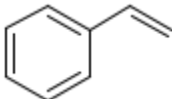


GPS Safety Summary - STYRENE

SUBSTANCE NAME

STYRENE

CHEMICAL IDENTITY

Name:		STYRENE
Chemical		name (IUPAC): STYRENE
CAS number:		100-42-5
EC number:	202-851-5	
Molecular formula:	C ₈ H ₈	

Structure:

USES AND APPLICATIONS

- Styrene is mainly used as a monomer for the manufacture of polymers (such as polystyrene, or certain rubber and latex).
- Styrene may be present in some consumer products (such as resins).



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PHYSICAL/CHEMICAL PROPERTIES

Phys/Chem Safety Assessment

Property	Value
Physical state (at 20°C)	Viscous liquid
Colour	Colourless
Odour	Aromatic
Density (at 20°C)	906 kg/m ³
Melting / boiling point	-30.6°C/145°C
Flammability	H226 - Flammable liquid and vapour
Explosive properties	Explosion limits (% vol) : upper = 6.1 ; lower = 1.1
Self-ignition temperature	490°C
Vapor pressure (at 20°C)	6-7 hPa at 20°C
Mol weight	104.15 g/mol
Water solubility	almost insoluble (320 mg/l at 25° C).
Flash point	31°C (ASTM D 92)
Octanol-water partition coefficient (LogKow) (at 20°C)	3



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HEALTH EFFECTS

Human Health Safety Assessment

Effect Assessment	Result
Acute Toxicity	Inhalation : high levels of exposure may cause headache, drowsiness, nausea, dizziness, respiratory irritation, loss of consciousness
	Skin Contact : In case of contact with skin, cutaneous penetration may induce a toxic effect
Local effect	Irritating to skin : may cause skin irritation and dermatitis due to the defatting properties of the product
	Irritating to eyes : irritation of ocular mucous membrane
Sensitisation	Not regarded as a sensitiser
Toxicity after repeated exposure	Inhalation : repeated exposure to high concentrations exposure may cause hearing loss, damages to central nervous system
Genotoxicity / Mutagenicity	Overall, not genotoxic
Carcinogenicity	Carcinogenic effect in the mouse lung. No carcinogenic effect in rats. No significant carcinogenic potential in humans. Humans are not comparable to mice.
Reproductive toxicity	No toxic effect on fertility (animal) Toxic effects for foetal development not proven at non-toxic concentrations in mothers (animal)
Aspiration hazard	In case of accidental swallowing, due to its low viscosity, the product may be aspirated into the lung and induce a chemical pneumonitis developing over a few hours



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ENVIRONMENTAL EFFECTS

Environment Safety Assessment

Styrene is not acutely toxic to aquatic organisms (such as fish, algae or Daphnia). Styrene is almost insoluble in water and will rapidly evaporate into the atmosphere from surface water. It is considered as readily biodegradable. In the atmosphere, styrene is degraded quickly by photo-oxidation and/or ozone. The potential bioaccumulation of the product in environment is low. The product is not considered to be either persistent and bioaccumulative, nor very persistent and very bioaccumulative.

EXPOSURE

Human health

Consumer : Consumers may be exposed to styrene as a component of certain products (such as resins). Based on model calculations, exposure will be below safe exposure levels as operation conditions and risk management measures recommended into the Safety Data Sheet (SDS) must be applied.

Workers : Styrene is mainly used either in closed process with no likelihood of exposure or in closed continuous process with occasional situations where controlled exposure can occur. Workers may be exposed to styrene during, for example, product transfer operations, product sampling, or maintenance/repair activities. Exposure is minimized as operation conditions and management measures recommended into the SDS must be applied.

Environment

Exposure to the environment may take place during production of styrene, formulation, synthesis of polymer, rubber or resins, and when consumer used products containing styrene. Based on model calculations and specific information from facilities manufacturing and using styrene, styrene does not pose concern for the environment as the risk management measures recommended into the SDS must be applied.



Refining & Chemicals

RISK MANAGEMENT RECOMMENDATIONS

Always handle the product in accordance with good industrial hygiene and safety procedures. Workers must use appropriate Personal protective equipment (PPE) such as gloves, goggles, safety shoes, respiratory protective equipment, etc..., especially, during operations where emission may occur, like product transfer operations, product sampling, or maintenance/repair activities. When using the product, avoid producing or diffusing fumes, vapour or spray into the air, avoid splashes, avoid contact with skin and eyes. As the product may form flammable / explosive vapor-air mixture, all possible sources of ignition must be removed. Do not eat, drink or smoke. If swallowed, rinse mouth with water, and do not induce vomiting. In case of eye or skin contact, rinse immediately with plenty of water, for at least 15 minutes, and get medical advice. Specific risk management measures are reported for each use in the SDS. Observation of Risk Management Measures under Risk management Recommendations ensure that the expected concentrations during these uses are below levels that may produce toxic effects.

STATE AGENCY REVIEW

- This substance has been registered under REACH (EC) 1907/2006.
- This substance has been evaluated under OECD HPV program.

REGULATORY INFORMATION / CLASSIFICATION AND LABELLING

Under GHS substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the eSDS. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use. Substances registered for REACH are classified according CLP (EC) 1272/2008.

Classification of the substance

EC-GHS (CLP) Classification according to the regulation EC 1272/2008 (EC-GHS) and ATP

Flam. Liq. 3

Asp. Tox. 1

Skin Irrit. 2

Eye Irrit. 2

Acute Tox. 4

STOT SE 3

STOT RE 1

Pictogram(s) GHS02, GHS07, GHS08

**H Phrase(s)**

H226 - Flammable liquid and vapor.

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 through prolonged or repeated exposure.

P Phrase(s)

P201 - Obtain special instructions before use.

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

P243 - Take precautionary measures against static discharge.

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

P273 - Avoid release to the environment.

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

P301/310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

P331 - Do NOT induce vomiting.

P303/361/353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P309/311 - IF exposed or if you feel unwell: Call a POISON CENTER or doctor/physician.

P403/235 - Store in a well-ventilated place. Keep cool.

CONCLUSION

- Styrene is mainly used as a monomer for the manufacture of polymers.
- Short high exposure to styrene by inhalation, ingestion, and skin contact may cause toxic effects. Repeated inhalation exposures may cause hearing loss and damages to central nervous system.
- Exposure to humans and the environment is considered low if properly handled.

CONTACT INFORMATION WITHIN COMPANY

For further information on this substance or product safety summaries in general, please contact:
pch.reach@total.com

Or visit the ICCA portal on: <http://www.icca-chem.org/en/Home/ICCA-initiatives/global-product-strategy/>

GLOSSARY

Acute Toxicity	Harmful effect resulting from a single or short term exposure to a substance
Biodegradation	Decomposition or breakdown of a substance under natural conditions (actions of micro organisms etc)
Bioaccumulation	Progressive accumulation in living organisms of a chemical substance present in the environment
Carcinogenicity	Substance effects causing cancer
Genotoxicity	Substance effect that causes damage to genes, including Mutagenicity and clastogenicity
GHS	Global Harmonized System of chemicals classification
Hazard	Inherent substance property bearing a threat to health or environment
Mutagenicity	Substance effect that cause mutation on genes
Persistence	Refers to the length of time a compound stays in the environment, once introduced
Reprotoxicity	Including teratogenicity, embryotoxicity and harmful effects on fertility
Sensitising	Allergenic

DISCLAIMER

The information contained in this paper is intended as basic advice and general information to this designated specific product (substance) only and whilst this information is provided in utmost good faith and has been based on the best information to our belief and to our knowledge currently available, it is to be relied upon at the user's own risk. The information in this paper is not intended to provide medical or medical emergency response information, nor treatment information; all detailed safety and health information is to be found in the Safety Data Sheets (SDS) for the product (substance) concerned and to be consulted before use of this product (substance). The information in this Safety Summary is not replacing the SDS and is not automatically applicable if this product (substance) is used with other products (substances) or in other processes.

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