According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Styrene Monomer

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SECTION 1. IDENTIFICATION

Product name : Styrene Monomer

Product code : Q9211, Q9215, Q9257, Q9271, Q9273

CAS-No. : 100-42-5

Other means of identification : Phenyl ethene, Phenyl ethylene, Vinyl benzene

Manufacturer or supplier's details

Company : Shell Chemical LP

PO Box 576

HOUSTON TX 77001

USA

SDS Request : 1-800-240-6737

Customer Service : 1-855-697-4355

Emergency telephone number

Chemtrec Domestic (24 hr) : 1-800-424-9300

Chemtrec International (24

: 1-703-527-3887

hr)

Recommended use of the chemical and restrictions on use

Recommended use : Base chemical for the production of polystyrene, rubbers and

resins.

Restrictions on use : Restricted to professional users., This product must not be

used in applications other than the above without first seeking

the advice of the supplier.

This product must not be used in applications other than those listed in Section 1 without first seeking the advice of the sup-

plier.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids : Category 3

Aspiration hazard : Category 1

Skin irritation : Category 2

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Eye irritation : Category 2A

Acute toxicity (Inhalation) : Category 4

Specific target organ toxicity

- single exposure

Category 3 (Respiratory Tract)

Specific target organ toxicity

- repeated exposure

Category 1 (Auditory system)

Long-term (chronic) aquatic

hazard

Category 3

GHS label elements

Hazard pictograms







Signal word : Danger

Hazard statements : PHYSICAL HAZARDS:

H226 Flammable liquid and vapour.

HEALTH HAZARDS:

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.

H372 Causes damage to organs (Auditory system) through pro-

longed or repeated exposure if inhaled.

ENVIRONMENTAL HAZARDS:

H412 Harmful to aquatic life with long lasting effects.

Precautionary statements : Prevention:

P210 Keep away from heat/ sparks/ open flames/ hot surfaces.

No smoking.

P240 Ground/bond container and receiving equipment.

P241 Use explosion-proof electrical/ ventilating/ lighting equip-

ment

P242 Use only non-sparking tools.

P243 Take precautionary measures against static discharge. P260 Do not breathe 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.

P273 Avoid release to the environment.

Response:

P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately

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all contaminated clothing. Rinse skin with water/ shower.

P370 + P378 In case of fire: Use appropriate media to extinguish.

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

P331 Do NOT induce vomiting.

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

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

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

P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.

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

Storage:

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

P235 Keep cool.

P405 Store locked up.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards which do not result in classification

Vapours are heavier than air. Vapours may travel across the ground and reach remote ignition sources causing a flashback fire danger.

Highly reactive.

Maintain dissolved oxygen and inhibitor at proper levels to prevent runaway polymerisation.

May form flammable/explosive vapour-air mixture.

This material is a static accumulator.

Even with proper grounding and bonding, this material can still accumulate an electrostatic charge.

If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable airvapour mixtures can occur.

The classification of this material is based on OSHA HCS 2012 criteria.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Hazardous components

Chemical name	Synonyms	CAS-No.	Concentration (% w/w)
styrene	styrene	100-42-5	99 - 100

Stabilised with tertiary butyl catechol., 10-15 ppm.

SECTION 4. FIRST-AID MEASURES

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General advice : Not expected to be a health hazard when used under normal

conditions.

If inhaled : Call emergency number for your location / facility.

Remove to fresh air. Do not attempt to rescue the victim unless proper respiratory protection is worn. If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting, or unresponsive, give 100% oxygen with rescue breathing or Cardio-Pulmonary Resuscitation as required and transport to

the nearest medical facility.

In case of skin contact : Remove contaminated clothing. Immediately flush skin with

large amounts of water for at least 15 minutes, and follow by washing with soap and water if available. If redness, swelling, pain and/or blisters occur, transport to the nearest medical

facility for additional treatment.

In case of eye contact : Immediately flush eye(s) with plenty of water.

Remove contact lenses, if present and easy to do. Continue

rinsing.

Transport to the nearest medical facility for additional treat-

ment.

If swallowed : Call emergency number for your location / facility.

If swallowed, do not induce vomiting: transport to nearest medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent aspiration. If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical facility: fever greater than 101° F (38.3°C), shortness of breath,

chest congestion or continued coughing or wheezing.

Most important symptoms and effects, both acute and delayed

Respiratory irritation signs and symptoms may include a temporary burning sensation of the nose and throat, coughing, and/or difficulty breathing.

Skin irritation signs and symptoms may include a burning sen-

sation, redness, swelling, and/or blisters.

Eye irritation signs and symptoms may include a burning sen-

sation, redness, swelling, and/or blurred vision.

If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest

congestion, shortness of breath, and/or fever.

If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical facility: fever greater than 101° F (38.3°C), shortness of breath, chest congestion or continued coughing or wheezing.

Defatting dermatitis signs and symptoms may include a burn-

ing sensation and/or a dried/cracked appearance.

Auditory system effects may include temporary hearing loss

and/or ringing in the ears.

Visual system disturbances may be evidenced by decreases

in the ability to discriminate between colours.

Protection of first-aiders : When administering first aid, ensure that you are wearing the

appropriate personal protective equipment according to the

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incident, injury and surroundings.

Indication of any immediate medical attention and special

medical attention and special treatment needed

IMMEDIATE TREATMENT IS EXTREMELY IMPORTANT!

Call a doctor or poison control center for guidance.

Potential for chemical pneumonitis.

Treat symptomatically.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : Foam, water spray or fog. Dry chemical powder, carbon diox-

ide, sand or earth may be used for small fires only.

Unsuitable extinguishing

media

Do not use water in a jet.

Specific hazards during fire-

fighting

Flammable vapours may be present even at temperatures

below the flash point.

Sustained fire attack on vessels may result in a Boiling Liquid

Expanding Vapor Explosion (BLEVE).

The vapour is heavier than air, spreads along the ground and

distant ignition is possible.

Will float and can be reignited on surface water. Hazardous combustion products may include:

Carbon monoxide. Formaldehyde

Specific extinguishing meth-

ods

Standard procedure for chemical fires.

Further information : Clear fire area of all non-emergency personnel.

All storage areas should be provided with adequate fire

fighting facilities.

Keep adjacent containers cool by spraying with water.

Special protective equipment :

for firefighters

Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if

large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to

relevant Standards (e.g. Europe: EN469).

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Observe all relevant local and international regulations.

Notify authorities if any exposure to the general public or the

environment occurs or is likely to occur.

Local authorities should be advised if significant spillages

cannot be contained.

Isolate hazard area and deny entry to unnecessary or unpro-

tected personnel.

Avoid contact with skin, eyes and clothing. Be ready for fire or possible exposure.

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Do not operate electrical equipment. Stay upwind and out of low areas.

Environmental precautions : Shut off leaks, if possible without personal risks. Remove all

possible sources of ignition in the surrounding area. Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers. Attempt to disperse the vapour or to direct its flow to a safe location for example by using fog sprays. Take precautionary measures against static discharge. Ensure electrical continuity by bond-

ing and grounding (earthing) all equipment. Monitor area with combustible gas indicator.

Methods and materials for containment and cleaning up

For small liquid spills (< 1 drum), transfer by mechanical means to a labeled, sealable container for product recovery or safe disposal. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove

contaminated soil and dispose of safely.

For large liquid spills (> 1 drum), transfer by mechanical means such as vacuum truck to a salvage tank for recovery or safe disposal. Do not flush away residues with water. Retain as contaminated waste. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely

Additional advice

: For guidance on selection of personal protective equipment

see Section 8 of this Safety Data Sheet.

For guidance on disposal of spilled material see Section 13 of

this Safety Data Sheet.

U.S. regulations may require reporting releases of this material to the environment which exceed the reportable quantity (refer to Section 15) to the National Response Center at (800)

424-8802.

SECTION 7. HANDLING AND STORAGE

Technical measures : Avoid breathing of or direct contact with material. Only use in

well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see

Section 8 of this Safety Data Sheet.

Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this

material.

Ensure that all local regulations regarding handling and stor-

age facilities are followed.

Advice on safe handling : Avoid inhaling vapour and/or mists.

Avoid contact with skin, eyes and clothing.

Extinguish any naked flames. Do not smoke. Remove ignition

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sources. Avoid sparks.

The vapour is heavier than air. Beware of accumulation in pits and confined spaces.

Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols.

Bulk storage tanks should be diked (bunded).

Properly dispose of any contaminated rags or cleaning materials in order to prevent fires.

Even with proper grounding and bonding, this material can still accumulate an electrostatic charge.

If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur.

Be aware of handling operations that may give rise to additional hazards that result from the accumulation of static charges.

These include but are not limited to pumping (especially turbulent flow), mixing, filtering, splash filling, cleaning and filling of tanks and containers, sampling, switch loading, gauging, vacuum truck operations, and mechanical movements.

These activities may lead to static discharge e.g. spark formation.

Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (≤ 1 m/s until fill pipe submerged to twice its diameter, then ≤ 7 m/s). Avoid splash filling. Do NOT use compressed air for filling, discharging, or handling operations.

Inhibitor levels should be maintained.

Protect against light.

Avoidance of contact : Strong oxidising agents.

Copper alloys.

Product Transfer : If positive displacement pumps are used, these must be fitted

with a non-integral pressure relief valve. Refer to guidance

under Handling section.

Conditions for safe storage : Refer to section 15 for any additional specific legislation cov-

ering the packaging and storage of this product.

Further information on stor-

age stability

Storage Temperature:

25 °C / 77 °F maximum.

Keep away from aerosols, flammables, oxidizing agents, corrosives and from other flammable products which are not

harmful or toxic to man or to the environment.

Must be stored in a diked (bunded) well- ventilated area, away from sunlight, ignition sources and other sources of heat. Must be kept inhibited during storage and shipment as material can polymerise.

Vapours from tanks should not be released to atmosphere. Breathing losses during storage should be controlled by a

suitable vapour treatment system.

Electrostatic charges will be generated during pumping. Electrostatic discharge may cause fire. Ensure electrical con-

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tinuity by bonding and grounding (earthing) all equipment to

reduce the risk.

The vapours in the head space of the storage vessel may lie in the flammable/explosive range and hence may be flamma-

ble.

Packaging material : Suitable material: For container paints, use epoxy paint, zinc

silicate paint., For containers, or container linings use mild

steel, stainless steel.

Unsuitable material: Copper., Copper alloys.

Container Advice : Containers, even those that have been emptied, can contain

explosive vapours. Do not cut, drill, grind, weld or perform

similar operations on or near containers.

Specific use(s) : Not applicable

Ensure that all local regulations regarding handling and stor-

age facilities are followed.

See additional references that provide safe handling practices for liquids that are determined to be static accumulators: American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practices

on Static Electricity).

IEC/TS 60079-32-1: Electrostatic hazards, guidance

SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis	
styrene	100-42-5	TWA	20 ppm 85 mg/m3	Shell Internal Standard (SIS) for 8 hour TWA.	
	Further information: The value is provided by the Industry Association. This value is provided for information only.				
styrene		TWA	100 ppm	OSHA Z-2	
styrene		CEIL	200 ppm	OSHA Z-2	
styrene		Peak	600 ppm OSHA 2 (5 mins. in any 3 hrs.)		
styrene		TWA	10 ppm	ACGIH	
styrene		STEL	20 ppm	ACGIH	

Biological occupational exposure limits

Components	CAS-No.	Control	Biological	Sam-	Permissible	Basis
		parameters	specimen	pling	concentra-	
				time	tion	

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styrene	100-42-5	Mandelic acid plus phenylgly- oxylic acid	Urine	End of shift (As soon as possible after exposure ceases)	150 mg/g creatinine	ACGIH BEI
		Styrene	Urine	End of shift (As soon as possible after exposure ceases)	20 μg/l	ACGIH BEI

Monitoring Methods

Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.

Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory.

Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available.

National Institute of Occupational Safety and Health (NIOSH), USA: Manual of Analytical Methods http://www.cdc.gov/niosh/

Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods http://www.osha.gov/

Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances http://www.hse.gov.uk/

Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA), Germany http://www.dguv.de/inhalt/index.jsp

L'Institut National de Recherche et de Securité, (INRS), France http://www.inrs.fr/accueil

Engineering measures

Use sealed systems as far as possible.

Adequate explosion-proof ventilation to control airborne concentrations below the exposure guidelines/limits.

Local exhaust ventilation is recommended.

Firewater monitors and deluge systems are recommended.

Eye washes and showers for emergency use.

Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated. The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include:

General Information:

Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to

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maintenance. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when there is potential for inhalation; clear up spills immediately and dispose of wastes safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.

Personal protective equipment

Respiratory protection

If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are unsuitable (e.g. airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus.

Where air-filtering respirators are suitable, select an appropriate combination of mask and filter.

If air-filtering respirators are suitable for conditions of use: Select a filter suitable for organic gases and vapours [Type A boiling point >65°C (149°F)].

Respirator selection, use and maintenance should be in accordance with the requirements of the OSHA Respiratory Protection Standard, 29 CFR 1910.134.

Hand protection Remarks

Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection. Longer term protection: Viton. Incidental contact/Splash protection: Nitrile rubber. For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same but recognize that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time maybe acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material. Glove thickness should be typically greater than 0.35 mm depending on the glove make and model. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key

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element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moistur-

izer is recommended.

Eye protection : Wear goggles for use against liquids and gas.

Wear full face shield if splashes are likely to occur.

Skin and body protection : Wear chemical resistant gloves/gauntlets and boots. Where

risk of splashing, also wear an apron.

Wear antistatic and flame-retardant clothing, if a local risk

assessment deems it so.

Protective measures : Personal protective equipment (PPE) should meet recom-

mended national standards. Check with PPE suppliers.

Hygiene measures : Wash hands before eating, drinking, smoking and using the

toilet.

Launder contaminated clothing before re-use.

Environmental exposure controls

General advice : Local guidelines on emission limits for volatile substances

must be observed for the discharge of exhaust air containing

vapour.

Minimise release to the environment. An environmental assessment must be made to ensure compliance with local envi-

ronmental legislation.

Information on accidental release measures are to be found in

section 6.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Oily liquid.

Colour : Colourless to yellowish

Odour : Aromatic hydrocarbon

Odour Threshold : 0.1 ppm

pH : Not applicable

Melting / freezing point : -31 °C / -24 °F

Boiling point : 145 °C / 293 °F

Flash point : 32 °C / 90 °F

Method: closed cup

Evaporation rate : 12.4

Method: ASTM D 3539, nBuAc=1

Flammability

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Flammability (solid, gas) Data not available

Lower explosion limit and upper explosion limit / flammability limit

Upper explosion limit / up- : 6.1 %(V)

per flammability limit

Lower explosion limit /

Lower flammability limit

: 1.1 %(V)

Vapour pressure 670 Pa (20 °C / 68 °F)

Relative vapour density

Relative density Data not available

Density 906 kg/m3 (20 °C / 68 °F)

Method: ASTM D4052

Solubility(ies)

Water solubility 0.29 kg/m3 (20 °C / 68 °F

Partition coefficient: n-

octanol/water

log Pow: 2.96

Method: Literature data.

490 °C / 914 °F Auto-ignition temperature

Decomposition temperature Data not available

Viscosity

Viscosity, dynamic 0.7 mPa.s (25 °C / 77 °F)

Method: ASTM D445

Data not available Viscosity, kinematic

Not applicable Explosive properties

Oxidizing properties Not applicable

Self-heating substances At high temperatures, for example fire conditions, exothermic

> polymerisation may occur causing possible container rupture., Dangerous polymerisation can occur on contact with highly catalytic surfaces., In case of contact with water the inhibitor concentration might decrease and cause polymerisation.

Surface tension 34 mN/m

Conductivity Low conductivity: < 100 pS/m, The conductivity of this material

> makes it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10,000 pS/m., Whether a liquid is nonconductive or semiconductive, the precautions are the same., A number of factors, for exam-

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ple liquid temperature, presence of contaminants, and antistatic additives can greatly influence the conductivity of a liq-

uid

Molecular weight : 104.15 g/mol

Particle size : Data not available

SECTION 10. STABILITY AND REACTIVITY

Reactivity : Polymerises with risk of fire and explosion.

Reacts with strong oxidising agents.

Chemical stability : Material is stable when properly inhibited and an appropriate

dissolved oxygen level is maintained (see Storage in Chapter

7).

Polymerises with risk of fire and explosion.

Reacts with strong oxidising agents.

Possibility of hazardous reac-

tions

Normally stable under ambient conditions and if properly in-

hibited.

Conditions to avoid : Heat, flames, and sparks.

Exposure to sunlight. Exposure to air.

In certain circumstances product can ignite due to static elec-

tricity.

Incompatible materials : Strong oxidising agents.

Copper alloys.

Hazardous decomposition

products

Thermal decomposition is highly dependent on conditions. A complex mixture of airborne solids, liquids and gases, includ-

ing carbon monoxide, carbon dioxide and other organic compounds will be evolved when this material undergoes combus-

tion or thermal or oxidative degradation.

SECTION 11. TOXICOLOGICAL INFORMATION

Basis for assessment : Information given is based on data on the components and

the toxicology of similar products.

Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual com-

ponent(s).

Information on likely routes of exposure

Inhalation is the primary route of exposure although absorption may occur through skin contact or following accidental ingestion.

Acute toxicity

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Components:

styrene:

Acute oral toxicity : LD 50 (Rat, male and female): > 5,000 mg/kg

Method: Based on weight of evidence.

Remarks: Low toxicity

Acute inhalation toxicity : LC 50 (Rat, Unspecified): 11.8 mg/l, 2770 ppm

Exposure time: 4 h
Test atmosphere: vapour

Method: Based on weight of evidence.

Remarks: Harmful if inhaled.

Acute dermal toxicity : LD 50 (Rat, male and female): > 2,000 mg/kg

Method: OECD Test Guideline 402

Remarks: Based on available data, the classification criteria

are not met.

Skin corrosion/irritation

Components:

styrene:

Species: Rabbit

Method: Based on weight of evidence. Remarks: Causes skin irritation.

Serious eye damage/eye irritation

Components:

styrene:

Species: Rabbit

Method: Based on weight of evidence. Remarks: Causes serious eye irritation.

Respiratory or skin sensitisation

Components:

styrene:

Species: Humans

Method: Based on Human Evidence

Remarks: Based on available data, the classification criteria are not met.

Germ cell mutagenicity

Components:

styrene:

Genotoxicity in vitro : Method: Based on weight of evidence.

Remarks: Based on available data, the classification criteria

are not met.

Genotoxicity in vivo : Method: Based on weight of evidence.

Remarks: Based on available data, the classification criteria

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are not met.

Germ cell mutagenicity- As-

sessment

: This product does not meet the criteria for classification in

categories 1A/1B.

Germ cell mutagenicity-

Carcinogenicity

Components:

styrene:

Species: Humans

Application Route: Occupational exposure Method: Based on weight of evidence.

Remarks: Based on available data, the classification criteria are not met.

Species: Rat

Application Route: Inhalation

Method: Based on weight of evidence.

Remarks: Based on available data, the classification criteria are not met.

Species: Rat

Application Route: Oral

Method: Based on weight of evidence.

Remarks: Based on available data, the classification criteria are not met.

Carcinogenicity - Assess-

ment

: This product does not meet the criteria for classification in

categories 1A/1B.

IARC Group 2A: Probably carcinogenic to humans

styrene 100-42-5

OSHA No component of this product present at levels greater than or

equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP Reasonably anticipated to be a human carcinogen

styrene 100-42-5

Reproductive toxicity

Components:

styrene:

Effects on fertility :

Species: Rat

Application Route: Inhalation

Method: OECD Test Guideline 416

Remarks: Based on available data, the classification criteria

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

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are not met.

This product does not meet the criteria for classification in

categories 1A/1B.

Effects on foetal develop-

ment

: Species: Rat

Application Route: Inhalation Method: OECD Test Guideline 416

Remarks: Causes foetotoxicity in animals at doses which are

maternally toxic.

Reproductive toxicity - As-

sessment

: This product does not meet the criteria for classification in

categories 1A/1B.

STOT - single exposure

Components:

styrene:

Exposure routes: Inhalation

Target Organs: Respiratory system

Remarks: Inhalation of vapours or mists may cause irritation to the respiratory system.

STOT - repeated exposure

Components:

stvrene:

Exposure routes: Inhalation

Target Organs: ear

Remarks: Harmful: danger of serious damage to health by prolonged exposure through inhalation., Can cause liver damage., Respiratory system: repeated exposure affects the respiratory system. Effects were seen at high doses only., Auditory system: prolonged and repeated exposures to high concentrations have resulted in hearing loss in rats.

Repeated dose toxicity

Components:

styrene:

Species: Humans, Unspecified Application Route: Inhalation Method: Occupational exposure

Target Organs: ear

Remarks: Harmful: danger of serious damage to health by prolonged exposure through inhala-

tion.

Can cause liver damage.

Respiratory System: repeated exposure affects the respiratory system.

Auditory system: prolonged and repeated exposures to high concentrations have resulted in hearing loss in rats. Solvent abuse and noise interaction in the work environment may cause hearing loss.

Nervous system: repeated exposure affects the nervous system. Effects were seen at high doses only.

Species: Rat, Unspecified Application Route: Inhalation Test atmosphere: vapour

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Method: Acceptable non-standard method.

Target Organs: ear

Remarks: Harmful: danger of serious damage to health by prolonged exposure through inhala-

tion.

Can cause liver damage.

Respiratory System: repeated exposure affects the respiratory system.

Auditory system: prolonged and repeated exposures to high concentrations have resulted in hearing loss in rats. Solvent abuse and noise interaction in the work environment may cause hearing loss.

Nervous system: repeated exposure affects the nervous system. Effects were seen at high doses only.

Aspiration toxicity

Components:

styrene:

Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

Further information

Components:

styrene:

Remarks: Classifications by other authorities under varying regulatory frameworks may exist.

SECTION 12. ECOLOGICAL INFORMATION

Basis for assessment : Information given is based on product data.

Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual com-

ponent(s).

Ecotoxicity

Components:

styrene:

Toxicity to fish (Acute toxici-

ty)

LC50 (Pimephales promelas (fathead minnow)): 4.02 mg/l

Exposure time: 96 h

Method: OECD Test Guideline 203

Remarks: Toxic

LC/EC/IC50 >1 - <=10 mg/l

Toxicity to daphnia and other :

aquatic invertebrates (Acute

toxicity)

EC50 (Daphnia magna (Water flea)): 4.7 mg/l

Exposure time: 48 h

Method: OECD Test Guideline 202

Remarks: Toxic

LC/EC/IC50 >1 - <=10 mg/l

Toxicity to algae (Acute tox-

icity)

ErC50 (Pseudokirchneriella subcapitata (algae)): 4.9 mg/l

Exposure time: 96 h

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Method: Test(s) equivalent or similar to OECD Test Guideline

201

Remarks: Toxic

NOEC/NOEL > 1.0 - <= 10 mg/I

Toxicity to fish (Chronic tox-

icity)

Remarks: Data not available

Toxicity to daphnia and other : aquatic invertebrates (Chron-

aquatic invertebrates

ic toxicity)

NOEC (Daphnia magna (Water flea)): 1.01 mg/l

Exposure time: 21 d

Method: OECD Test Guideline 211

Remarks: NOEC/NOEL > 1.0 - <=10 mg/l (based on test data)

Toxicity to microorganisms

(Acute toxicity)

LC50 (Activated sludge): 500 mg/l

Exposure time: 3 h

Method: Test(s) equivalent or similar to OECD Guideline 209

Remarks: Practically non toxic:

LL/EL/IL50 > 100 mg/l

Persistence and degradability

Components:

styrene:

Biodegradability : Biodegradation: 70.9 %

Exposure time: 28 d Method: ISO DIS 9408

Remarks: Readily biodegradable.

Bioaccumulative potential

Components:

styrene:

Bioaccumulation : Remarks: Does not bioaccumulate significantly.

Mobility in soil

Components:

styrene:

Mobility : Remarks: Floats on water.

If product enters soil, it will be highly mobile and may contam-

inate groundwater.

Other adverse effects

Components:

styrene:

Results of PBT and vPvB

assessment

The substance does not fulfill all screening criteria for persistence, bioaccumulation and toxicity and hence is not consid-

ered to be PBT or vPvB.

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SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues

Recover or recycle if possible.

It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations.

Waste product should not be allowed to contaminate soil or ground water, or be disposed of into the environment. Do not discharge extinguishing waters into the aquatic environment.

Do not dispose of tank water bottoms by allowing them to drain into the ground. This will result in soil and groundwater contamination.

Waste arising from a spillage or tank cleaning should be disposed of in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.

Disposal should be in accordance with applicable regional, national, and local laws and regulations.

Local regulations may be more stringent than regional or national requirements and must be complied with.

MARPOL - see International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) which provides technical aspects at controlling pollutions from ships.

Contaminated packaging

Drain container thoroughly.

After draining, vent in a safe place away from sparks and fire. Residues may cause an explosion hazard. Do not puncture, cut, or weld uncleaned drums. Send to drum recoverer or metal reclaimer.

Packing: Emptying: Place the package upside down, and tilt slightly, circa 10 degrees, to enable drainage in such a way that the lowest part of the package is at the exit orifice. On some packing an extra hole must be made. Drainage should be carried out at room temperature (at least 15 °C). Wait until the package is drip dry. Do not close package after draining. Please note the risks connected with emptying package and containers with flammable liquids. Emptied package should be ventilated in a safe place away from sparks and fire. Residues may be an explosion risk. Do not puncture, cut or weld in non-cleaned package, containers or drums.

SECTION 14. TRANSPORT INFORMATION

National Regulations

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

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US Department of Transportation Classification (49 CFR Parts 171-180)

UN/ID/NA number : UN 2055

Proper shipping name : STYRENE MONOMER, STABILIZED

Class : 3
Packing group : III
Labels : 3

Reportable quantity Styrene (1,000 lb)

ERG Code : 128P Marine pollutant : no

International Regulations

IATA-DGR

UN/ID No. : UN 2055

Proper shipping name : STYRENE MONOMER, STABILIZED

Class : 3
Packing group : III
Labels : 3

IMDG-Code

UN number : UN 2055

Proper shipping name : STYRENE MONOMER, STABILIZED

Class : 3
Packing group : III
Labels : 3
Marine pollutant : no

Maritime transport in bulk according to IMO instruments

Pollution category : Y

Ship type : 3; Must be Double Hulled

Product name : Styrene monomer

Special precautions for user

Remarks : Special Precautions: Refer to Section 7, Handling & Storage,

for special precautions which a user needs to be aware of or

needs to comply with in connection with transport.

Additional Information: This product may be transported under nitrogen blanketing.

Nitrogen is an odourless and invisible gas. Exposure to nitrogen enriched atmospheres displaces available oxygen which may cause asphyxiation or death. Personnel must observe strict safety precautions when involved with a confined space

entry.

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

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Components	CAS-No.	Component RQ	Calculated product RQ	
		(lbs)	(lbs)	
styrene	100-42-5	1000	1000	

*: SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards Flammable (gases, aerosols, liquids, or solids)

Skin corrosion or irritation

Serious eye damage or eye irritation

Specific target organ toxicity (single or repeated exposure)

SARA 313 The following components are subject to reporting levels es-

tablished by SARA Title III, Section 313:

100-42-5 >= 90 - <= 100 % styrene

Clean Water Act

The following Hazardous Chemicals are listed under the U.S. CleanWater Act, Section 311, Table 117.3:

100-42-5 100 % styrene

US State Regulations

Pennsylvania Right To Know

styrene 100-42-5

California Prop. 65

WARNING: This product can expose you to chemicals including styrene, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

California List of Hazardous Substances

100-42-5 styrene

Other regulations:

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

The components of this product are reported in the following inventories:

AIIC : Listed

DSL Listed

IECSC : Listed

ENCS Listed

KECI Listed

NZIoC Listed

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PICCS Listed

TSCA Listed

TCSI Listed

SECTION 16. OTHER INFORMATION

Further information

NFPA Rating (Health, Fire, Reac- 3, 3, 2

tivity)

3, 3, 2

Full text of other abbreviations

ACGIH USA. ACGIH Threshold Limit Values (TLV) ACGIH - Biological Exposure Indices (BEI) ACGIH BEI

OSHA Z-2 USA. Occupational Exposure Limits (OSHA) - Table Z-2

ACGIH / TWA 8-hour, time-weighted average Short-term exposure limit ACGIH / STEL OSHA Z-2 / TWA 8-hour time weighted average OSHA Z-2 / CEIL Acceptable ceiling concentration

OSHA Z-2 / Peak Acceptable maximum peak above the acceptable ceiling con-

centration for an 8-hr shift

The standard abbreviations and acronyms used in this docu-Abbreviations and Acronyms

ment can be looked up in reference literature (e.g. scientific

dictionaries) and/or websites.

ACGIH = American Conference of Governmental Industrial

Hygienists

ADR = European Agreement concerning the International

Carriage of Dangerous Goods by Road

AICS = Australian Inventory of Chemical Substances ASTM = American Society for Testing and Materials

BEL = Biological exposure limits

BTEX = Benzene, Toluene, Ethylbenzene, Xylenes

CAS = Chemical Abstracts Service

CEFIC = European Chemical Industry Council CLP = Classification Packaging and Labelling

COC = Cleveland Open-Cup

DIN = Deutsches Institut fur Normung DMEL = Derived Minimal Effect Level DNEL = Derived No Effect Level DSL = Canada Domestic Substance List

EC = European Commission

EC50 = Effective Concentration fifty

ECETOC = European Center on Ecotoxicology and Toxicolo-

gy Of Chemicals

ECHA = European Chemicals Agency

EINECS = The European Inventory of Existing Commercial

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Chemical Substances

EL50 = Effective Loading fifty

ENCS = Japanese Existing and New Chemical Substances

Inventory

EWC = European Waste Code

GHS = Globally Harmonised System of Classification and

Labelling of Chemicals

IARC = International Agency for Research on Cancer

IATA = International Air Transport Association

IC50 = Inhibitory Concentration fifty

IL50 = Inhibitory Level fifty

IMDG = International Maritime Dangerous Goods

INV = Chinese Chemicals Inventory

IP346 = Institute of Petroleum test method N° 346 for the determination of polycyclic aromatics DMSO-extractables

KECI = Korea Existing Chemicals Inventory

LC50 = Lethal Concentration fifty

LD50 = Lethal Dose fifty per cent.

LL/EL/IL = Lethal Loading/Effective Loading/Inhibitory loading

LL50 = Lethal Loading fifty

MARPOL = International Convention for the Prevention of

Pollution From Ships

NOEC/NOEL = No Observed Effect Concentration / No Ob-

served Effect Level

OE_HPV = Occupational Exposure - High Production Volume

PBT = Persistent, Bioaccumulative and Toxic

PICCS = Philippine Inventory of Chemicals and Chemical

Substances

PNEC = Predicted No Effect Concentration

REACH = Registration Evaluation And Authorisation Of

Chemicals

RID = Regulations Relating to International Carriage of Dan-

gerous Goods by Rail

SKIN DES = Skin Designation

STEL = Short term exposure limit

TRA = Targeted Risk Assessment

TSCA = US Toxic Substances Control Act

TWA = Time-Weighted Average

vPvB = very Persistent and very Bioaccumulative

A vertical bar (|) in the left margin indicates an amendment from the previous version.

Sources of key data used to : compile the Safety Data

Sheet

The quoted data are from, but not limited to, one or more sources of information (e.g. toxicological data from Shell Health Services, material suppliers' data, CONCAWE, EU

IUCLID date base, EC 1272 regulation, etc).

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The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not

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to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

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