國喬石油化學股份有限公司
GRAND PACIFIC PETROCHEMICAL CORPORATION

SAFETY DATA SHEET

Product: **Styrene** Page: 1 / 12

Version: 1.1 Date: 1/1/2021

1 IDENTIFICATION OF THE SUBSTANCE/mixture AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Substance name:	styrene monomer
Synonyms:	phenyl ethylene Phenyl ethene Vinyl benzene Ethenyl benzene
Chemical name and formula:	styrene C8H8
Trade name:	styrene
CAS:	100-42-5
EINECS	202-851-5
Molecular Weight:	104.1491
REACH Registration number:	01-2119457861-32-0007

1.2 Relevant identified uses of the substance or mixture and uses advised against

Please check the identified uses in table 1 of the Annex 1 of this SDS.
There are no uses advised against.

1.3 Details of the supplier of the safety data sheet

Name:	Grand Pacific Petrochemical Corp.
Address:	No.4, Hsing-Kung Road, Dashe, Kaohsiung , Taiwan
Phone N°:	886-7-3513911
Fax N°:	886-7-3512038
E-mail of competent person responsible for SDS in the MS or in the EU:	joan-marc.juncosa@swissiesp.com

1.4 Emergency telephone number

European Emergency N°:	112
National centre for Prevention and Treatment of Intoxications N°:	
Emergency telephone at the company	886-7-3513911
Available outside office hours:	☐ Yes

2 HAZARDS IDENTIFICATION

2.1 Classification of the substance

2.1.1 Classification according to Regulation (EC) 1272/2008

H226: Flammable liquid and vapour.

H332: Harmful if inhaled.

H319: Causes serious eye irritation.

H335: May cause respiratory irritation.

H315: Causes skin irritation.

H372: Causes damage to organs through prolonged or repeated exposure (hearing)

H304: May be fatal if swallowed and enters airways.

P210: Flammable liquid and vapour.

P261: Harmful if inhaled

P264: Causes serious eye irritation

P261: May cause respiratory irritation.

P264: Causes skin irritation.

P260: Causes damage to organs through prolonged or repeated exposure (hearing)

P301: May be fatal if swallowed and enters airways.

2.1.2 Classification according to Directive 67/548/EEC

Indication of danger:Xn - harmful

R-phrases: R10 - flammable

R20 - harmful by inhalation

R36/37/38 - irritating to eyes, respiratory system and skin

R48/20 - harmful: danger of serious damage to health by prolonged exposure through inhalation

R65 - harmful: may cause lung damage if swallowed

2.2 Label elements

2.2.1 Labeling according to Regulation (EC) 1272/2008

Signal word: Danger

Hazard pictograms:

GHS02: flame

GHS08: health hazard

Hazard statements:

H226: Flammable liquid and vapour.

H332: Harmful if inhaled.

H319: Causes serious eye irritation.

H335: May cause respiratory irritation.

H315: Causes skin irritation.

H372: Causes damage to organs <or state all organs affected, if known> through prolonged or repeated exposure <state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard>. (hearing)

H304: May be fatal if swallowed and enters airways.

P210: Flammable liquid and vapour.

P261: Harmful if inhaled

P264: Causes serious eye irritation

P261: May cause respiratory irritation.

P264: Causes skin irritation.

P260: Causes damage to organs through prolonged or repeated exposure (hearing)

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2.2.2 Labelling according to (EC) 67/548

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R10 - flammable

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R48/20 - harmful: danger of serious damage to health by prolonged exposure through inhalation

R65 - harmful: may cause lung damage if swallowed

S-phrases:

S23 - do not breathe gas/fumes/vapour/spray (appropriate wording to be specified by the manufacturer) (vapour)

S62 - if swallowed, do not induce vomiting: seek medical advice immediately and show this container or label

2.3 Other hazards

The substance does not meet the criteria for PBT or vPvB substance.
No other hazards identified.

3 COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Composition

Main constituent

Name:	styrene monomer
CAS:	100-42-5
EINECS:	202-851-5

Impurities

No impurities relevant for classification and labelling.

Impurity	Typical concentration	Concentration range	Remarks

2-phenylpropene EC no.: 202-705-0		0.011 — 0.04 % (w/w)	max. 1000 ppm
ethylbenzene EC no.: 202-849-4		0.0068 — 0.3 % (w/w)	max. 3000 ppm
toluene EC no.: 203-625-9		0.0 — 0.0010 % (w/w)	max. 10 ppm
cumene EC no.: 202-704-5		80 — 230 ppm	
benzene EC no.: 200-753-7		0.0 — 0.04 % (w/w)	max. 400 ppm
p-xylene EC no.: 203-396-5	< 120.0 ppm		
m-xylene EC no.: 203-576-3	< 200.0 ppm		
o-xylene EC no.: 202-422-2	< 300.0 ppm		
propylbenzene EC no.: 203-132-9		150.0 — 220.0 ppm	
hydrogen peroxide EC no.: 231-765-0	< 100.0 ppm		
phenylacetylene EC no.: 208-645-1	< 300.0 ppm		
benzaldehyde EC no.: 202-860-4	< 200.0 ppm		
ethyltoluene EC no.: 247-093-6	< 200.0 ppm		

4 FIRST AID MEASURES

4.1 Description of first aid measures

General advice:
Remove contaminated clothing. If danger of loss of consciousness, place patient in recovery position and transport accordingly. Apply artificial respiration if necessary.
If inhaled:Keep patient calm, remove to fresh air, and seek medical attention.
On skin contact:Wash thoroughly with soap and water.
On contact with eyes:Immediately wash affected eyes for at least 15 minutes under running water with eyelids held open, consult an eye specialist.
On ingestion:Keep patient calm, remove to fresh air, seek medical attention.

4.2 Most important symptoms and effects, both acute and delayed

Aspiration into the lungs may cause chemical pneumonitis, which can be fatal. Harmful by inhalation; may cause lung damage. Irritating to skin and eyes. Headache, nausea, dizziness, narcosis.

Target organs: Central nervous system, auditory system, liver, respiratory system.

4.3 Indication of any immediate medical attention and special treatment needed
Follow the advises given in section 4.1

5 FIREFIGHTING MEASURES
5.1 Extinguishing media
5.1.1 Suitable extinguishing media
dry extinguishing media, foam, carbon dioxide

5.2 Special hazards arising from the substance or mixture
Hazardous combustion products may include carbon monoxide and formaldehyde.
Will float and can be reignited on surface water.
The vapour is heavier than air, spreads along the ground and distant ignition is possible.

5.2.1 Unsuitable extinguishing media
Unsuitable extinguishing media for safety reasons: water

5.3 Advice for firefighters
Special protective equipment: Wear self-contained breathing apparatus and chemical-protective clothing.

Further information: Keep containers cool by spraying with water if exposed to fire.

6 ACCIDENTAL RELEASE MEASURES
6.1 Personal precautions, protective equipment and emergency procedures
6.1.1 For non-emergency personnel
Use breathing apparatus if exposed to vapours/aerosol.

Sources of ignition should be kept well clear.
Evacuate the area of all non-essential personnel. Shut off leaks, if possible without personal risk.
Extinguish naked flames. Remove ignition sources. No smoking. Avoid sparks. Take precautionary measures against static discharge.

6.1.2 For emergency responders
Avoid contact with skin, eyes, and clothing. Ventilate contaminated area thoroughly. Do not breathe vapour. Take off immediately all contaminated clothing.

6.2 Environmental precautions
Prevent contamination of soil and water. Prevent from spreading or entering into drains, ditches or rivers by using sand, earth, or other appropriate barriers.

6.3 Methods and material for containment and cleaning up
Methods for cleaning up or taking up:

For small amounts: Pick up with suitable absorbent material. Dispose of absorbed material in accordance with regulations.

For large amounts: Dike spillage. Place into suitable container for disposal.

For residues: Pick up with suitable absorbent material. Dispose of absorbed material in accordance with regulations.

6.4 Reference to other sections
For more information on exposure controls/personal protection or disposal considerations, please check section 8 and 13 of this safety data sheet.

7 HANDLING AND STORAGE

7.1 Precautions for safe handling

7.1.1 Protective measures

Electrostatic discharge may cause fire
Ensure electrical continuity by bonding and grounding (earthing) all equipment.
Do NOT use compressed air for filling, discharging or handling operations
Electrostatic charges may be generated during pumping.
Restrict line velocity during pumping in order to avoid generation of electrostatic discharge.
If positive displacement pumps are used, these must be fitted with a non-integral pressure relief valve
Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks
The vapour is heavier than air, spreads along the ground and distant ignition is possible

7.1.2 Advice on general occupational hygiene

Wear suitable protective clothing and gloves.

7.2 Conditions for safe storage, including any incompatibilities

Storage

Further information on storage conditions: Keep at temperature not exceeding 40 °C.

Storage stability:Storage temperature: < 40 °C

Check frequently to ensure that stabilizer content is adequate.additives: 4-tert-butyl catechol (CAS

Number: 98-29-3) Precautions for safe handling

Unsuitable materials for containers: brass, copper

7.3 Specific end use(s)

Please check the identified uses in table 1 of the Appendix of this SDS.
For more information please see the relevant exposure scenario, available via your supplier/given in the Appendix,and check section 2.1: Control of worker exposure.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

8.1.1 Control parameters for the purpose of the CSA for REACH

DN(M)ELs for workers

Acute - systemic effects,inhalation289 mg/m³
Acute - local effects, inhalation306 mg/m³
Long-term - systemic effects,dermal406 mg/kg bw/day
Long-term - systemic effects, inhalation 85 mg/m³

DN(M)ELs for the general population
Acute - systemic effects, inhalation 174.25 mg/m³
Acute - local effects, inhalation 182.75 mg/m³
Long-term - systemic effects, dermal 343 mg/kg bw/day
Long-term - systemic effects, inhalation 10.2 mg/m³
Long-term - systemic effects, oral 2.1 mg/kg bw/day
Consumer -DNEL long-term inhalation:
The consumer DNEL long-term inhalation route 17 ppm
Humans via environment DNEL long-term inhalation:
effects on colour vision DNEL long-term inhalation via environment 6.0 ppm (25.5 mg/m3)
ototoxicity DNEL long-term inhalation via environment:2.4 ppm(10.2 mg/m3)

PNEC water
PNEC aqua (freshwater): 0.028 mg/L

PNEC aqua (marine water): 0.0028 mg/L

PNEC aqua (intermittent releases): 0.04 mg/L

PNEC sediment

PNEC sediment (freshwater): 0.614 mg/kg sediment dw

PNEC sediment (marine water): 0.0614 mg/kg sediment dw

8.1.2 Control parameters, occupational exposure levels

Country	8hr avg TLV (ppm)	STEL (ppm)
Austria	50	100 (15 min)
Belgium	50	100 (15 min)
Czech Republic	47	234
Denmark	25	25
Finland	20	100 (15 min)
France	50	-
Germany	20	40 (30 min)
Hungary	12	-
Italy	50	100 (15 min)
Luxemburg	20	40 (30 min)
Netherlands	25	50 (15 min)
Norway	25	37.5 (15 min)
Poland	24	72
Spain	50	100 (15 min)
Sweden	20	50 (15 min)
Switzerland	50	100 (4 x 10 min)
United Kingdom	100	250 (10 min)

8.2 Exposure controls

Please check the relevant exposure scenario, given in the Appendix/available via your supplier.

9 PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Property	Results	Discussion
Physical state at 20°C and 1013 hPa	liquid Colour: Colorless to yellowish	
Melting / freezing point	-31° C	Melting point is not relevant because the value is below -20° C.
Boiling point	145° C at 1013 hPa	
Relative density	0.9 - 0.91 at 20° C.	Relative density (d20/4). Result is a range of eighteen values.
Vapour pressure	6.67 hPa at 20° C.	
Surface tension	not applicable	Based on chemical structure, no surface activity is predicted.
Water solubility	320 mg/l at 25° C.	
Partition coefficient n-octanol/water (log value)	log Pow= 2.96 at 25° C	
Flash point	31° C at 1013 hPa	
Flammability	Flammable liquid	flammable Substance is a flammable liquid, GHS-Category 3. (FP: > 23° C and < 60°C). Flammability derived from flash point.

		Based on chemical structure pyrophoric properties and flammability in contact with water are not to be expected.
Explosive properties	non explosive	non explosive There are no chemical groups associated with explosive properties present in the molecule as cited in the ECHA Guidance R7a, Table 7.1 -28).
Self-ignition temperature	490° C at 1013 hPa	
Oxidising properties	no oxidising properties	Oxidising: no Substance is incapable of reacting exothermically with combustible materials.
Granulometry	Not applicable	Substance is marketed or used in a non-solid or granular form.
Stability in organic solvents and identity of relevant degradation products	not applicable	The stability of the substance is not considered as critical.
Dissociation constant	not applicable	The substance does not contain any ionisable structure.
Viscosity	0.696 mPa/s (dynamic) at 25°C	

10 STABILITY AND REACTIVITY

10.1 Reactivity

Reacts violently with strong oxidizing agents.Oxidizes on contact with air.Polymerizes exothermically on exposure to light, heat and most halides. In case of contact with water the inhibitor concentration might decrease and cause polymerization.

10.2 Chemical stability

Check frequently to ensure that stabilizer content is adequate. Additives: 4-tert-butyl catechol (CAS

Number: 98-29-3)

Unsuitable materials for containers: brass, copper

10.3 Possibility of hazardous reactions

Hazardous reactions are not expected during normal storage.

10.4 Conditions to avoid

Heat, flames and sparks.
Exposure to air, exposure to sunlight.

10.5 Incompatible materials

Unsuitable materials for containers: brass, copper
Strong oxidizing agents, halides

10.6 Hazardous decomposition products

Hazardous decomposition products are not expected to form during normal storage

11 TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity :
Oral low toxicity,
Dermal low toxicity LD50: > 2000 mg/kg bw
Inhalation study with 6 human volunteers exposed for 7 hours: NOAEC = 100 ppm; no effects on the central nervous system (CNS) function at this concentration
acute inhalation toxicity: rat, 4 h inhalation: LC50 = 2770 ppm (11.8 mg/l)
Based on the physical-chemical properties of styrene, the substance fulfils the requirements to be classified as Category 1 for aspiration hazard according to GHS-CLP criteria (1272/2008/EC) and as Xn, R65 according to EU-DSD criteria (67/548/EEC).

Irritation / corrosion:
Styrene is not corrosive.
Eye irritation: rabbit: irritating
Skin irritation: rabbit: irritating
Respiratory irritation: human: NOAEC = 216 ppm
Styrene fulfils the requirements to be classified as Category 2 for skin irritation according to GHS-CLP criteria (1272/2008/EC) and as Xi, R38 according to EU-DSD criteria (67/548/EEC).
Styrene fulfils the requirements to be classified as Category 2A for eye irritation according to GHS-CLP criteria (1272/2008/EC) and as Xi, R36 according to EU-DSD criteria (67/548/EEC).
Styrene fulfils the requirements to be classified as STOT single exposure Category 3 for respiratory irritation according to GHS-CLP criteria (1272/2008/EC) and as Xi, R37 according to EU-DSD criteria (67/548/EEC).
Sensitisation
Dermal: not skin sensitizing
Respiratory tract: not respiratory sensitizing

Repeated dose toxicity
- human: effects on colour vision after long-term inhalation: NOAEC = 50 ppm (8-hr TWA)
Inhalation:
- human: ototoxicity after long-term inhalation: NOAEC = 20 ppm
- rat: ototoxicity after long-term inhalation: NOAEC = 500 ppm
- rat: developmental toxicity after long-term inhalation: NOAEC = 500 ppm
Dermal: corrected NOAEL = 615 mg/kg/d,

resulting from route-to-route extrapolation (inhalation to dermal route)
Styrene causes a specific adverse effect on hearing in laboratory animals after long-term exposure. Additionally, there is an indication for styrene-induced hearing losses in humans.
Classification of styrene as Xn, R48 according to EU-criteria (67/548/EE) and as STOT RE Category 1 according to GHS-criteria (1272/2008/EC) is warranted for ototoxic effects.

Mutagenicity
There is no convincing evidence that styrene possesses significant mutagenic/clastogenic potential in vivo from the available data in experimental animals.
Classification for mutagenicity according to EU-criteria (67/548/EEC) and to GHS-criteria (1272/2008/EC) is not warranted for styrene.

Carcinogenicity
There is no convincing evidence that styrene possesses significant carcinogenic potential in humans.
Classification for carcinogenicity according to EU-criteria (67/548/EEC) and to GHS-criteria (1272/2008/EC) is not warranted for styrene.

Toxicity for reproduction
There is no convincing evidence that styrene possesses a significant potential for causing effects on fertility or developmental toxicity in humans.

12 ECOLOGICAL INFORMATION

12.1 Toxicity

12.1.1 Acute/Prolonged toxicity to fish

Short term toxicity to freshwater fish

LC50 for freshwater fish: 4.02 mg/L

12.1.2 Acute/Prolonged toxicity to aquatic invertebrates

Acutely toxic for aquatic invertebrates

EC50/LC50 for freshwater invertebrates: 4.7 mg/L

Long term toxicity for aquatic invertebrates

EC10/LC10 or NOEC for freshwater invertebrates: 1.01 mg/L

12.1.3 Acute/Prolonged toxicity to aquatic plants

Acutely toxic to aquatic algae.

EC50/LC50 for freshwater algae: 4.9 mg/L

12.1.4 Toxicity to sediment organisms

The substance is not persistent in the sediment compartment. The equilibrium partitioning method has been used for assessing the hazard to sediment organisms.

12.1.5 Toxicity to micro-organisms e.g. bacteria

EC50/LC50 for aquatic micro-organisms: 500 mg/L

12.1.6 Chronic toxicity to aquatic organisms

12.1.7 Toxicity to soil dwelling organisms

No data on chronic terrestrial toxicity are available. The substance is not persistent in the soil compartment. The equilibrium partitioning method has been used for assessing the hazard to soil organisms.

12.1.8 Toxicity to terrestrial plants

No data on chronic terrestrial toxicity are available. The substance is not persistent in the soil compartment. The equilibrium partitioning method has been used for assessing the hazard to soil organisms.

12.1.9 General effect

12.2 Persistence and degradability

Hydrolysis: According to structural properties, hydrolysis is not expected

Phototransformation in air: After evaporation or exposure to the air, the product will be rapidly degraded by photochemical processes.

Phototransformation in water: Indirect photolysis is not a relevant degradation process in water in comparison to volatilisation and biotransformation.

Biodegradation in water and in soil: Styrene can be readily degraded in water under aerobic conditions. Rate of microbial mineralisation is rapid also in sewage, mineral soils and organic soils under aerobic conditions. Styrene degrades more slowly in groundwater than in surface waters.

12.3 Bioaccumulative potential
Significant accumulation in organisms is not to be expected

12.4 Mobility in soil
Adsorption to solid soil phase is possible. Koc at 20°C: 352

12.5 Results of PBT and vPvB assessment
Taking into account all available data on biotic and abiotic degradation, bioaccumulation and toxicity it can be stated that styrene does not fulfill the PBT criteria (not PBT) and not the vPvB criteria (not vPvB).

13 DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods
Recover or recyle if possible. Otherwise: incineration

The recommendations given are considered appropriate for safe disposal. However, local regulations may be more stringent and these must be complied with.

14 TRANSPORT INFORMATION

Road/Rail transport ADR/RID

14.1 UN-Number
UN-2055

14.2 UN proper shipping name
STYRENE MONOMER, STABILIZED

14.3 Transport hazard class(es)
Class 3

Classification code F1

14.4 Packing group
III

14.5 Environmental hazards
Non marine pollutant

14.6 Special precautions for user
none

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
Category B (Y)

IBC 3

15 REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance
EC label/EC number : 202-851-5
EC Label name: STYRENE
EC classification : Harmful. Flammable.
EC symbols: (Xn) Harmful.
EC Risk Phrases: (R10) Flammable.
(R20) Harmful by inhalation.
(R36/38) Irritating to eyes and skin.

EC Safety Phrases: (S23) Do not breathe vapour.
TSCA (USA): Listed.
AICS (Australia): Listed.
DSL (Canada): Listed.
EC Annex I number: 601-026-00-0
EINECS (EC): 202-851-5
METI (Japan): 3-4

15.2 Chemical safety assessment
A chemical safety assessment has been carried out for this substance.

16 OTHER INFORMATION
Data are based on our latest knowledge but do not constitute a guarantee for any specific product features and do not establish a legally valid contractual relationship.

Prepared in accordance with Annex II of the REACH regulation EC 1907/2006,

Regulation (EC) 1272/2008 and regulation (EC) 453/2010

16.1 Hazard Statement
Please check section 2 of the present document

16.2 Precautionary Statement
Pleasqe check under section 2 of the present document

16.3 Risk Phrases
Please check under section 2 of the present document

16.4 Safety Phrases
Please check under section 2 of the present document

16.5 Revision
Date of creation 23 November 2010

Disclaimer:

GPPC provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. Furthermore, this safety data sheet is made up based on the legal requirements as set by EC 1907/2006 (REACH) based on information as is available per August 27, 2010. Further information received following the time scale as foreseen by REACH and the guidance policies as described in the REACH Implementation Programs will be added when it becomes available.