irritation

10) STOT-repeated exposure:



Material Safety Data Sheet

Creation 2009.11.20

Revision 2022.04.01

Styrene Monomer

Rev. No. 4

Sheet 10/12

– Mouse Oral repeated test: In animals administered 100 or 200 mg/kg/day styrene there was a statistically significant and dose dependent increase in the frequency of S-phase cells in the terminal bronchioles. NOAEL 10 mg/kg/day.

– As a result of 13-week repeated inhalation toxicity test (GLP) using a mouse, hepatic histopathology (infection, fibrosis and hepatocyte loss) was observed in 5 in the 150 ppm female group and 2 in the 200 ppm male group. Nasal abnormalities were observed in all exposed groups, and abnormalities in the lungs were observed above 100 ppm. NOAEC = 0.21 mg/L

–As a result of repeated 13-week inhalation toxicity test using rats, this toxicity was caused by hearing loss at high concentration of 800ppm. NOAEL = 200 ppm (ECHA)

11) Aspiration hazard:

– Hydrocarbon, dynamic viscosity 0.696 mPa/s (25 °C) (ECHA)

12. Ecological Information

A. Ecotoxicity:

1) Fish: LC50 =10 mg/l 96hr (OECD TG 203, GLP)(ECHA)

2) Crustacean: LC50 4.7 mg/l 48hr Daphnia magna(OECD TG 202, GLP)

Daphnia magna, NOEC(21d) =1.01 mg/L(OECD TG 211, GLP)(ECHA)

3) Algae: EC50 4.9 mg/l 72hr Selenastrum capricornutum (EPA OTS 797.1050, GLP)(ECHA)

B. Persistence and Degradability:

1) Persistence: log Kow 2.96 (OECD TG 107)

2) Degradability: Not available

C. Bioaccumulation potential:

1) Bioaccumulation potential: BCF 74 L/kg (ECHA)

2) Biodegradation: After 28 days,100%(ECHA)

D. Mobility in soil: Koc 352

E. Hazardous to the ozone layer : Not classified

F. Other adverse effects: Not available

13. Disposal Consideration

A. Disposal method:

Suppress the generation of waste as much as possible and minimize the discharge of waste by recycling the generated waste by yourself.



Material Safety Data Sheet

| | |
|----------|------------|
| Creation | 2009.11.20 |
| Revision | 2022.04.01 |
| Rev. No. | 4 |
| Sheet | 11/12 |

Styrene Monomer

If oil-water separation technology shall be applied as pre-waste treatment if it is applicable
Dispose by incineration.
Will be pre-processed by the separation of oil and water.

B. Special precaution for disposal:

Anyone with business license number who generates industrial wastes shall treat the waste by him/herself or by entrusting to the legal entities who treat the wastes, recycle the wastes of others or install and operate the waste treatment facilities according to the Wastes Control Act
Dispose of waste in accordance with all applicable laws and regulations.

14. Transportation Information

- A. UN No.(IMDG CODE/IATA DGR): 2055
- B. Proper shipping name: STYRENE MONOMER, STABILIZED
- C. Hazard class: 3
- D. Packing group: III
- E. Marine pollutant: Not applicable
- F. Special precautions for user related to transport or transportation measures
 - Local transport follows in accordance with Dangerous goods Safety Management Law.
 - Package and transport follow in accordance with Department of Transportation (DOT) and other regulatory agency requirements.
 - EmS FIRE SCHEDULE: F-E (Non-water-reactive flammable liquids)
 - EmS SPILLAGE SCHEDULE: S-D (Flammable liquids)

15. Regulatory Information

- A. National and/or international regulatory information
 - Information of EU Classification:
 - Classification: H226, H332, H319, H315
 - U.S. Federal regulations:
 - OSHA PROCESS SAFETY (29CFR1910.119): Not applicable
 - CERCLA Section 103 (40CFR302.4): 453.599 kg 1000 lb
 - EPCRA Section 302 (40CFR355.30): Not applicable
 - EPCRA Section 304 (40CFR355.40): Not applicable
 - EPCRA Section 313 (40CFR372.65): Applicable
 - Rotterdam Convention listed ingredients: Not applicable
 - Stockholm Convention listed ingredients: Not applicable
 - Montreal Protocol listed ingredients: Not applicable



Material Safety Data Sheet

Creation 2009.11.20

Revision 2022.04.01

Styrene Monomer

Rev. No. 4

Sheet 12/12

16. Other Information

This information relates to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty or guarantee is made as to its accuracy, reliability on completeness. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for his own particular use. We do not accept liability for any loss or damage that may occur from the use of this information nor do we offer warranty against patent infringement.

A. Issue date: 2009.11.20

B. Last revision: 2022.04.01, Rev 4.

- Rev.4 : Change company name and logo