

EVIC 774A POLYESTER PRIMER PART A

Chemwatch Material Safety Data Sheet
Issue Date: 20-Nov-2008
NA317TC

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Section 2 - HAZARDS IDENTIFICATION

POISONS SCHEDULE

S5

RISK

- » Highly flammable.
- » Harmful by inhalation and if swallowed.
- » Irritating to eyes and skin.
- » Limited evidence of a carcinogenic effect.
- » HARMFUL- May cause lung damage if swallowed.

SAFETY

- » Keep away from sources of ignition. No smoking.
- » Do not breathe gas/fumes/vapour/spray.
- » Use only in well ventilated areas.
- » Keep container in a well ventilated place.
- » Avoid exposure - obtain special instructions before use.
- » Do not empty into drains.
- » To clean the floor and all objects contaminated by this material use water and detergent.
- » Keep container tightly closed.
- » Keep away from food drink and animal feeding stuffs.
- » In case of contact with eyes rinse with plenty of water and contact Doctor or Poisons Information Centre.
- » If swallowed IMMEDIATELY contact Doctor or Poisons Information Centre. (show this container or label).
- » This material and its container must be disposed of as hazardous waste.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
polyester resin		30-60
styrene	100-42-5	10-30
alkyl ester		0-10
other ingredients determined not to be hazardous		0-60

Section 4 - FIRST AID MEASURES

SWALLOWED

- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Seek medical advice.
- Avoid giving milk or oils.
- Avoid giving alcohol.
- If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.

EYE

- » If this product comes in contact with the eyes:
 - Wash out immediately with fresh running water.
 - Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
 - If pain persists or recurs seek medical attention.
 - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

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Section 4 - FIRST AID MEASURES

SKIN

» If skin contact occurs:

- Immediately remove all contaminated clothing, including footwear.
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.

NOTES TO PHYSICIAN

» for poisons (where specific treatment regime is absent):

BASIC TREATMENT

- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- Administer oxygen by non-rebreather mask at 10 to 15 L/min.
- Monitor and treat, where necessary, for pulmonary oedema .
- Monitor and treat, where necessary, for shock.
- Anticipate seizures .
- DO NOT use emetics. Where ingestion is suspected rinse mouth and give up to 200 ml water (5 ml/kg recommended) for dilution where patient is able to swallow, has a strong gag reflex and does not drool.

ADVANCED TREATMENT

- Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- Positive-pressure ventilation using a bag-valve mask might be of use.
- Monitor and treat, where necessary, for arrhythmias.
- Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.
- Drug therapy should be considered for pulmonary oedema.
- Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications.
- Treat seizures with diazepam.
- Proparacaine hydrochloride should be used to assist eye irrigation.

BRONSTEIN, A.C. and CURRANCE, P.L.

EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994.

Any material aspirated during vomiting may produce lung injury. Therefore emesis should not be induced mechanically or pharmacologically. Mechanical means should be used if it is considered necessary to evacuate the stomach contents; these include gastric lavage after endotracheal intubation. If spontaneous vomiting has occurred after ingestion, the patient should be monitored for difficult breathing, as adverse effects of aspiration into the lungs may be delayed up to 48 hours.

For acute or short term repeated exposures to styrene:

INHALATION:

- Severe exposures should have cardiac monitoring to detect arrhythmia.
- Catecholamines, especially epinephrine (adrenaline) should be used cautiously (if at all).
- Aminophylline and inhaled beta-two selective bronchodilators (e.g. salbutamol) are the drugs of choice for treatment of bronchospasm.

INGESTION:

- Ipecac syrup should be given for ingestions exceeding 3ml (styrene)/kg.

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- For patients at risk of aspiration because of obtundation, intubation should precede lavage.
- Pneumonitis is a significant risk. Watch the patient closely in an upright (alert patient) or left lateral head-down position (obtunded patient) to reduce aspiration potential. [Ellenhorn and Barceloux: Medical Toxicology]

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker who has been exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
1. Mandelic acid in urine	800 mg/gm creatinine	End of shift	NS
2. Phenylglyoxylic acid in urine	300 mg/gm creatinine	Prior to next shift	NS
	240 mg/gm creatinine	End of shift	NS
3. Styrene in venous blood	100 mg/gm creatinine	Prior to next shift	SQ
	0.55 mg/L	End of shift	
	0.02 mg/L	Prior to next shift	SQ

NS: Non-specific determinant; also seen after exposure to other materials.

SQ: Semi-quantitative determinant - Interpretation may be ambiguous; should be used as a screening test or confirmatory test.

B: Background levels occur in specimens collected from subjects NOT exposed.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Consider evacuation (or protect in place).
- Fight fire from a safe distance, with adequate cover.
- If safe, switch off electrical equipment until vapour fire hazard removed.
- Use water delivered as a fine spray to control the fire and cool adjacent area.
- Avoid spraying water onto liquid pools.
- Do not approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.

FIRE/EXPLOSION HAZARD

- Liquid and vapour are highly flammable.
- Severe fire hazard when exposed to heat, flame and/or oxidisers.
- Vapour may travel a considerable distance to source of ignition.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- On combustion, may emit toxic fumes of carbon monoxide (CO).

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Section 5 - FIRE FIGHTING MEASURES

Combustion products include: carbon dioxide (CO₂), other pyrolysis products typical of burning organic material. Contains low boiling substance: Closed containers may rupture due to pressure buildup under fire conditions.

FIRE INCOMPATIBILITY

• Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result.

HAZCHEM: None

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS

- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid breathing vapours and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb small quantities with vermiculite or other absorbent material.
- Wipe up.
- Collect residues in a flammable waste container.

MAJOR SPILLS

» Chemical Class: aromatic hydrocarbons

For release onto land: recommended sorbents listed in order of priority.

SORBENT TYPE	RANK	APPLICATION	COLLECTION	LIMITATIONS
LAND SPILL - SMALL				
Feathers - pillow	1	throw	pitchfork	DGC, RT
cross- linked polymer - particulate	2	shovel	shovel	R, W, SS
cross- linked polymer- pillow	2	throw	pitchfork	R, DGC, RT
sorbent clay - particulate	3	shovel	shovel	R, I, P,
treated clay/ treated natural organic - particulate	3	shovel	shovel	R, I
wood fibre - pillow	4	throw	pitchfork	R, P, DGC, RT
LAND SPILL - MEDIUM				
cross- linked polymer - particulate	1	blower	skiploader	R, W, SS
treated clay/ treated natural organic - particulate	2	blower	skiploader	R, I
sorbent clay - particulate	3	blower	skiploader	R, I, P
polypropylene -	3	blower	skiploader	W, SS, DGC

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Section 6 - ACCIDENTAL RELEASE MEASURES

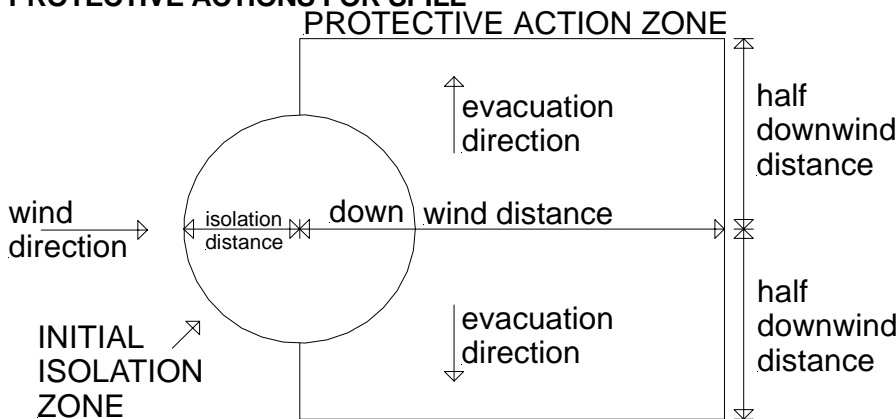
particulate				
feathers - pillow	3	throw	skiploader	DGC, RT
expanded mineral -	4	blower	skiploader	R, I, W, P, DGC
particulate				

Legend
 DGC: Not effective where ground cover is dense
 R; Not reusable
 I: Not incinerable

P: Effectiveness reduced when rainy
 RT: Not effective where terrain is rugged
 SS: Not for use within environmentally sensitive sites
 W: Effectiveness reduced when windy
 Reference: Sorbents for Liquid Hazardous Substance Cleanup and Control;
 R.W Melvold et al: Pollution Technology Review No. 150: Noyes Data Corporation 1988.

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Consider evacuation (or protect in place).
- No smoking, naked lights or ignition sources.
- Increase ventilation.
- Stop leak if safe to do so.
- Water spray or fog may be used to disperse /absorb vapour.
- Contain spill with sand, earth or vermiculite.
- Use only spark-free shovels and explosion proof equipment.
- Collect recoverable product into labelled containers for recycling.
- Absorb remaining product with sand, earth or vermiculite.
- Collect solid residues and seal in labelled drums for disposal.
- Wash area and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise emergency services.

PROTECTIVE ACTIONS FOR SPILL



From IERG (Canada/Australia)

Isolation Distance	25 metres
Downwind Protection Distance	300 metres
IERG Number	14

FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.

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- 2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.
- 3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.
- 4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills".
LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.
- 5 Guide 128 is taken from the US DOT emergency response guide book.
- 6 IERG information is derived from CANUTEC - Transport Canada.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:

styrene 1000ppm

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:

styrene 250ppm

other than mild, transient adverse effects without perceiving a clearly defined odour is:

styrene 50ppm

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

Very Toxic (T+)	>= 0.1%	Toxic (T)	>= 3.0%
R50	>= 0.25%	Corrosive (C)	>= 5.0%
R51	>= 2.5%		
else	>= 10%		

where percentage is percentage of ingredient found in the mixture

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Containers, even those that have been emptied, may contain explosive vapours.
- Do NOT cut, drill, grind, weld or perform similar operations on or near containers.

Contains low boiling substance:

Storage in sealed containers may result in pressure buildup causing violent rupture of containers not rated appropriately.

- Check for bulging containers.
- Vent periodically
- Always release caps or seals slowly to ensure slow dissipation of vapours.
- DO NOT USE brass or copper containers / stirrers.
- DO NOT allow clothing wet with material to stay in contact with skin.
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.

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Section 7 - HANDLING AND STORAGE

- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- Avoid smoking, naked lights, heat or ignition sources.
- When handling, DO NOT eat, drink or smoke.
- Vapour may ignite on pumping or pouring due to static electricity.
- DO NOT use plastic buckets.
- Earth and secure metal containers when dispensing or pouring product.
- Use spark-free tools when handling.
- Avoid contact with incompatible materials.
- Keep containers securely sealed.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.

SUITABLE CONTAINER

- Packing as supplied by manufacturer.
- Plastic containers may only be used if approved for flammable liquid.
- Check that containers are clearly labelled and free from leaks.
- For low viscosity materials (i) : Drums and jerry cans must be of the non-removable head type. (ii) : Where a can is to be used as an inner package, the can must have a screwed enclosure.
- For materials with a viscosity of at least 2680 cSt. (23 deg. C)
- For manufactured product having a viscosity of at least 250 cSt. (23 deg. C)
- Manufactured product that requires stirring before use and having a viscosity of at least 20 cSt (25 deg. C)
- (i) : Removable head packaging;
- (ii) : Cans with friction closures and
- (iii) : low pressure tubes and cartridges may be used.
- Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages
- In addition, where inner packagings are glass and contain liquids of packing group I there must be sufficient inert absorbent to absorb any spillage, unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.

STORAGE INCOMPATIBILITY

» WARNING:

May decompose violently or explosively on contact with other substances.

- This substance is one of the relatively few compounds which are described as "endothermic" i.e. heat is absorbed into the compound, rather than released from it, during its formation.
- The majority of endothermic compounds are thermodynamically unstable and may decompose explosively under various circumstances of initiation.
- Many but not all endothermic compounds have been involved in decompositions, reactions and explosions and, in general, compounds with significantly positive values of standard heats of formation, may be considered suspect on stability grounds.

BRETHERRICK L.: Handbook of Reactive Chemical Hazards.

- Contamination with polymerisation catalysts - peroxides, persulfates, oxidising agents - also strong acids, strong alkalis, will cause polymerisation with exotherm - generation of heat.
- Polymerisation of large quantities may be violent - even explosive.
- Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous.
- Vigorous reactions, sometimes amounting to explosions, can result from the contact between aromatic rings and strong oxidising agents.
- Aromatics can react exothermically with bases and with diazo compounds.

Styrene:

- requires inhibition with adequate levels of substituted phenol (such as tert-butylcatechol to prevent polymerisation - material that has had inhibitor removed, e.g. is uninhibited, must be refrigerated and used within 24 hours, i.e. not stored; contact with alkali solutions or glycols will remove inhibitor and render material unstable on storage

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- polymerisation may cause container to explode
- polymerisation may be caused by elevated temperatures (above 66 deg C.), butyl lithium, peroxides, UV light, or sunlight
- reacts violently with chlorosulfonic acid, strong oxidisers, sulfuric acid, xenon tetrafluoride
- is incompatible with acids, rust, catalysts for vinyl polymerisation, 2,5-dimethyl-2,5-di(tert-butylperoxy)hexane, peroxides, metals salts (e.g., aluminium chloride, copper chlorate, manganese nitrate, etc.)
- corrodes copper and its alloys
- attacks some plastics, rubber or coatings
- flow or agitation may generate electrostatic charges due to low conductivity
- uninhibited monomer vapour may block vents and confined spaces by forming solid polymer.

STORAGE REQUIREMENTS

- Storage requires stabilising inhibitor content and dissolved oxygen content to be monitored. Refer to manufacturer's recommended levels.
- DO NOT overfill containers so as to maintain free head space above product.
- Blanketing or sparging with nitrogen or oxygen free gas will deactivate stabiliser. Inhibitor level should be regularly checked to maintain stability.
- Store in original containers in approved flame-proof area.
- No smoking, naked lights, heat or ignition sources.
- DO NOT store in pits, depressions, basements or areas where vapours may be trapped.
- Keep containers securely sealed.
- Store away from incompatible materials in a cool, dry well ventilated area.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	STEL mg/m ³
Australia Exposure Standards	styrene (Styrene, monomer)	50	213	100	426

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m ³)	Revised IDLH Value (ppm)
styrene		700

MATERIAL DATA

» for styrene:

Odour Threshold: 0.017 to 1.9 with a geometric average threshold of 0.32 ppm.

NOTE: Detector tubes measuring styrene at greater than 10 ppm are available.

The recommended TLV-TWA and STEL is based on the influence of styrene exposure on the central and peripheral nervous systems. At the TWA, total daily styrene exposure to the standard 70 kg medium-frame man who inhales 10 m³ and who retains 70% of the inspired compound is 21 mg/kg with 0.5 mg/kg absorbed through the skin. The total absorbed dose can be increased six-fold with physical work and increased respiration rate.

Measurement of styrene and its metabolites in the urine can be an indication of recent exposure though this approach may be limited by factors such as the influence of alcohol consumption on styrene pharmacokinetics. Exposure at or below the TLV-TWA is thought to protect the worker against the significant risks of narcosis, neuropathies and irritation although other findings suggest that neuro-optical effects are significant amongst workers exposed at 4 ppm.

Odour Safety Factor(OSF)

OSF=63 (STYRENE).

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

INGREDIENT DATA

STYRENE:

» for styrene:

Odour Threshold: 0.017 to 1.9 with a geometric average threshold of 0.32 ppm.

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Odour Safety Factor(OSF)

OSF=63 (STYRENE).

Established occupational exposure limits frequently do not take into consideration reproductive end points that are clearly below the thresholds for other toxic effects. Occupational reproductive guidelines (ORGs) have been suggested as an additional standard. These have been established after a literature search for reproductive no-observed-adverse effect-level (NOAEL) and the lowest-observed-adverse-effect-level (LOAEL). In addition the US EPA's procedures for risk assessment for hazard identification and dose-response assessment as applied by NIOSH were used in the creation of such limits. Uncertainty factors (UFs) have also been incorporated.

These exposure guidelines have been derived from a screening level of risk assessment and should not be construed as unequivocally safe limits. ORGs represent an 8-hour time-weighted average unless specified otherwise.

CR = Cancer Risk/10000; UF = Uncertainty factor:

TLV believed to be adequate to protect reproductive health:

LOD: Limit of detection

Toxic endpoints have also been identified as:

D = Developmental; R = Reproductive; TC = Transplacental carcinogen

Jankovic J., Drake F.: A Screening Method for Occupational Reproductive

American Industrial Hygiene Association Journal 57: 641-649 (1996).

PERSONAL PROTECTION

EYE

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

HANDS/FEET

- Wear chemical protective gloves, eg. PVC.
 - Wear safety footwear or safety gumboots, eg. Rubber.
- Suitability and durability of glove type is dependent on usage. Factors such as:
- frequency and duration of contact,
 - chemical resistance of glove material,
 - glove thickness and
 - dexterity,
- are important in the selection of gloves.

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OTHER

- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- Ensure there is ready access to a safety shower.
- Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.

RESPIRATOR

» Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half- face Respirator	Full- Face Respirator
1000	10	A- AUS	-
1000	50	-	A- AUS
5000	50	Airline *	-
5000	100	-	A- 2
10000	100	-	A- 3
	100+		Airline**

* - Continuous Flow

** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

» For flammable liquids and flammable gases, local exhaust ventilation or a process enclosure ventilation system may be required. Ventilation equipment should be explosion-resistant.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapours, degreasing etc., evaporating from tank (in still air).	0.25- 0.5 m/s (50- 100 f/min.)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5- 1 m/s (100- 200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1- 2.5 m/s (200- 500 f/min.)

Within each range the appropriate value depends on:

Lower end of the range

- 1: Room air currents minimal or favourable to capture
- 2: Contaminants of low toxicity or of nuisance value only.
- 3: Intermittent, low production.
- 4: Large hood or large air mass in motion

Upper end of the range

- 1: Disturbing room air currents
- 2: Contaminants of high toxicity
- 3: High production, heavy use
- 4: Small hood- local control only

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Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min.) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

White viscous flammable liquid with a strong solvent odour; not miscible with water.

PHYSICAL PROPERTIES

Liquid.

Does not mix with water.

Sinks in water.

Molecular Weight: Not applicable.

Melting Range (°C): Not available.

Solubility in water (g/L): Immiscible

pH (1% solution): Not applicable

Volatile Component (%vol): 30 approx

Relative Vapour Density (air=1): Not available

Lower Explosive Limit (%): 2.2

Autoignition Temp (°C): Not available.

State: Liquid

Boiling Range (°C): 80 ap prox.

Specific Gravity (water =1): 1.4 approx.

pH (as supplied): Not applicable

Vapour Pressure (kPa): 10 @ 20 degC

Evaporation Rate: Not available

Flash Point (°C): < 10

Upper Explosive Limit (%): 11.5

Decomposition Temp (°C): Not Available

Viscosity: Not Available

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

» Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.

Swallowing of the liquid may cause aspiration of vomit into the lungs with the risk of haemorrhaging, pulmonary oedema, progressing to chemical pneumonitis; serious consequences may result.

Signs and symptoms of chemical (aspiration) pneumonitis may include coughing, gasping, choking, burning of the mouth, difficult breathing, and bluish coloured skin (cyanosis).

Styrene is absorbed into the body following oral or inhalation exposure. Complete absorption occurred in fasted rats given a total of 3.147 mg styrene by gavage in an aqueous solution. A peak blood level of 6 micrograms/mL was reached within minutes. Following oral administration of 20 mg/kg of radiolabeled styrene to rats, the highest organ

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levels were found in the kidney, liver, and pancreas.

Styrene is presumed to be metabolised to styrene oxide which is then converted to styrene glycol. Styrene glycol is metabolised to either mandelic acid or to benzoic acid and then hippuric acid. Mandelic acid is also metabolized to phenylglyoxylic acid. Minor metabolic pathways include the conjugation of styrene oxide with glutathione and the formation of vinyl phenol.

Following an oral dose of 50 mg/kg radiolabeled styrene to rats, 95% of the label was recovered in the urine, 1% in expired air, and 4% in the feces over 72-hours.

EYE

» Evidence exists, or practical experience predicts, that the material may cause severe eye irritation in a substantial number of individuals and/or may produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals. Eye contact may cause significant inflammation with pain. Corneal injury may occur; permanent impairment of vision may result unless treatment is prompt and adequate. Repeated or prolonged exposure to irritants may cause inflammation characterised by a temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur.

SKIN

» The material may accentuate any pre-existing dermatitis condition.

Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.

Open cuts, abraded or irritated skin should not be exposed to this material.

Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

Dermal absorption of styrene has been shown to be significantly less than absorption by the respiratory tract.

The material produces moderate skin irritation; evidence exists, or practical experience predicts, that the material either

- produces moderate inflammation of the skin in a substantial number of individuals following direct contact, and/or
- produces significant, but moderate, inflammation when applied to the healthy intact skin of animals (for up to four hours), such inflammation being present twenty-four hours or more after the end of the exposure period.

Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis.

INHALED

» Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be harmful.

Limited evidence or practical experience suggests that the material may produce irritation of the respiratory system, in a significant number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however,

produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs.

Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system.

Central nervous system (CNS) depression is seen at styrene exposures exceeding 50 ppm, whilst headache, fatigue, nausea and dizziness are reported consistently at exposures of 100 ppm.

Eye and throat irritation occurred in human volunteers exposed to 376 ppm styrene for 1 hour and was accompanied by increased nasal secretion at exposures of 800 ppm for 4 hours. At the end of an 8-hour workshift, workers exposed to 212 ppm styrene had higher urinary levels of alanine-aminopeptidase and N-acetyl-glucosaminidase than unexposed workers, indicating potential renal effects of styrene .

Evidence exists that 5% to 10% reductions in sensory nerve conduction occur at 100 ppm and that slowed reaction times occur after exposure to 50 ppm. Exposure at 370 ppm produces unpleasant subjective symptoms and signs of neurological impairment. High vapour concentrations may have a toxic and anaesthetic effect which may lead to unconsciousness or death. Exposure at 1000 ppm can rapidly lead to unconsciousness whilst exposure to 10000 ppm may cause death in less than one hour. Simple reaction times were increased and coordination decreased amongst volunteers inhaling 350 ppm (via mouth tube) for 30 minutes. Controlled inhalation studies with 300 ppm (via mouth

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tube) for one hour found reduced ocular tracking abilities but no changes in balance or coordination. In humans exposed to styrene vapor, pulmonary retention is approximately 66% of the administered concentration. Following inhalation exposure, styrene is preferentially distributed to adipose tissue. Fat levels in rats were 10-times greater than levels in observed organs after exposure to 50-2000 ppm for 5 hours.

Urinary excretion is the major route of elimination of styrene. In humans, the main urinary metabolites are mandelic acid and phenylglyoxylic acid; rats also excrete hippuric acid and glucuronide. Human volunteers exposed by inhalation to 50 to 200 parts per million (ppm) showed biphasic urinary elimination of mandelic acid with a half-life for the first phase of 4 hours and for the second phase of 25 hours. Urinary metabolite concentrations have been correlated with exposure concentrations in humans.

If exposure to highly concentrated vapour atmosphere is prolonged this may lead to narcosis, unconsciousness, even coma and unless resuscitated - death.

The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing.

Before starting consider control of exposure by mechanical ventilation.

Acute effects from inhalation of high vapour concentrations may be chest and nasal irritation with coughing, sneezing, headache and even nausea.

CHRONIC HEALTH EFFECTS

» On the basis, primarily, of animal experiments, concern has been expressed that the material may produce carcinogenic or mutagenic effects; in respect of the available information, however, there presently exists inadequate data for making a satisfactory assessment.

Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative effects involving organs or biochemical systems.

There is some evidence that human exposure to the material may result in developmental toxicity. This evidence is based on animal studies where effects have been observed in the absence of marked maternal toxicity, or at around the same dose levels as other toxic effects but which are not secondary non-specific consequences of the other toxic effects.

Exposure to styrene may aggravate central nervous system disorders, chronic respiratory disease, skin disease, kidney disease and liver disease.

Workers engaged in the manufacture of styrene polymers with exposure to generally <1 ppm for 1-36 years had low erythrocyte counts and altered liver enzyme profiles. Blood and liver effects do not appear to be of concern for human exposures to styrene. Occupational studies in humans show styrene to be a neurotoxicant.

Occupational styrene exposure causes central and peripheral nervous system effects. It causes a reversible decrease in colour discrimination and in some studies effects on hearing have been reported.

Neuro-optic pathways have been shown to be particularly vulnerable to organic solvent exposure and studies support the proposition that styrene exposure can induce dose-dependent colour vision loss. In the fibre-glass reinforced plastics industry, visual colour impairment was detected where exposure was above 4 ppm. Campagna D. et al, *Neurotoxicology*, 17(2), pp 367-374, 1996

Studies of effects of styrene on the haematopoietic and immune systems, liver and kidney, in exposed workers, do not reveal consistent changes. Central nervous system effects of styrene in rats, guinea pigs and rabbits, have been reported. Styrene exposure causes liver and lung toxicity in mice and nasal toxicity in rats and mice.

Chromosomal abnormalities (micronuclei, chromosome gaps or breaks, nuclear bridges and unscheduled DNA synthesis in peripheral lymphocytes) have been recorded in workers exposed to styrene. Such aberrations however are not always apparent in epidemiological studies and the status of styrene as a DNA effector is equivocal.

Death due to cancers among workers exposed to styrene is statistically unremarkable.

The dominant first metabolite of styrene is styrene-7,8-epoxide which binds covalently to DNA and shows activity in various in-vitro and in-vivo assays for genetic effects where it induces dose-related responses of chromosomal damage at low concentrations. Styrene-7,8-oxide is detected in the blood of workers exposed to styrene. Adducts in haemoglobin and DNA, DNA single-strand breaks/alkali-labile sites as well as significant increases in the frequency of chromosomal damage have been found in workers exposed to styrene in the reinforced plastics industry.

In humans there is little evidence for an association between workplace exposure to styrene and spontaneous abortions, malformations or decreased male fecundity.

Spontaneous abortions amongst female worker, exposed to styrene, has been reported in some studies. This finding has not been substantiated in other studies. Increased congenital malformations, embryonic foetal deaths or reduced birth weights have also been reported but simultaneous exposure to other substances makes the link to styrene conjectural. In rats, there is some evidence for reduced sperm count and peripubertal animals may be more sensitive than adult animals. Styrene crosses the placenta in rats and mice. It increases prenatal death at doses levels causing decreased maternal weight gain. Decreased pup weight, postnatal developmental delays as well as

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neurobehavioral and neurochemical abnormalities have been reported in rats exposed to styrene during pre- or postnatal development. The potential for developmental toxicity appears to be much higher for styrene-7,8-oxide, a metabolite.

Rats given weekly doses of styrene by gavage at 500 mg/kg for 102 weeks showed liver, kidney, and stomach lesions; no effects were seen in mice. Reduced weight gain and increased liver and kidney weights occurred in rats receiving 285 or 475 mg/kg/day for 185 days but no effects at 95 mg/kg/day. Male and female rats were given 0, 1000, or 2000 mg/kg and male and female mice were given 0, 150, or 300 mg/kg by gavage for 78 weeks. Reduced body weight occurred in both treated male rat groups, high-dose female rats, and both treated female mouse groups. In another study, male and female mice were treated weekly with 1350 mg/kg. At 20 weeks, mortality was 50% and 20% for males and females, respectively accompanied by liver necrosis, splenic hypoplasia, and lung congestion. Male and female mice were exposed to 0, 62.5, 125, 250, or 500 ppm styrene for 6 hours/day, 5 days/week for 13 weeks. In both sexes the liver to body weight ratio was increased at the two highest doses; histopathology of the respiratory tract revealed metaplasia and degeneration of the olfactory epithelium of the nasal cavity at the lowest dose, necrosis at higher concentrations, and bronchiolar regeneration at all concentrations. Male and female rats exposed to 0, 125, 500, 1000, or 1500 ppm on the same schedule had increased liver to body weight ratios at the three highest levels in males and the two highest levels in females; degeneration of the olfactory epithelium occurred in both sexes at around 1000 ppm. Pathological changes were observed in the respiratory mucosa of rats following exposure to 1000 ppm 4 hours/day, 5 days/week for 3 weeks

Chromosomal abnormalities (micronucleii, chromosome gaps or breaks, nuclear bridges and unscheduled DNA synthesis in peripheral lymphocytes) have been recorded in workers exposed to styrene. Such aberrations however are not always apparent in epidemiological studies and the status of styrene as a DNA effector is equivocal.

Death due to cancers among workers exposed to styrene is statistically unremarkable.

The dominant first metabolite of styrene is styrene-7,8-epoxide which binds covalently to DNA and shows activity in various in-vitro and in-vivo assays for genetic effects where it induces dose-related responses of chromosomal damage at low concentrations. Styrene-7,8-oxide is detected in the blood of workers exposed to styrene. Adducts in haemoglobin and DNA, DNA single-strand breaks/ alkali-labile sites as well as significant increases in the frequency of chromosomal damage have been found in workers exposed to styrene in the reinforced plastics industry.

TOXICITY AND IRRITATION

» Not available. Refer to individual constituents.

STYRENE:

» unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY

Oral (Rat) LD50: 2650 mg/kg

Intraperitoneal (Rat) LD50: 898 mg/kg

Oral (Mouse) LD50: 316 mg/kg

Inhalation (Mouse) LC50: 9500 mg/m³/4h

Intraperitoneal (Mouse) LD50: 660 mg/kg

Intravenous (Mouse) LD50: 90 mg/kg

Inhalation (Rabbit) LC: 4000 ppm/4h

Inhalation (Rat) LC50: 24000 mg/m³/4h

Inhalation (Human) LCLo: 10000 ppm/30 m

» The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling the epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.

WARNING: This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.

IRRITATION

Skin (rabbit): 500 mg - Mild

Eye (rabbit): 100 mg/24h - Moderate

Skin (rabbit): 500 mg - Mild

Eye (rabbit): 100 mg/24h - Moderate

CARCINOGEN

styrene

International Agency for Research on Cancer
(IARC) Carcinogens

Group

2B

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Section 12 - ECOLOGICAL INFORMATION

This material and its container must be disposed of as hazardous waste.

Section 13 - DISPOSAL CONSIDERATIONS

- Containers may still present a chemical hazard/ danger when empty.
- Return to supplier for reuse/ recycling if possible.

Otherwise:

- If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.

- Where possible retain label warnings and MSDS and observe all notices pertaining to the product.

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction,
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: Burial in a licenced land-fill or Incineration in a licenced apparatus (after admixture with suitable combustible material).
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

Section 14 - TRANSPORTATION INFORMATION

Labels Required: FLAMMABLE LIQUID
HAZCHEM: 3[Y]E (ADG6)

UNDG:

Dangerous Goods Class:	3	Subrisk:	None
UN Number:	1263	Packing Group:	II
Shipping Name: PAINT RELATED MATERIAL (including paint thinning or reducing compound)			

Air Transport IATA:

ICAO/IATA Class:	3	ICAO/IATA Subrisk:	None
UN/ID Number:	1263	Packing Group:	II
Special provisions:	A3 A72		
Shipping name: PAINT RELATED MATERIAL			

Maritime Transport IMDG:

IMDG Class:	3	IMDG Subrisk:	None
UN Number:	1263	Packing Group:	II
EMS Number:	F- E, S- E	Special provisions:	163 944
Limited Quantities:	5 L	Marine Pollutant:	Not Determined

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Section 14 - TRANSPORTATION INFORMATION

Shipping Name: PAINT (including paint, lacquer, enamel, stain, shellac solutions, varnish, polish, liquid filler and liquid lacquer base) or PAINT RELATED MATERIAL (including paint thinning or reducing compound)

Section 15 - REGULATORY INFORMATION

POISONS SCHEDULE: S5

REGULATIONS

Evic 774A Polyester Primer Part A (CAS: None):

No regulations applicable

styrene (CAS: 100-42-5) is found on the following regulatory lists;

Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (Domestic water supply - organic compounds)

Australia - Australian Capital Territory Environment Protection Regulation Pollutants entering waterways - Domestic water quality

Australia Dangerous Goods Code (ADG Code) - Goods Too Dangerous To Be Transported

Australia Exposure Standards

Australia Hazardous Substances

Australia High Volume Industrial Chemical List (HVICL)

Australia Inventory of Chemical Substances (AICS)

Australia National Pollutant Inventory

Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix E (Part 2)

Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix F (Part 3)

Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 5

GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships

IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk

IMO Provisional Categorization of Liquid Substances - List 1: Pure or technically pure products

International Agency for Research on Cancer (IARC) Carcinogens

International Air Transport Association (IATA) Dangerous Goods Regulations

International Air Transport Association (IATA) Dangerous Goods Regulations - Prohibited List

OECD Representative List of High Production Volume (HPV) Chemicals

WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water

Section 16 - OTHER INFORMATION

REPRODUCTIVE HEALTH GUIDELINES

» Established occupational exposure limits frequently do not take into consideration reproductive end points that are clearly below the thresholds for other toxic effects. Occupational reproductive guidelines (ORGs) have been suggested as an additional standard. These have been established after a literature search for reproductive no-observed-adverse effect-level (NOAEL) and the lowest-observed-adverse-effect-level (LOAEL). In addition the US EPA's procedures for risk assessment for hazard identification and dose-response assessment as applied by NIOSH were used in the creation of such limits. Uncertainty factors (UFs) have also been incorporated.

Ingredient	ORG	UF	Endpoint	CR	Adeq TLV
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styrene	85 mg/m3	NAD	0.3	-	
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» These exposure guidelines have been derived from a screening level of risk assessment and should not be construed as unequivocally safe limits. ORGs represent an 8-hour time-weighted average unless specified otherwise.

CR = Cancer Risk/10000; UF = Uncertainty factor:

TLV believed to be adequate to protect reproductive health:

LOD: Limit of detection

Toxic endpoints have also been identified as:

D = Developmental; R = Reproductive; TC = Transplacental carcinogen

Jankovic J., Drake F.: A Screening Method for Occupational Reproductive

American Industrial Hygiene Association Journal 57: 641-649 (1996).

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Section 16 - OTHER INFORMATION

MSDS SECTION CHANGES

The following table displays the version number of and date on which each section was last changed.

Section Name Date	Version	Date	Section Name	Version	Date	Section Name	Version
First Aid 20- Nov- 2008 (inhaled)	5	20- Nov- 2008	Storage (storage requirement)	5	20- Nov- 2008	Acute Health (swallowed)	5
Fire Fighter (fire 20- Nov- 2008 fighting)	5	20- Nov- 2008	Exposure Standard	5	20- Nov- 2008	Chronic Health	5
Fire Fighter 20- Nov- 2008 (fire/explosion hazard)	5	20- Nov- 2008	Acute Health (inhaled)	5	20- Nov- 2008	Environmental	5
Spills (major) 20- Nov- 2008	5	20- Nov- 2008	Acute Health (skin)	5	20- Nov- 2008	Disposal	5
Storage (storage incompatibility)	5	20- Nov- 2008					

» Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references. A list of reference resources used to assist the committee may be found at: www.chemwatch.net/references.

» The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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