



ISO 14001
compliant

Safety Data Sheet

Revision Date: 20-Aug-15

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MSDS003/REV02

1. PRODUCT AND COMPANY IDENTIFICATION

TRADE NAME: NCS MONOMER

MANUFACTURER / SUPPLIERS

NCS Resins Durban Head Office	TEL 031 713 0600 FAX 031 705 9858	9 Pineside Road, New Germany 3610
Aurora Glass Fibre NZ Ltd	TEL +64 9 273-3540 FAX +64 9 273-3565	3/16 Zelanian Drive, East Tamaki, Auckland 2013, New Zealand

EMERGENCY TELEPHONE No.: +64 9 273-3540

2. HAZARDS IDENTIFICATION

Classification: GHS Classification and labelling according to JISZ 7252-2009 and JIS Z 7253-2012 (GHS 2011)

OSHA Regulatory Status

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute toxicity - Dermal	Category 4
Acute toxicity - Inhalation (Vapors)	Category 4
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2A
Carcinogenicity	Sub-category 1B
Specific target organ toxicity (single exposure)	Category 3
Specific target organ toxicity (repeated exposure)	Category 1
Chronic aquatic toxicity	Category 3

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Labeling

Signal word: Danger

Hazard Statements:

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.

H341: Suspected of causing genetic defects.

H351: Suspected of causing cancer.

H360: May damage fertility or the unborn child.

H370: Causes damage to organs (Central nervous system).

H372: Causes damage to organs (Blood system, Liver, Nervous system, respiratory tract/organ) through prolonged or repeated exposure.

H401: Toxic to aquatic life.

Symbols:



Appearance: Clear colourless

Physical State: Liquid

Odour: Pungent

Precautionary Statements – 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.

P243: Take precautionary measures against static discharge.

P260: Do not breathe dust/fume/gas/mist/vapor/spray.

P264: Wash skin thoroughly after handling.

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



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

P273: Avoid release to the environment.

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

Precautionary Statements – Response

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

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

P304 + P340: IF INHALED: Remove person to fresh air and keep 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 + P311: IF exposed or concerned: Call a **POISON CENTER** or doctor/ physician.

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

P321: Specific treatment (see supplemental first aid instructions on this label).

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 + P364: Take off contaminated clothing and wash it before reuse.

P370 + P378: In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

Precautionary Statements – 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.

Precautionary Statements – Disposal

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

P505: Dispose of in accordance with local bylaws and national waste regulations

3. COMPOSITION / INFORMATION ON INGREDIENTS

Synonyms:

Inhibited Styrene
Phenylethylene
Benzene, Ethenyl
Styrol
Cinnamene
Vinylbenzene
Styrolene
Styrene Monomer



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Molecular formula: C₈H₈

Component	CAS No	Weight %
Styrene	100-42-5	100

Chemical Name
Chemical Family

Styrene
Aromatic hydrocarbon

4. FIRST-AID MEASURES

First Aid - Eyes

Immediately flood the eyes with plenty of water for at least 15 minutes, holding the eye open
Obtain medical attention urgently.

First Aid - Skin

Wash skin thoroughly with soap and water. Obtain medical attention if blistering occurs or redness persists.

First Aid - Ingestion

Wash mouth with water. Do not induce vomiting
If any material enters the lungs, for example during swallowing or vomiting, obtain medical attention urgently.

First Aid - Inhalation

Remove from exposure. Keep warm and at rest.
If there is difficulty in breathing, give oxygen. If breathing stops or gives signs of failing, give artificial respiration. If heart beat absent, give external cardiac compression. (CPR)
Obtain medical attention

Most important symptoms and effects, both acute and delayed

Irritating to eyes, respiratory system and skin. Harmful by inhalation, in contact with skin and if swallowed.

Indication of any immediate medical attention and special treatment needed

Notes to Physician:

Treat symptomatically. Keep under medical surveillance for 48 hours if aspiration could have occurred.

5. FIRE - FIGHTING MEASURES

Suitable Extinguishing Media

Carbon dioxide (CO₂), Foam, Dry chemical, Water spray



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Unsuitable Extinguishing Media

Do not use a solid water stream as it may scatter and spread fire.

Specific hazards arising from the chemical

Hazardous combustion products Combustion may produce carbon monoxide, carbon dioxide and irritating or toxic vapors and gases

Combustion/Explosion Hazards Flammable. Vapors may form explosive mixture with air. Flash back possible over considerable distance. This material may polymerize (react) when its container is exposed to heat (as during a fire). This polymerization increases pressure inside a closed container and may result in the violent rupture of the container. Empty containers may retain product residue (liquid and/or vapor). Do not pressurize, cut, weld, braze, solder, drill, grind, or expose these containers to heat, flame, sparks, static electricity, or other sources of ignition as the container may explode and may cause injury or death.

Protective Equipment and Precautions for Firefighters:

Wear self-contained breathing apparatus (SCBA) and full fire-fighting protective clothing. Thoroughly decontaminate all protective equipment after use. Evacuate all persons from the fire area to a safe location. Move non-burning material, as feasible, to a safe location as soon as possible. Fire fighters should be protected from potential explosion hazard while extinguishing the blaze. DO NOT extinguish a fire resulting from the flow of this flammable liquid until the flow of liquid is effectively shut off. This precaution will help prevent the accumulation of an explosive vapor-air mixture after the initial fire is extinguished. Use water spray to cool fire-exposed containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal Precautions Remove all sources of ignition. Evacuate personnel to safe areas. Avoid contact with skin and eyes. Use personal protective equipment as required. Ensure adequate ventilation. Keep people away from and upwind of spill/leak. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.

Other Information All equipment used when handling the product must be grounded.

Environmental Precautions

Environmental Precautions Prevent further leakage or spillage if safe to do so. Do not allow material to contaminate ground water system. Prevent product from entering drains. Soak up with inert absorbent material and dispose of as hazardous waste. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. Take precautionary measures against static discharges.

Methods and material for containment and cleaning up

Methods for Containment Prevent spilled material from 1) contaminating soil, 2) entering sanitary sewers, storm sewers, and drainage systems, and 3) entering bodies of water or ditches that lead to waterways. Prevent spreading over a wide area (e.g. by containment or oil barriers).

Methods for Clean-up Soak up with inert absorbent material. Remove from surface water (e.g. by skimming or siphoning). Dispose of contaminated material as waste according to item 13.



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7. HANDLING AND STORAGE

Precautions for Safe Handling

Handling Do not breathe vapor or mist. Avoid contact with eyes, skin and clothing. Take off contaminated clothing and wash before reuse. Ensure adequate ventilation. Ground and bond containers when transferring material. Use spark-proof tools and explosion-proof equipment. Consult your supplier of promoters and catalysts for additional instructions on proper mixing and usage. Empty containers may retain product residue (liquid and/or vapor). Do not pressurize, cut, weld, braze, solder, drill, grind, or expose these containers to heat, flame, sparks, static electricity, or other sources of ignition as the container may explode and may cause injury or death. Empty drums should be completely drained and properly bunged. Empty drums should be promptly returned to a drum reconditioner or properly disposed. Do not use compressed air for filling, discharging or handling. Wash hands before breaks and immediately after handling the product.

Conditions for safe storage, including any incompatibilities

Storage Keep away from heat and sources of ignition. No smoking. Keep away from direct sunlight. Keep containers tightly closed in a cool, well-ventilated place. To ensure maximum stability and maintain optimum resin properties, resins should be stored in closed containers at temperatures below 77°F (25°C).

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limits:

Components with workplace control parameters

Styrene (CAS #: 100-42-5)

Occupational Health and Safety Act, 1993

Regulations for Hazardous Chemical Substances, 1995 Table 1&2

TWA OEL CL-RL 100 ppm (styrene)
 STEL OEL CL-RL 250 ppm

Legend

- TWA - Time-weighted average
- STEL - Short Term Exposure Limit
- OEL - Occupational Exposure Limit
- CL – Control limit for Hazardous Chemical Substances
- RL – Recommended limit for Hazardous Chemical Substances

Biological exposure index (BEI) for STYRENE

Chemical Determinant	Sampling Time	BEI	Notation
Mandelic acid in urine	End of shift	800mg/g creatinine	Determinant is non-specific
Mandelic acid in urine	Prior to next shift	300mg/g creatinine	Determinant is non-specific
Phenylglyoxylic acid in urine	End of Shift	240mg/g creatinine	Determinant is non-specific; determinant is usually present



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			in a significant amount in biological specimens
Phenylglyoxylic acid in urine	Prior to next shift	100mg/g creatinine	Determinant is non-specific; determinant is usually present in a significant amount in biological specimens
Styrene in venous blood	End of Shift	0.55mg/l	Determinant is an indicator of exposure to the chemical but semi-quantitative (ambiguous interpretation)
Styrene in venous blood	Prior to next shift	0.02mg/l	Determinant is an indicator of exposure to the chemical but semi-quantitative (ambiguous interpretation)

Appropriate engineering controls

Engineering Controls Use general ventilation to maintain airborne concentrations to levels that are below regulatory and recommended occupational exposure limits. Local ventilation may be required during certain operations. Use explosion-proof equipment.

Respiratory protection

If TWA OEL CL level above is exceeded, then suitable respiratory protection must be worn. Up to 500 ppm a chemical cartridge respirator with organic vapour cartridge(s). Above 500 ppm then full face supplied air respirator, or self-contained breathing apparatus should be used. Note that the IDL (immediately dangerous to life or health) concentration of styrene is 700 ppm.

Hand protection

Impervious gloves. Evaluate the resistance of the product under conditions of use.

Eye protection

Wear approved safety glasses or chemical goggles or a face shield. Have an emergency eyewash station readily available in the working area.

Skin & body protection

Impervious gloves, coveralls, boots, and/or other resistant protective clothing. Have a safety shower/ eye wash fountain readily available in the immediate work area.

Personal protection comments

Dust generated by grinding or polishing finished products is regarded as hazardous and precautions should be taken to ensure dust concentrations to be maintained below a TWA OEL value of 10 mg/m³. Where dust concentrations exceed these values, appropriate dust masks should be worn.

Other protective measures

Remove contaminated clothing immediately. Keep contaminated clothing in closed containers. Discard or launder before re-wearing. Inform laundry personnel of contaminated hazards.

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9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
Colour	Clear colourless
ODOUR	Pungent
pH	Not applicable
BOILING POINT/RANGE	145 - 148 °C
FREEZING POINT	-30.6°C
FLASH POINT	31 ° (closed cup)
FLAMMABILITY	1.1 - 6.1 % v/v
AUTO IGNITION TEMPERATURE	490°C
EXPLOSIVE PROPERTIES	LEL 1.1% UEL 6.1%
OXIDISING PROPERTIES	None
VAPOUR PRESSURE	0.60 kPa at 20°C 0.81 kPa at 25°C
DENSITY	0.9 g cm ⁻³
SOLUBILITY - WATER	Practically insoluble 0.03%
VAPOUR DENSITY (Air=1)	4.33

10. STABILITY AND REACTIVITY

STABILITY

Stable under normal storage conditions, below 25°C

CONDITIONS TO AVOID

Heat, sparks, open flames, ignition sources

MATERIALS TO AVOID

Oxidizing agents. Mineral Acids. Alkalis. Phosphorous pentoxide. Peroxides. Ferrous chloride and other metal halides.

HAZARDOUS DECOMPOSITION PRODUCTS

Heating to decomposition may cause the emission of thick irritating and acrid fumes, resulting in zero visibility. Styrene may form styrene oxide as decomposition product.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Primary Routes of Entry Eye contact, Ingestion, Inhalation, Skin Contact, Skin absorption



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Acute toxicity

Styrene

Oral LD50	= 5000 mg/kg (Rat)
Dermal LD50	> 2000 mg/kg (Rat)
Inhalation LC50	= 11.8 mg/l (4 H) (Rat)

Information on toxicological effects

Symptoms Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Eyes	Irritating to eyes.
Skin	Harmful by skin absorption. Contact causes skin irritation. Prolonged skin contact may defat the skin and produce dermatitis.
Inhalation	Harmful by inhalation. May cause irritation of respiratory tract. Inhalation of high vapor concentrations can cause CNS-depression and narcosis.
Ingestion	Harmful if swallowed. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. Aspiration hazard if swallowed - can enter lungs and cause damage. Ingestion is not an anticipated route of exposure for this material in industrial use.
Sensitization	Not sensitizing.
Repeated dose toxicity	In humans, styrene may cause a transient decrease in color discrimination and effects on hearing. Repeated or prolonged exposure may cause skin irritation and dermatitis, due to defatting properties of the product. May cause damage to the liver, eyes, brain, respiratory system, central nervous system through prolonged or repeated exposure if inhaled. May cause damage to the kidneys, liver, eyes, brain, respiratory system, central nervous system through prolonged or repeated exposure if inhaled.
Mutagenic effects	Styrene has given mixed positive and negative results in a number of mutagenicity tests. Styrene was not mutagenic without metabolic activation but gave negative and positive mutagenic results with metabolic activation.
Carcinogenicity	
Styrene	
ACGIH	Group A4 - Not classifiable as a human carcinogen.
IARC	Group 2B - Possibly Carcinogenic to Humans
NTP	Reasonably anticipated to be human carcinogen
Legend	<i>IARC - International Agency for Research on Cancer</i> <i>NTP - National Toxicology Program</i>
Reproductive Toxicity	No information available.
Neurological Effects	No information available.
STOT - single exposure	No information available.
STOT - repeated exposure	No information available.
Target organ(s)	Liver, Central nervous system (CNS), Respiratory system, Kidney.
Aspiration Hazard	No information available.

Numerical measures of toxicity - Product Information



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The following values are calculated based on chapter 3.1 of the GHS document.

ATEmix (oral) 2923 mg/kg

ATEmix (dermal) 1967 mg/kg

ATEmix (inhalation-vapor) 11.4 mg/L

12. ECOLOGICAL INFORMATION

Toxicity to fish

Styrene:

LC50: 4.02 mg/l

Exposure time: 96 h

Species: Pimephales promelas (fathead minnow)

flow-through test Test substance: yes

Toxic to fish.

Toxicity to daphnia and other aquatic invertebrates

Styrene:

EC50: 4.7 mg/l

Exposure time: 48 h

Species: Daphnia magna (Water flea)

flow-through test

Toxicity to algae

Styrene:

EC50: 4.9 mg/l

Exposure time: 72 h

Species: Selenastrum capricornutum (algae)

Toxicity to bacteria

Styrene:

EC10: 0.28 mg/l

Exposure time: 96 h

Growth rate

Species: Skeletonema costatum (Marine Algae)

Test substance: yes

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)

Styrene:

NOEC: 1.01 mg/l

Exposure time: 21 d

Species: Daphnia magna (Water flea)

semi-static test

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Test substance: yes
Method: OECD Test Guideline 211

Elimination information (persistence and degradability)

Bioaccumulation

Styrene: Does not significantly accumulate in organisms.

Biodegradability: According to the results of tests of biodegradability this product is considered as being readily biodegradable.

Ecotoxicology Assessment

Acute aquatic toxicity

Styrene: Toxic to aquatic life.

Chronic aquatic toxicity

Styrene: Harmful to aquatic life with long lasting effects.

Toxicity Data on Soil

Styrene: No data available

Other organisms relevant to the environment

Styrene: No data available

Impact on Sewage Treatment

Styrene: No data available

Results of PBT assessment

Styrene: This substance is not considered to be very persistent nor very bioaccumulating (vPvB)., This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).

Additional ecological

Information: An environmental hazard cannot be excluded in the event of unprofessional handling or disposal., Toxic to aquatic life., Harmful to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal Considerations Hazardous waste. Can be incinerated, when in compliance with local regulations.

Contaminated packaging Empty containers should be taken for local recycling, recovery or waste disposal.



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14. TRANSPORT INFORMATION

NOT TO BE SENT BY MAIL

TARIFF No.	2902.50
UN No.	2055
Substance Identity No. S.I.N. SANS 10232-3	2055
Emergency Action Code EAC SANS 10232-3	27
SANS 10228:2006 S.I.N.	2055
SANS 10228:2006 Technical Name	Styrene
SANS 10228:2006 Class	3
SANS 10228:2006 Danger Group	111
SANS 10228:2006 Subsidiary Risks	Nil
SANS 10228:2006 Packaging Methods SABS 0229	13.3
IMDG - SHIPPING NAME	Styrene monomer, inhibited
IMDG - CODE	PAGE 3381
IMDG - CLASS	Class 3.3
IMDG - PACKAGING GROUP	111
IMDG - MARINE POLLUTANT	Yes
IMDG - EMS No.	3-07
IMDG - MFAG TABLE No.	310
IATA - SHIPPING NAME	Styrene monomer, inhibited
IATA _ CLASS	Class 3
IATA - SUBSIDIARY RISK(S)	None
IATA - PACKAGING GROUP	111
IATA- PACKAGING INSTRUCTION Passenger	309
IATA - PACKAGING INSTRUCTION Cargo	310
TREMCARD No. TEC(R)	101

15. REGULATORY INFORMATION

EEC HAZARD CLASSIFICATION Flammable. Harmful. Irritant. [R10; Xn; Xi] (Styrene)

RISK PHRASES Flammable. Harmful by inhalation. Irritating to eyes and skin.
[R: 10, 20, 36/38]

SAFETY PHRASES Do not breathe vapour. [S: 23]

NATIONAL LEGISLATION South African Hazardous Substance Act 15 of 1973
South African Occupational Health & Safety Act (85 of 1993)

16. OTHER INFORMATION



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Ref: Chevron Phillips Chemical Company
Occupational Health and Safety Act, 1993
Hazardous Chemical Substances Regulations, 1995

MSDS on STYRENE

Version 1.3

Prepared By: L Maistry in accordance with GHS requirements

Phone Number: 031 7130600

Revision Date: 23 July 2015

Revision Summary: 02

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