

STYRENE

1. IDENTIFICATION

GHS product identifier : Styrene
Chemical name : styrene
Other means of identification : benzene, vinyl-; cinnamene; cinnamol; diarex hf 77; ethylene, phenyl-; nci-c02200; phenethylene; phenethene; phenylethylene; stirol (italian); styreen (dutch); styren (czech); styrol (german); styrole; styrolene; styron; styropol; styropor; vinylbenzen (czech); vinylbenzene; vinylbenzol; styrene monomer
Product type : Liquid

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

Identified uses

Manufacture of substance
Manufacture of substance, Continuous Polymerization. (HIPS, GPPS)
Suspension of Polymerisation (bulk and batch)
Production of Polymers, Polymerisation (bulk and batch)
Production of polymers, Copolymers.
Manufacture of resins
Manufacture of substance (FRP), Industrial
Manufacture of substance (FRP), Professional
Production of polymers, Butadiene rubber
Production of polymers, Butadiene latex rubber
Production of polymers, (Isoprene) Copolymers
Production of polymers, Other Polymeric. Dispersion
Production of polymers, Polyol processes
liquid Resin, (Consumer use)
Resin paste, (Consumer use)

Supplier/ Exporter

RAR Resin & Chemical Industries JLT
11th Floor, Jumeirah Lake Towers, P.O. Box: 47381,
Dubai UAE
Tel: +971 4 4356516 / +971 4 4356517
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Website: www.rarresin.com

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2. HAZARDS IDENTIFICATION

Classification of the substances or mixture

: FLAMMABLE LIQUID- Category 3
ACUTE TOXICITY: INHALATION- Category 4
SKIN CORROSION/ IRRITATION- Category 2
SERIOUS EYE DAMAGE/ EYE TOXICITY (SINGLE EXPOSURE)
[Respiratory tract irritation] - category 3
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE):
INHALATION- Category 1
ASPIRATION HAZARD- Category 1

GHS label elements

Hazard pictograms:



Danger

: Signal word

Hazard statements

: Flammable liquid and vapor.
Harmful if inhaled
Causes skin Irritation
Causes serious eye irritation
May be fatal if swallowed and enters airways
May cause respiratory irritation
Causes damage to organs through prolonged or repeated exposure if inhaled.

Precautionary statements

Prevention

: Wear protective gloves: > 8 hours (breakthrough time) : Viton® (> 0.7 mm) ; 4-8 hours (breakthrough time): polyvinyl alcohol (PVA). Wear eye or face protection: Recommended: safety glasses with side- shields. Keep away from heat, sparks, open flames and hot surfaces. No smoking. Use explosion- proof electrical, ventilating, lighting and all material- handling equipment. Do not breathe vapor.

Response

: IF INHALED: remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF SWALLOWED: Immediately call a POISON CENTER or physician
Do NOT induce vomiting.
IF ON SKIN (or hair) : Take off immediately all contaminated clothing. Rinse skin with water or shower.

Storage

: Keep cool

Disposal

: Not applicable

Other hazards which do not result in classification

: not available

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3. COMPOSITION/ INFORMATION ON INGREDIENTS

Substance/ mixture : Substance
Chemical name : styrene
Other means of identification : benzene, vinyl-; cinnamene; cinnamenol; cinnamol; diarex hf 77; ethylene, phenyl-; nci-c02200, phenethylene; phenylethylene; stirolò (Italian); styreen (dutch); styren (czech); styrol (german); styrole; styrolene; styropol; styropor; vinylbenzen (czech); vinylbenzene; vinylbenzol; styrene monomer

CAS number/ other identifiers

CAS number : 100-42-5
EC number : 202-851-5

| CAS number | % | Ingredient name |
|------------|--------|-----------------|
| 100-42-5 | > 99.5 | Styrene |

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this selection.

Occupational exposure limits, if available, are listed in Section 8.

4. FIRST AID MEASURES

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim from fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus.
If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink.

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Stop if the exposed person feels sick as vomiting may be dangerous. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt, or waistband.

Maintain important symptoms/ effects, acute and delayed

Potential acute health effects

| | |
|---------------------|---|
| Eye contact | : Causes serious eye irritation |
| Inhalation | : harmful if inhaled. may cause respiratory irritation. |
| Skin contact | : Causes skin irritation |
| Ingestion | : May be fatal if swallowed and enters airways. Irritating to mouth, throat and stomach |

Over-exposure signs/ symptoms

| | |
|---------------------|---|
| Eye contact | : Adverse symptoms may include the following - pain or irritation - watering - redness |
| Inhalation | : Adverse symptoms may include the following - respiratory tract irritation - coughing |
| Skin contact | : Advers symptoms may include the following - irritation - redness |
| Ingestion | : Adverse symptoms may include the following - nausea or vomiting |

Indication of immediate medical attention and special treatment needed, if necessary

| | |
|-------------------------------------|---|
| Notes to physician | : treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled. |
| Specific treatment | : no specific treatment |
| Protection for first- aiders | : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self- contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. |

See toxicological Information (Section 11)

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5. FIRE-FIGHTING MEASURES

Extinguishing media

| | |
|--|---|
| Suitable extinguishing media | : Use dry chemical, CO ₂ , water spray (fog) or foam. |
| Unsuitable extinguishing media | : Do not use water jet. |
| Specific hazards arising from the chemical | : Flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/ gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard. |
| Hazardous thermal decomposition products | : Decomposition products may include the following materials - carbon dioxide - carbon monoxide |
| Special protective actions for fire-fighter | : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. |
| Special protective equipment for fire- fighters | : Fire- fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated pressure mode. |

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipemnt and emergency procedures

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|-------------------------------------|---|
| For non- emergency personnel | : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipement. |
| For emergency responders | : Id specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in “ For non-emergency personnel” |
| Environmental precautions | : Avoid dispersal of spilled material and run off and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air.) |

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Methods and materials for containment and cleaning up

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|--------------------|--|
| Small spill | : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water- soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal contractor. |
| Large spill | : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non- combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Use spark- proof tools and explosion- proof equipment. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. note: See section 1 for emergency contact information and section 13 for waste disposal. |

7. HANDLING AND STORAGE

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|--------------------------------------|---|
| Precautions for safe handling | : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Do not breathe vapor or mist. Do not swallow. Avoid contact with eyes, skin, and clothing. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion- proof electrical (ventilating, lighting and material handling) equipment. Use only non- sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container. |
|--------------------------------------|---|

| | |
|--|---|
| Conditions for safe storage including any incompatibilities | : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well- ventilated area, away from incompatible materials (see section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. |
|--|---|

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Control parameters Occupational exposure limits

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Ingredient name**Exposure limits****Styrene**

ACGIH TLV (United States, 2/2010)
Absorbed through skin.
STEL: 170 mg/ m³ 15 minute(s)
STEL: 40 ppm 15 minute(s)
TWA: 85 mg/m³ 8 hour(s)
TWAS: 20 ppm 8 hour(s)

Recommended monitoring procedures

: If this product contain ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/ or the necessity to use respiratory protective equipment.

Appropriate engineering controls

: Use only with adequate ventilation. use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below statutory limits. The engineering controls also need to keep gas any recommended or, vapor or dust concentrations below any lower explosive limits.
use explosion- proof ventilation equipment.

Environmental exposure controls

: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures**Hygiene measures**

: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Washing contaminated clothing before reusing. Ensure that eyewash stations and safety are close to the workstation location.

Hand protection

: Safety eye wear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. Recommended: safety glasses with side-shields.

Skin protection**Hand protection**

: Chemical- resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. >8 hours (breakthrough time) : Viton® (> 0.7 mm) 4-8 hours (breakthrough time): polyvinyl alcohol (PVA)

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| | |
|--------------------------------|---|
| Body protection | : Personal protective equipment for the body should be based on the task being performed and the risks involved and should be approved by a specialist before handling this product. |
| Other skin protection | : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this/ product. |
| Rerspiratory protection | : Use a properly fitted, air-purifying respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: organic vapor filter (type A) |

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

| | |
|---|---|
| Physical state | : Liquid |
| Color | : Colorless to light yellow |
| Odor | : Characteristic. Sweetish |
| Odor threshold | : 0.05 to 0.08 ppm |
| pH | : Not available |
| Melting point/ freezing point | : -31 °C (-23.8 °F) |
| Boiling Point | : 145 °C (293 °F) |
| Flash point | : Closed cup: 31 °C (87.8 °F) [Closed cup] |
| Burning time | : Not applicable |
| Burning rate | : Not applicable |
| Evaporation rate | : 0.536 (butyl acetate = 1) |
| Flammability (solid,gas) | : Not available |
| Lower and upper explosive (flammable) limits | : Lower: 1.1 % : Upper :6.1 % |
| Vapor pressure | : 0.67 kPa (5 mm Hg) [20 °C] |
| Vapor density | : 3.6 [Air =1] |
| Relative density | : 0.906 |
| Solubility | : Soluble in the following materials: methanol and acetone. Very slight soluble in the following materials: cold water |
| Partition coefficient: n-octanol/ water | : Not available |
| Auto-ignition temperature | : 490 °C (914 °F) |
| Decomposition temperature | : Not available |
| SADT | : Not available |
| Viscosity | : Dynami: 0.696 mPa.s (0.696 cP) |

10. STABILITY AND REACTIVITY

| | |
|---|--|
| Reactivity | : No specific test data related to reactivity available for this product or its ingredients. |
| Chemical stability | : The product is stable. |
| Possibility of hazardous reactions | : Under normal conditions of storage and use, hazardous reactions will not occur. |

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| | |
|---|--|
| Conditions to avoid | : Avoid all possible sources of ignition (spark or flame). : Do not pressurize, cut , weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas. |
| Incompatible materials | : reactive or incompatible with the following materials: oxidizing materials. |
| Hazardous decomposition products | : Under normal conditions of storage and use, hazardous decomposition products should not be produced. |

Information on toxicological effects

Acute toxicity

| Product/ Ingredient name | Exposure | Dose | Species | Result |
|--------------------------|-------------------|-------------|-----------------------|-------------|
| Styrene | 4 hours 11.8 mg/l | Rat | LC50 Inhalation Vapor | |
| | - | >2000 mg/kg | Rat | LD50 Dermal |
| | - | 5000 mg/kg | Rat | LD50 Oral |

Irritation/ Corrosion

| | |
|-------------|----------------------|
| Skin | : Irritating to skin |
| Eyes | : irritating to eyes |

Sensitization : Not available

Conclusion/ Summary

| | |
|--------------------|---------------------------|
| Skin | : Non- sensitizer to skin |
| Respiratory | : Non- sensitizer |

Mutagenicity : Not available

Carcinogenicity : Not available

Reproductive toxicity : Not available

Teratogenicity : Not available

Specific target organ toxicity(single exposure) : Not available

Specific target organ toxicity (repeated exposure) : Not available

Aspiration hazard : Not available

Information on the likely routes of exposure : Not available

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Potential acute health effects

| | |
|---------------------|--|
| Eye contact | : Causes serious eye irritation |
| Inhalation | : Harmful if inhaled. May cause respiratory irritation. |
| Skin contact | : Causes skin irritation |
| Ingestion | : may be fatal if swallowed and enter airways. Irritating to mouth, throat and stomach |

Symptoms related to the physical, chemical and toxicological characteristics

| | |
|--------------------|---|
| Eye contact | : Adverse symptoms may include the following: <ul style="list-style-type: none">- pain or irritation- watering- redness |
| Inhalation | : Adverse symptoms may include the following: <ul style="list-style-type: none">- respiratory tract irritation- coughing |
| Skin | : Adverse symptoms may include the following: <ul style="list-style-type: none">- irritation- redness |
| Ingestion | : Adverse symptoms may include the following: <ul style="list-style-type: none">- nausea or vomiting |

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

Short term exposure

| | |
|------------------------------------|-----------------|
| Potential immediate effects | : Not available |
| Potential delayed effects | : Not available |

Long term exposure

| | |
|------------------------------------|-----------------|
| Potential immediate effects | : Not available |
| Potential delayed effects | : Not available |

Potential chronic health effects

| Product/ ingredient name | Exposure | Dose | Species | Result |
|--------------------------|--|-----------|-----------|--------------------------------|
| Styrene | 4 weeks; 6 hours per day 5 workdays/ week. | 2.13 mg/l | Rat Vapor | Chronic NOAEL inhalation |
| | 13 weeks: 6 hours per day 5 workdays/ week | 2.13 mg/l | Rat | Chronic NOAEL inhalation Vapor |

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| | |
|------------------------------|--|
| General | : Causes damage to organs through prolonged or repeated exposure if inhaled. |
| Carcinogenicity | : No known significant effects or critical hazards. |
| Mutagenicity | : No known significant effects or critical hazards. |
| Teratogenicity | : No known significant effects or critical hazards. |
| Developmental effects | : No known significant effects or critical hazards. |
| Fertility effects | : No known significant effects or critical hazards. |

Numerical measures of toxicity

Acute toxicity estimates

not available.

12. ECOLOGICAL INFORMATION

| Product/ ingredient name | Exposure | Species | Result |
|--------------------------|----------|----------------------------------|------------------------------------|
| Styrene | 72 hours | Algae- selenastrum capricornutum | Acute EC50 4.9 mg/l Fresh water |
| | 48 hours | Daphnia magna Acute | EC50 4.7 mg/l Fresh water |
| | 96 hours | Crustaceans- hyalella azteca | Acute LC50 9.5 mg/l Fresh water |
| | 96 hours | Fish- Pimephales promelas | Acute LC50 4.02 mg/l Fresh water |
| | 96 hours | Fish- pimephales promelas | Acute LC50 10mg/l/ Fresh water |
| | 21 hours | Daphnia- daphnia magna | Chronic NOEC 1.01 mg/l fresh water |
| | 96 hours | Fish- Pimephales promelas | Chronic NOEC 4000 ug/L fresh water |

Persistence and degradability

| Product/ ingredient name | Inoculum | Dose | Result | Test |
|--------------------------|------------------|------------------|-----------------------|--------------|
| Styrene | - | - | 68%- readily- 10 days | ISO DIS 9408 |
| Product/ ingredient name | Biodegradability | Photolysis | Aquatic half-life | |
| Styrene | Readily | 50%; 031 day (s) | - | |

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Bioaccumulative potential

| Product/Ingredient name | Potential | BCF | LogPow |
|-------------------------|-----------|-----|--------|
| Styrene | low | 74 | 2.96 |

Mobility in Soil




Soil/water partition coefficient (Koc) : 352

Other Adverse effects : No known significant effects or critical hazards.

13. DISPOSAL CONSIDERATIONS

Disposal methods : the generation of waste should be avoided or minimized wherever possible. Significant quantities of waste products residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

14. TRANSPORT INFORMATION

| | IATA | IMDG | UN |
|----------------------------|---|---|---|
| UN number | UN2055 | UN2055 | UN2055 |
| UN proper Shipping name | Styrene monomer, stabilize | STYRENE MONOMER STABILIZED | |
| Transport hazard class(es) |  |  |  |
| Packing group | III | III | III |
| Environmental hazards | No | No | No |

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| | IATA | IMDG | UN |
|---|---|------------------------------------|---------------|
| Special precautions for user | Not available | Not available | Not available |
| Additional Information | passenger and cargo Aircraft Quantity limitation: 60 L Packaging instructions: 355 Cargo Aircraft Only Quantity Limitation: 220 L Packaging instructions: 366 Limited Quantities- Passenger Aircraft Quantity limitation: 10 L Packaging instructions: Y344 | Emergency schedules (Ems) F-E, S-D | |
| Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code | | : Not available | |

15. REGULATORY INFORMATION

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|--|--|
| Safety, health and environmental regulations specific for the product | : No known specific national and/ or regional regulations applicable to this product (including its ingredients) |
|--|--|

16. OTHER INFORMATION

History

1-6-2012

1-6-2012

: **Date of printing**

: **Date of issue / Date of revision**

No previous validation.

1

ADN / ADNR = European Provisions concerning the International Carriage of Dangerous Goods by Inland Waterway

ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road

ATE = Acute Toxicity Estimate

BCF = Bioconcentration Factor

GHS = Globally Harmonized System of Classification and Labelling of Chemicals

IATA = International Air Transport Association

IBC = Intermediate Bulk Container

IMDG = International Maritime Dangerous Goods

LogPow = logarithm of the octanol / water partition coefficient

MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)

RID = The Regulations concerning the International Carriage of Dangerous Goods by Rail

UN = United Nations

Not available.

: **Date of previous issue**

: **Version**

: **Key to abbreviation**

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