

Safety Data Sheet

Hazardous, Dangerous Goods

1. MATERIAL AND SUPPLY COMPANY IDENTIFICATION

Product name: **Vulkem 360**

Recommended use: Waterproofing membrane. Use according to manufacturer's directions.

Supplier: Tremco CPG Australia Pty Ltd
ABN: 25 000 024 064
Street Address: 12/4 Southridge Street
Eastern Creek NSW 2766
Telephone: 02 9638 2755
Facsimile: 02 9638 2955

Emergency Telephone number: **02 9037 2994**

2. HAZARDS IDENTIFICATION

This material is hazardous according to the criteria of Safe Work Australia GHS 7.



Signal Word
Danger

Hazard Classifications

Acute Toxicity - Oral - Category 4
Acute Toxicity - Inhalation - Category 2
Skin Corrosion/Irritation - Category 2
Eye Damage/Irritation - Category 1
Sensitisation - Respiratory - Category 1
Sensitisation - Skin - Category 1
Germ Cell Mutagenicity - Category 2
Carcinogenicity - Category 1A
Specific Target Organ Toxicity (Repeated Exposure) - Category 2
Acute Hazard to the Aquatic Environment - Category 2

Hazard Statements

H302 Harmful if swallowed.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H318 Causes serious eye damage.
H330 Fatal if inhaled.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H341 Suspected of causing genetic defects .
H350 May cause cancer .
H373 May cause damage to organs through prolonged or repeated exposure.
H401 Toxic to aquatic life.

Prevention Precautionary Statements

P102 Keep out of reach of children.
P103 Read carefully and follow all instructions.
P202 Do not handle until all safety precautions have been read and understood.

Safety Data Sheet



- P260 Do not breathe dust, fume, gas, mist, vapours or spray.
- P264 Wash hands, face and all exposed skin thoroughly after handling.
- P270 Do not eat, drink or smoke when using this product.
- P271 Use only outdoors or in a well-ventilated area.
- P272 Contaminated work clothing should not be allowed out of the workplace.
- P273 Avoid release to the environment.
- P280 Wear protective gloves/protective clothing including eye/face protection.
- P284 In case of inadequate ventilation wear respiratory protection.

Response Precautionary Statements

- P101 If medical advice is needed, have product container or label at hand.
- P301+P312 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.
- P302+P352 IF ON SKIN: Wash with plenty of water and soap.
- P304+P341 IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position 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.
- P310 Immediately call a POISON CENTER/doctor/insert appropriate source of emergency medical advice.
- P320 Specific treatment is urgent (see on product label).
- P330 Rinse mouth.
- P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
- P342+P311 If experiencing respiratory symptoms: Call a POISON CENTRE or doctor/physician.
- P362+P364 Take off contaminated clothing and wash it before reuse

Storage Precautionary Statements

- P403+P233 Store in a well-ventilated place. Keep container tightly closed.
- P405 Store locked up.

Disposal Precautionary Statement

- P501 Dispose of contents/container in accordance with local, regional, national and international regulations.

Poison Schedule:

DANGEROUS GOOD CLASSIFICATION

Classified as Dangerous Goods by the criteria of the "Australian Code for the Transport of Dangerous Goods by Road & Rail" and the "New Zealand NZS5433: Transport of Dangerous Goods on Land".

Dangerous Goods Class: 6.1

3. COMPOSITION INFORMATION

CHEMICAL ENTITY	CAS NO	PROPORTION
Limestone	1317-65-3	30-60 %
MDI, propoxylated	9048-57-1	30-60 %
Naphtha, petroleum, hydrotreated heavy diisononyl phthalate	64742-48-9	10-30 %
MDI-glycerol, propoxylated. ethoxylated	68515-48-0	10-30 %
Titanium oxide (TiO ₂)	59675-67-1	5-10 %
Calcium oxide	13463-67-7	1-5 %
4, 4' - diphenylmethane diisocyanate (MDI)	1305-78-8	0-5 %
Silane	101-68-8	0-5 %
toluene-2,6-diisocyanate	7803-62-5	0-5 %
Ingredients determined to be Non-Hazardous	91-08-7	0-5 %
		Balance
		100%

4. FIRST AID MEASURES

If poisoning occurs, contact a doctor or Poisons Information Centre (Phone Australia 131 126, New Zealand 0800 764 766).

Inhalation: • 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, without delay. Following uptake by inhalation, move person to an area free from risk of further exposure. Oxygen or artificial respiration should be administered as needed. Asthmatic-type symptoms may develop and may be immediate or delayed up to several hours. Treatment is essentially symptomatic. A physician should be consulted.

Skin Contact: 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.

Eye contact: If this product comes in contact with the eyes: • Immediately hold eyelids apart and flush the eye continuously with 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. • Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes. • Transport to hospital or doctor without delay. • Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Ingestion: 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.

PPE for First Aiders: Wear rubber boots, overalls, gloves, respirator. Use with adequate ventilation. If inhalation risk exists wear organic vapour/particulate respirator meeting the requirements of AS/NZS 1715 and AS/NZS 1716. Available information suggests that gloves made from nitrile rubber, polyvinyl alcohol (PVA), teflon should be suitable for intermittent contact. However, due to variations in glove construction and local conditions, the user should make a final assessment. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using.

Notes to physician: Treat symptomatically. Effects may be delayed. Can cause corneal burns. Indication of any immediate medical attention and special treatment needed. 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. Treat symptomatically. For petroleum distillates: • In case of ingestion, gastric lavage with activated charcoal can be used promptly to prevent absorption - decontamination (induced emesis or lavage) is controversial and should be considered on the merits of each individual case; of course the usual precautions of an endotracheal tube should be considered prior to lavage, to prevent aspiration. • Individuals intoxicated by petroleum distillates should be hospitalized immediately, with acute and continuing attention to neurologic and cardiopulmonary function. • Positive pressure ventilation may be necessary. • Acute central nervous system signs and symptoms may result from large ingestions of aspiration-induced hypoxia. • After the initial episode, individuals should be followed for changes in blood variables and the delayed appearance of pulmonary oedema and chemical pneumonitis. Such patients should be followed for several days or weeks for delayed effects, including bone marrow toxicity, hepatic and renal impairment. Individuals with chronic pulmonary disease will be more seriously impaired, and recovery from inhalation exposure may be complicated. • Gastrointestinal symptoms are usually minor and pathological changes of the liver and kidneys are reported to be uncommon in acute intoxications. • Chlorinated and non-chlorinated hydrocarbons may sensitize the heart to epinephrine and other circulating catecholamines so that arrhythmias may occur. Careful consideration of this potential adverse effect should precede administration of epinephrine or other cardiac stimulants and the selection of bronchodilators. BP America Product Safety & Toxicology Department For sub-chronic and chronic exposures to isocyanates: • This material may be a potent pulmonary sensitiser which causes bronchospasm even in patients without prior airway hyperreactivity. • Clinical symptoms of exposure involve mucosal irritation of respiratory and gastrointestinal tracts. • Conjunctival irritation,

Safety Data Sheet



skin inflammation (erythema, pain vesiculation) and gastrointestinal disturbances occur soon after exposure. • Pulmonary symptoms include cough, burning, substernal pain and dyspnoea. Some cross-sensitivity occurs between different isocyanates. • Noncardiogenic pulmonary oedema and bronchospasm are the most serious consequences of exposure. Markedly symptomatic patients should receive oxygen, ventilatory support and an intravenous line. • Treatment for asthma includes inhaled sympathomimetics (epinephrine [adrenalin], terbutaline) and steroids. • Activated charcoal (1 g/kg) and a cathartic (sorbitol, magnesium citrate) may be useful for ingestion. • Mydriatics, systemic analgesics and topical antibiotics (Sulamyd) may be used for corneal abrasions. • There is no effective therapy for sensitised workers. [Ellenhorn and Barceloux; Medical Toxicology]NOTE: Isocyanates cause airway restriction in naive individuals with the degree of response dependant on the concentration and duration of exposure. They induce smooth muscle contraction which leads to bronchoconstrictive episodes. Acute changes in lung function, such as decreased FEV₁, may not represent sensitivity. [Karol & Jin, Frontiers in Molecular Toxicology, pp 56-61, 1992] Personnel who work with isocyanates, isocyanate prepolymers or polyisocyanates should have a pre-placement medical examination and periodic examinations thereafter, including a pulmonary function test. Anyone with a medical history of chronic respiratory disease, asthmatic or bronchial attacks, indications of allergic responses, recurrent eczema or sensitisation conditions of the skin should not handle or work with isocyanates. Anyone who develops chronic respiratory distress when working with isocyanates should be removed from exposure and examined by a physician. Further exposure must be avoided if a sensitivity to isocyanates or polyisocyanates has developed.

5. FIRE FIGHTING MEASURES

Hazchem Code: 2X

Suitable extinguishing media: If material is involved in a fire use water fog (or if unavailable fine water spray), alcohol resistant foam, standard foam, dry agent (carbon dioxide, dry chemical powder).

Specific hazards: Combustible material.

Fire fighting further advice: On burning or decomposing may emit toxic fumes. Fire fighters to wear self-contained breathing apparatus and suitable protective clothing if risk of exposure to vapour or products of combustion or decomposition.

6. ACCIDENTAL RELEASE MEASURES

SMALL SPILLS

Environmental hazard - contain spillage. • Remove all ignition sources. • Clean up all spills immediately. • Avoid breathing vapours and contact with skin and eyes. • Control personal contact with the substance, by using protective equipment. • Contain and absorb spill with sand, earth, inert material or vermiculite. • Wipe up. • Place in a suitable, labelled container for waste disposal.

LARGE SPILLS

Environmental hazard - contain spillage. • Liquid Isocyanates and high isocyanate vapour concentrations will penetrate seals on self contained breathing apparatus - SCBA should be used inside encapsulating suit where this exposure may occur. For isocyanate spills of less than 40 litres (2 m²): • Evacuate area from everybody not dealing with the emergency, keep them upwind and prevent further access, remove ignition sources and, if inside building, ventilate area as well as possible. • Notify supervision and others as necessary. • Put on personal protective equipment (suitable respiratory protection, face and eye protection, protective suit, gloves and impermeable boots). • Control source of leakage (where applicable). • Dike the spill to prevent spreading and to contain additions of decontaminating solution. • Prevent the material from entering drains. • Estimate spill pool volume or area. • Absorb and decontaminate. - Completely cover the spill with wet sand, wet earth, vermiculite or other similar absorbent. - Add neutraliser (for suitable formulations: see below) to the adsorbent materials (equal to that of estimated spill pool volume). Intensify contact between spill, absorbent and neutraliser by carefully mixing with a rake and allow to react for 15 minutes • Shovel absorbent/decontaminant solution mixture into a steel drum. • Decontaminate surface. - Pour an equal amount of neutraliser solution over contaminated surface. - Scrub area with a stiff bristle brush, using moderate pressure. - Completely cover decontaminant with vermiculite or other similar absorbent. - After 5 minutes, shovel absorbent/decontamination solution mixture into the same steel drum used above. • Monitor for residual isocyanate. If surface is decontaminated, proceed to next step. If contamination persists, repeat decontaminate procedure immediately above • Place loosely covered drum

Safety Data Sheet



(release of carbon dioxide) outside for at least 72 hours. Label waste-containing drum appropriately. Remove waste materials for incineration. • Decontaminate and remove personal protective equipment. • Return to normal operation. • Conduct accident investigation and consider measures to prevent reoccurrence. Decontamination: • Treat isocyanate spills with sufficient amounts of isocyanate decontaminant preparation ("neutralising fluid"). Isocyanates and polyisocyanates are generally not miscible with water. Liquid surfactants are necessary to allow better dispersion of isocyanate and neutralising fluids/preparations. Alkaline neutralisers react faster than water/surfactant mixtures alone. Typically, such a preparation may consist of: Sawdust: 20 parts by weight Kieselguhr 40 parts by weight plus a mixture of {ammonia (s.g. 0.880) 8% v/v non-ionic surfactant 2% v/v water 90%v/v}. Let stand for 24 hours Three commonly used neutralising fluids each exhibit advantages in different situations. Formulation A :liquid surfactant 0.2-2% sodium carbonate 5-10% water to 100% Formulation B liquid surfactant 0.2-2% concentrated ammonia 3-8% water to 100% Formulation C ethanol, isopropanol or butanol 50% concentrated ammonia 5% water to 100% After application of any of these formulae, let stand for 24 hours. Formulation B reacts faster than Formulation A. However, ammonia-based neutralisers should be used only under well-ventilated conditions to avoid overexposure to ammonia or if members of the emergency team wear suitable respiratory protection. Formulation C is especially suitable for cleaning of equipment from unreacted isocyanate and neutralizing under freezing conditions. Regard has to be taken to the flammability of the alcoholic solution. • Avoid contamination with water, alkalies and detergent solutions. • Material reacts with water and generates gas, pressurises containers with even drum rupture resulting. • DO NOT reseal container if contamination is suspected. • Open all containers with care. • Clear area of personnel and move upwind. • Alert Fire Brigade and tell them location and nature of hazard. • Wear full body protective clothing with breathing apparatus. • Prevent, by any means available, spillage from entering drains or water course. • Stop leak if safe to do so. • Contain spill with sand, earth or vermiculite. • Collect recoverable product into labelled containers for recycling. • Neutralise/decontaminate residue (see Section 13 for specific agent). • Collect solid residues and seal in labelled drums for disposal. • Wash area and prevent runoff into drains. • After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using. • If contamination of drains or waterways occurs, advise emergency services. The conductivity of this material may make it a static accumulator. A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10 000 pS/m. Whether a liquid is nonconductive or semi-conductive, the precautions are the same. A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid. • 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. • DO NOT allow clothing wet with material to stay in contact with skin. • Overheating of ethoxylates/alkoxylates in air should be avoided. When some ethoxylates are heated vigorously in the presence of air or oxygen, at temperatures exceeding 160 C, they may undergo exothermic oxidative degeneration resulting in self-heating and autoignition. • Nitrogen blanketing will minimise the potential for ethoxylate oxidation. Prolonged storage in the presence of air or oxygen may cause product degradation. Oxidation is not expected when stored under a nitrogen atmosphere. Inert gas blanket and breathing system needed to maintain color stability. Use dry inert gas having at least -40 C dew point. • Trace quantities of ethylene oxide may be present in the material. Although these may accumulate in the headspace of storage and transport vessels, concentrations are not expected to exceed levels which might produce a flammability or worker exposure hazard. • Electrostatic discharge may be generated during pumping - this may result in fire. • Ensure electrical continuity by bonding and grounding (earthing) all equipment. • Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (≤ 1 m/sec until fill pipe submerged to twice its diameter, then ≤ 7 m/sec). • Avoid splash filling. • Do NOT use compressed air for filling discharging or handling operations. • Avoid all personal contact, including inhalation. • Wear protective clothing when risk of exposure occurs. • Use in a well-ventilated area. • Prevent concentration in hollows and sumps. • DO NOT enter confined spaces until atmosphere has been checked. • DO NOT allow material to contact humans, exposed food or food utensils. • Avoid contact with incompatible materials. • When handling, DO NOT eat, drink or smoke. • Keep containers securely sealed when not in use. • Avoid physical damage to containers. • Always wash hands with soap and water after handling. • Work clothes should be laundered separately. Launder contaminated clothing before re-use. • Use good occupational work practice. • Observe manufacturer's storage and handling recommendations contained within this SDS. • Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained. • Store in original containers. • Keep containers securely sealed. • No smoking, naked lights or ignition sources. • Store in a cool, dry, well-ventilated area. • Store away from incompatible materials and foodstuff containers. • Protect containers against physical damage and check regularly for leaks. • Observe manufacturer's storage and handling recommendations contained within this SDS.

Dangerous Goods - Initial Emergency Response Guide No: 36

7. HANDLING AND STORAGE

Product Name: Vulkem 360

Reference No: 460712 229

Issued: 2022-08-22

Version: 1.0

Page 5 of 18

Safety Data Sheet



Handling: All processes in which isocyanates are used should be enclosed wherever possible. Total enclosure, accompanied by good general ventilation, should be used to keep atmospheric concentrations below the relevant exposure standards. If total enclosure of the process is not feasible, local exhaust ventilation may be necessary. Local exhaust ventilation is essential where lower molecular weight isocyanates (such as TDI or HDI) is used or where isocyanate or polyurethane is sprayed. Where other isocyanates or pre-polymers are used and aerosol formation cannot occur, local exhaust ventilation may not be necessary if the atmospheric concentration can be kept below the relevant exposure standards. Where local exhaust ventilation is installed, exhaust vapours should not be vented to the exterior in such a manner as to create a hazard. Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are: Process controls which involve changing the way a job activity or process is done to reduce the risk. Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use. Employers may need to use multiple types of controls to prevent employee overexposure. Spraying of material or material in admixture with other components must be carried out in conditions conforming to local state regulations (AS/NZS 4114, UNI EN 12215:2010, ANSI/AIHA Z9.3-2007 or national equivalent). Local exhaust ventilation with full face positive-pressure air supplied breathing apparatus (hood or helmet type) is required. Spraying should be performed in a spray booth fitted with an effective exhaust system which complies with local environmental legislation. The spray booth area must be isolated from unprotected personnel whilst spraying is in progress and until all spraying mist has cleared. NOTE: Isocyanate vapours will not be adequately absorbed by organic vapour respirators. 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: 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 Upper end of the range 1: Room air currents minimal or favourable to capture 1: Disturbing room air currents 2: Contaminants of low toxicity or of nuisance value only 2: Contaminants of high toxicity 3: Intermittent, low production. 3: High production, heavy use 4: Large hood or large air mass in motion 4: Small hood-local control only 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 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 4-10 m/s (800-2000 f/min.) for extraction of solvents generated by spraying at a point 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.

Storage: For ethoxylates suitable containers include carbon steel coated with baked phenolic. Any moisture may cause rusting of carbon steel. If product is moisture free, uncoated carbon steel tanks may be used. • Lined metal can, lined metal pail/ can. • Plastic pail. • Polyliner drum. • Packing as recommended by manufacturer. • Check all containers are clearly labelled and free from leaks. For low viscosity materials • Drums and jerricans must be of the non-removable head type. • 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) and solids (between 15 C deg. and 40 deg C.): • Removable head packaging; • Cans with friction closures and • 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 and II 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. All inner and sole packagings for substances that have been assigned to Packaging Groups I or II on the basis of inhalation toxicity criteria, must be hermetically sealed. • Avoid reaction with water, alcohols and detergent solutions. Isocyanates are electrophiles, and as such they are reactive toward a variety of nucleophiles including alcohols, amines, and even water. Upon treatment with an alcohol, an isocyanate forms a urethane linkage. If a di-isocyanate is treated with a compound containing two or more hydroxyl groups, such as a diol or a polyol, polymer chains are formed, which are known as polyurethanes. Reaction between a di-isocyanate and a compound containing two or more amine groups, produces long polymer chains known as polyureas. • Isocyanates and thioisocyanates are incompatible with many classes of compounds, reacting exothermically to release toxic gases. Reactions with amines, strong bases, aldehydes, alcohols, alkali metals, ketones, mercaptans, strong oxidisers, hydrides, phenols, and peroxides can cause vigorous releases of heat. Acids and bases initiate polymerisation reactions in these materials. • Isocyanates also can react with themselves. Aliphatic di-isocyanates can form trimers, which are structurally related to cyanuric acid. Isocyanates participate in Diels-

Safety Data Sheet



Alder reactions, functioning as dienophiles. Isocyanates easily form adducts with carbodiimides, isothiocyanates, ketenes, or with substrates containing activated CC or CN bonds. Some isocyanates react with water to form amines and liberate carbon dioxide. This reaction may also generate large volumes of foam and heat. Foaming spaces may produce pressure in confined spaces or containers. Gas generation may pressurise drums to the point of rupture. Do NOT reseal container if contamination is expected. Open all containers with care. Base-catalysed reactions of isocyanates with alcohols should be carried out in inert solvents. Such reactions in the absence of solvents often occur with explosive violence. Isocyanates will attack and embrittle some plastics and rubbers. The isocyanate anion is a pseudohalide (syn pseudohalogen) whose chemistry, resembling that of the true halogens, allows it to substitute for halogens in several classes of chemical compounds. The behavior and chemical properties of the several pseudohalides are identical to that of the true halide ions. Avoid strong acids, bases. A range of exothermic decomposition energies for isocyanates is given as 20-30 kJ/mol. The relationship between energy of decomposition and processing hazards has been the subject of discussion; it is suggested that values of energy released per unit of mass, rather than on a molar basis (J/g) be used in the assessment. For example, in "open vessel processes" (with man-hole size openings, in an industrial setting), substances with exothermic decomposition energies below 500 J/g are unlikely to present a danger, whilst those in "closed vessel processes" (opening is a safety valve or bursting disk) present some danger where the decomposition energy exceeds 150 J/g. BRETHERRICK: Handbook of Reactive Chemical Hazards, 4th Edition

This material is classified as a Division 6.1 Toxic Substance as per the criteria of the "Australian Code for the Transport of Dangerous Goods by Road & Rail" and/or the "New Zealand NZS5433: Transport of Dangerous Goods on Land" and must be stored in accordance with the relevant regulations.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

National occupational exposure limits:

	TWA		STEL		NOTICES
	ppm	mg/m3	ppm	mg/m3	
Calcium oxide	-	2	-	-	-
Methylene bisphenyl isocyanate (MDI)					
Silicon tetrahydride	5	6.6	-	-	-
Titanium dioxide	-	10	-	-	-

As published by Safe Work Australia.

TWA - The time-weighted average airborne concentration over an eight-hour working day, for a five-day working week over an entire working life.

STEL (Short Term Exposure Limit) - the average airborne concentration over a 15 minute period which should not be exceeded at any time during a normal eight-hour workday.

These Exposure Standards are guides to be used in the control of occupational health hazards. All atmospheric contamination should be kept to as low a level as is workable. These exposure standards should not be used as fine dividing lines between safe and dangerous concentrations of chemicals. They are not a measure of relative toxicity.

If the directions for use on the product label are followed, exposure of individuals using the product should not exceed the above standard. The standard was created for workers who are routinely, potentially exposed during product manufacture.

Biological Limit Values: As per the "National Model Regulations for the Control of Workplace Hazardous Substances (Safe Work Australia)" the ingredients in this material do not have a Biological Limit Allocated.

Engineering Measures: Ensure ventilation is adequate to maintain air concentrations below Exposure Standards. Use only in well ventilated areas. Use with local exhaust ventilation or while wearing appropriate respirator.

Personal Protection Equipment: RUBBER BOOTS, OVERALLS, GLOVES, RESPIRATOR.

Safety Data Sheet



Personal protective equipment (PPE) must be suitable for the nature of the work and any hazard associated with the work as identified by the risk assessment conducted.

Wear rubber boots, overalls, gloves, respirator. Use with adequate ventilation. If inhalation risk exists wear organic vapour/particulate respirator meeting the requirements of AS/NZS 1715 and AS/NZS 1716. Available information suggests that gloves made from nitrile rubber, polyvinyl alcohol (PVA), teflon should be suitable for intermittent contact. However, due to variations in glove construction and local conditions, the user should make a final assessment. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using.

RECOMMENDATIONS FOR CONSUMER USE:

Eye and face protection: Safety glasses with unperforated side shields may be used where continuous eye protection is desirable, as in laboratories; spectacles are not sufficient where complete eye protection is needed such as when handling bulk quantities, where there is a danger of splashing, or if the material may be under pressure. Chemical goggles whenever there is a danger of the material coming in contact with the eyes; goggles must be properly fitted. Full face shield (20 cm, 8 in minimum) may be required for supplementary but never for primary protection of eyes; these afford face protection. Alternatively a gas mask may replace splash goggles and face shields. Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses 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], [AS/NZS 1336 or national equivalent]

Skin protection: See Hand protection below

Hands/feet protection: Elbow length PVC gloves

When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots.

NOTE: The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact. Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed. The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application. The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended. Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
- Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use.

Contaminated gloves should be replaced. As defined in ASTM F-739-96 in any application, gloves are rated as:

- Excellent when breakthrough time > 480 min
- Good when breakthrough time > 20 min
- Fair when breakthrough time < 20 min
- Poor when glove material degrades

For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended. It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times. Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturer's technical data should always be taken into account to ensure selection of the most appropriate glove for the task. Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example:

- Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of.
- Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended. Do NOT wear natural rubber (latex gloves). Isocyanate resistant materials include Teflon, Viton, nitrile rubber and some PVA gloves. Protective gloves

Safety Data Sheet



and overalls should be worn as specified in the appropriate national standard. Contaminated garments should be removed promptly and should not be re-used until they have been decontaminated. NOTE: Natural rubber, neoprene, PVC can be affected by isocyanates DO NOT use skin cream unless necessary and then use only minimum amount. Isocyanate vapour may be absorbed into skin cream and this increases hazard. Body protection: See Other protection below Other protection: All employees working with isocyanates must be informed of the hazards from exposure to the contaminant and the precautions necessary to prevent damage to their health. They should be made aware of the need to carry out their work so that as little contamination as possible is produced, and of the importance of the proper use of all safeguards against exposure to themselves and their fellow workers. Adequate training, both in the proper execution of the task and in the use of all associated engineering controls, as well as of any personal protective equipment, is essential. Employees exposed to contamination hazards should be educated in the need for, and proper use of, facilities, clothing and equipment and thereby maintain a high standard of personal cleanliness. Special attention should be given to ensuring that all personnel understand instructions, especially newly recruited employees and those with local-language difficulties, where they are known. Overalls. Eyewash unit. Barrier cream. Skin cleansing cream

Hygiene measures: All employees working with isocyanates must be informed of the hazards from exposure to the contaminant and the precautions necessary to prevent damage to their health. They should be made aware of the need to carry out their work so that as little contamination as possible is produced, and of the importance of the proper use of all safeguards against exposure to themselves and their fellow workers. Adequate training, both in the proper execution of the task and in the use of all associated engineering controls, as well as of any personal protective equipment, is essential. Employees exposed to contamination hazards should be educated in the need for, and proper use of, facilities, clothing and equipment and thereby maintain a high standard of personal cleanliness. Special attention should be given to ensuring that all personnel understand instructions, especially newly recruited employees and those with local-language difficulties, where they are known. Overalls. Eyewash unit. Barrier cream. Skin cleansing cream

9. PHYSICAL AND CHEMICAL PROPERTIES

Form:	Liquid
Colour:	Grey thick liquid
Odour:	Not Available
Solubility:	Does not mix with water.
Solubility in water:	Immiscible
Density:	Not Available
Flash Point (°C):	Not Available

(Typical values only - consult specification sheet)
N Av = Not available, N App = Not applicable

10. STABILITY AND REACTIVITY

Chemical stability: • Unstable in the presence of incompatible materials. • Product is considered stable. • Hazardous polymerisation will not occur.

Conditions to avoid: See section 7

Incompatible materials: See section 7

Hazardous decomposition products: See section 5

Hazardous reactions: See section 7

11. TOXICOLOGICAL INFORMATION

No adverse health effects expected if the product is handled in accordance with this Safety Data Sheet and the

Safety Data Sheet



product label. Symptoms or effects that may arise if the product is mishandled and overexposure occurs are:

Acute Effects

Inhalation: Fatal if inhaled. The vapour/mist may be highly irritating to the upper respiratory tract and lungs; the response may be severe enough to produce bronchitis and pulmonary oedema. Possible neurological symptoms arising from isocyanate exposure include headache, insomnia, euphoria, ataxia, anxiety neurosis, depression and paranoia. Gastrointestinal disturbances are characterised by nausea and vomiting. Pulmonary sensitisation may produce asthmatic reactions ranging from minor breathing difficulties to severe allergic attacks; this may occur following a single acute exposure or may develop without warning for several hours after exposure. Sensitized people can react to very low doses, and should not be allowed to work in situations allowing exposure to this material. Continued exposure of sensitised persons may lead to possible long term respiratory impairment. Inhalation hazard is increased at higher temperatures. In addition to producing pulmonary sensitisation, toluene diisocyanate (TDI) is active in contracting smooth muscle such as that found in the airway. So-called bronchoconstriction is often mistaken for sensitisation and lung function tests, including measurement of forced expiratory volume (FEV1) and forced vital capacity (FCV) may distinguish acute reaction. Severe irritation is produced by inhalation of low vapour concentrations. At 0.02 ppm, TDI does not produce immediate irritation but this may become apparent after an extended period of exposure. Symptoms may include a burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. Overexposure or repeated exposure may produce bronchial spasm and asthma which may not appear for several hours. Symptoms may persist for several weeks. Most individuals recover completely. Both allergy-prone and non allergy-prone individuals may become sensitised. Cross-sensitisation to other isocyanates may occur. Some aliphatic hydrocarbons produce axonal neuropathies. Isoparaffinic hydrocarbons produce injury to the kidneys of male rats. When albinorats were exposed to isoparaffins at 21.4 mg/l for 4 hours, all animals experienced weakness, tremors, salivation, mild to moderate convulsions, chromodacryorrhoea and ataxia within the first 24 hours. Symptoms disappeared after 24 hours. Several studies have evaluated sensory irritation in laboratory animals or odor or sensory response in humans. When evaluated by a standard procedure to assess upper airway irritation, isoparaffins did not produce sensory irritation in mice exposed to up to 400 ppm isoparaffin in air. Human volunteers were exposed for six hours to 100 ppm isoparaffin. The subjects were given a self-administered questionnaire to evaluate symptoms, which included dryness of the mucous membranes, loss of appetite, nausea, vomiting, diarrhea, fatigue, headache, dizziness, feeling of inebriation, visual disturbances, tremor, muscular weakness, impairment of coordination or paresthesia. No symptoms associated with solvent exposure were observed. With a human expert panel, odour from liquid imaging copier emissions became weakly discernible at approximately 50 ppm. Numerous long-term exposures have been conducted in animals with only one major finding observed. Renal tubular damage has been found in kidneys of male rats upon repeated exposures to isoparaffins. It does not occur in mice or in female rats. This male rat nephropathy has been observed with a number of hydrocarbons, including wholly vaporized unleaded gasoline. The phenomenon has been attributed to reversible binding of hydrocarbon to alpha2-globulin. Since humans do not synthesize alpha2-globulin or a similar protein, the finding is not considered to be of biological significance to man. No clinically significant renal abnormalities have been found in refinery workers exposed to hydrocarbons. When evaluated for developmental toxicity in rats, isoparaffins were neither embryotoxic nor teratogenic. Isoparaffins were consistently negative on standard bacterial genotoxicity assays. They were also non-genotoxic in in vivo mammalian testing for somatic or germ cell mutations (mouse micronucleus test and rat dominant lethal assay, respectively). Mullin et al: *Jnl Applied Toxicology* 10, pp 136-142, 2006. Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may produce severely toxic effects; these may be fatal. Evidence shows, or practical experience predicts, that the material produces irritation of the respiratory system, in a substantial 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. A respiratory sensitizer. Can cause possible allergic reactions.

Skin contact: Skin contact with the material may damage the health of the individual; systemic effects may result following absorption. Dermal, isoparaffins have produced slight to moderate irritation in animals and humans under occluded patch conditions where evaporation cannot freely occur. However, they are not irritating in non-occluded tests, which are a more realistic simulation of human exposure. They have not been found to be sensitizers in guinea pig or human patch testing. However, occasional rare idiosyncratic sensitization reactions in humans have been reported. 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

Safety Data Sheet



suitably protected. Evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant 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. The material may produce moderate skin irritation; limited evidence or practical experience suggests, 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. A skin sensitiser. Repeated or prolonged skin contact may lead to allergic contact dermatitis.

Ingestion: Harmful if 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. Many aliphatic hydrocarbons create a burning sensation because they are irritating to the GI mucosa. Vomiting has been reported in up to one third of all hydrocarbon exposures. While most aliphatic hydrocarbons have little GI absorption, aspiration frequently occurs, either initially or in a semi-delayed fashion as the patient coughs or vomits, thereby resulting in pulmonary effects. Once aspirated, the hydrocarbons can create a severe pneumonitis. Rats given isoparaffinic hydrocarbons - isoalkanes- (after 18-24 hours fasting) showed lethargy and/or general weakness, ataxia and diarrhoea. Symptoms disappeared within 24-28 hours. Phthalates (aromatic dicarboxylic acid esters), in general, exhibit low toxicity, partly because of poor absorption but mainly as a result of rapid metabolism in which the esters are saponified to phthalic acid (which is rapidly excreted) and the parent alcohol (which is subsequently metabolised). The pathology of these compounds seems to be related to the released alcohol and its biological effects. The rate of absorption of ingested phthalate esters is influenced by the content of dietary fat. Ingested phthalate esters may to a lesser degree be absorbed as the monoester derivatives or in the case of di(2-ethylhexyl)phthalate, as the diester. Cumulative toxicity of the phthalates has been observed on repeated administration. Both di-n-octyl phthalate and di(2-ethylhexyl)phthalate were found to have 22-28 times greater toxicity (based on LD50s) following repeated administration to animals. The liver has been shown to be the target organ affected by the phthalates. In general phthalates have induced liver enlargement; this increase in liver weight has been attributed to rapid cell division (hyperplasia) along with the detachment of cells (hypertrophy). The increase in liver weight caused by phthalates has been found to reverse to normal or even below normal levels on prolonged exposure. Exposure to phthalates, in general, has been found to be associated with a reduction in circulating cholesterol and serum triglyceride levels which accounted for a reduction in liver steroidogenesis. The phthalates also effect carbohydrate metabolism in the liver producing depleted glycogen and electron transport inhibitors following interaction with mitochondria. Testicular atrophy produced in rats during feeding studies depends on the length and structure of the alcohol; in general the lower molecular weight esters produce the more severe effects. The toxicity of phthalic acid isomers decreases in the order o-phthalic acid, isophthalic acid and terephthalic acid. Phthalic acid is not metabolised but is excreted, unchanged, in the urine and faeces. Terephthalic acid appears to potentiate the biological effects of substances such as antibiotics, thiamine and sulfonamides.

Eye contact: When applied to the eye(s) of animals, the material produces severe ocular lesions which are present twenty-four hours or more after instillation. Instillation of isoparaffins into rabbit eyes produces only slight irritation

Acute toxicity

Inhalation: This material has been classified as a Category 2 Hazard. Acute toxicity estimate (based on ingredients): $0.5 < LC_{50} \leq 2.0$ mg/L for vapours or $0.05 < LC_{50} \leq 0.5$ mg/L for dust and mist.

silane LC50 (Mice): 9600 ppm/4h[2]

toluene diisocyanate LC50 (Mice): 0.069 mg/L/4h[2]

naphtha petroleum, heavy, hydrotreated LC50 (Rat): >4.42 mg/L/4h[1]

diisononyl phthalate LC50 (Rat): >4.4 mg/L/4h[1]

titanium dioxide LC50 (Rat): >2.28 mg/L/4h[1]

Safety Data Sheet

calcium oxide LC50 (Rat): >3 mg/l4h[1]

4,4'-diphenylmethane diisocyanate (MDI) LC50 (Rat): 0.368 mg/L4h[1]

Skin contact: This material has been classified as not hazardous for acute dermal exposure. Acute toxicity estimate (based on ingredients): LD₅₀ > 2,000 mg/Kg bw

titanium dioxide LD50 (Guinea pig): >=10000 mg/kg[2] (Method: Dermal)

naphtha petroleum, heavy, hydrotreated LD50 (Rabbit): >1900 mg/kg[1] (Method: Dermal)

diisononyl phthalate LD50 (Rabbit): >3160 mg/kg[2] (Method: Dermal)

4,4'-diphenylmethane diisocyanate (MDI) LD50 (Rabbit): >6200 mg/kg[2] (Method: Dermal)

silane LD50 (Rabbit): 3540 mg/kg[2] (Method: Dermal)

toluene diisocyanate LD50 (Rabbit): >9400 mg/kg[1] (Method: Dermal)

calcium oxide LD50 (Rat): >2000 mg/kg[1] (Method: Dermal)

Ingestion: This material has been classified as a Category 4 Hazard. Acute toxicity estimate (based on ingredients): 300 < LD₅₀ ≤ 2,000 mg/Kg bw

limestone LD50 (Rat): 6450 mg/kg[2] (Method: Oral)

naphtha petroleum, heavy, hydrotreated LD50 (Rat): >4500 mg/kg[1] (Method: Oral)

diisononyl phthalate LD50 (Rat): >10000 mg/kg[2] (Method: Oral)

titanium dioxide LD50 (Rat): >=2000 mg/kg[1] (Method: Oral)

calcium oxide LD50 (Rat): >2000 mg/kg[1] (Method: Oral)

4,4'-diphenylmethane diisocyanate (MDI) LD50 (Rat): >2000 mg/kg[1] (Method: Oral)

MDI-glycerol, propoxylated. ethoxylated LD50 (Rat): >2000 mg/kg[2] (Method: Oral)

toluene diisocyanate LD50 (Rat): >2000 mg/kg[1] (Method: Oral)

toluene-2,6-diisocyanate LD50 (Rat): >2000 mg/kg[1] (Method: Oral)

Corrosion/Irritancy: Eye: this material has been classified as a Category 1 Hazard (irreversible effects to eyes).

Skin: this material has been classified as a Category 2 Hazard (reversible effects to skin).

limestone Skin irritant (Rabbit): 500 mg/24h-moderate

4,4'-diphenylmethane diisocyanate (MDI) Skin irritant (Rabbit): 500 mg /24 hours

Sensitisation: Inhalation: this material has been classified as a Category 1 Hazard (respiratory sensitiser). Skin: this material has been classified as a Category 1 Hazard (skin sensitiser).

Aspiration hazard: This material has been classified as not an aspiration hazard.

Specific target organ toxicity (single exposure): This material has been classified as not a specific hazard to target organs by a single exposure.

Chronic Toxicity

Mutagenicity: This material has been classified as a Category 2 Hazard.

Carcinogenicity: This material has been classified as a Category 1A Hazard.

Reproductive toxicity (including via lactation): This material has been classified as not a reproductive toxicant.

Specific target organ toxicity (repeat exposure): This material has been classified as a Category 2 Hazard. On the basis of epidemiological data, it has been concluded that prolonged inhalation of the material, in an occupational setting, may produce cancer in humans. Repeated or long-term occupational exposure is likely to produce cumulative health effects involving organs or biochemical systems. Strong evidence exists that the substance may cause irreversible but non-lethal mutagenic effects following a single exposure. Practical evidence shows that inhalation of the material is capable of inducing a sensitisation reaction in a substantial number of individuals at a greater frequency than would be expected from the response of a normal population. Pulmonary sensitisation, resulting in hyperactive airway dysfunction and pulmonary allergy may be accompanied by fatigue, malaise and aching. Significant symptoms of exposure may persist for extended periods, even after exposure ceases. Symptoms can be activated by a variety of nonspecific environmental stimuli such as automobile exhaust, perfumes and passive smoking. Practical experience shows that skin contact with the material is capable either of

Safety Data Sheet



inducing a sensitisation reaction in a substantial number of individuals, and/or of producing a positive response in experimental animals. Substances that can cause occupational asthma (also known as asthmagens and respiratory sensitisers) can induce a state of specific airway hyper-responsiveness via an immunological, irritant or other mechanism. Once the airways have become hyper-responsive, further exposure to the substance, sometimes even to tiny quantities, may cause respiratory symptoms. These symptoms can range in severity from a runny nose to asthma. Not all workers who are exposed to a sensitiser will become hyper-responsive and it is impossible to identify in advance who are likely to become hyper-responsive. Substances that can cause occupational asthma should be distinguished from substances which may trigger the symptoms of asthma in people with pre-existing air-way hyper-responsiveness. The latter substances are not classified as asthmagens or respiratory sensitisers. Wherever it is reasonably practicable, exposure to substances that can cause occupational asthma should be prevented. Where this is not possible the primary aim is to apply adequate standards of control to prevent workers from becoming hyper-responsive. Activities giving rise to short-term peak concentrations should receive particular attention when risk management is being considered. Health surveillance is appropriate for all employees exposed or liable to be exposed to a substance which may cause occupational asthma and there should be appropriate consultation with an occupational health professional over the degree of risk and level of surveillance.

Harmful: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed. Serious damage (clear functional disturbance or morphological change which may have toxicological significance) is likely to be caused by repeated or prolonged exposure. As a rule the material produces, or contains a substance which produces severe lesions. Such damage may become apparent following direct application in subchronic (90 day) toxicity studies or following sub-acute (28 day) or chronic (two-year) toxicity tests. There is sufficient evidence to establish a causal relationship between human exposure to the material and impaired fertility. There is sufficient evidence to establish a causal relationship between human exposure to the material and subsequent developmental toxic effects in the off-spring. There is sufficient evidence to provide a strong presumption that human exposure to the material may result in impaired fertility on the basis of: -clear evidence in animal studies of impaired fertility in the absence of toxic effects, or evidence of impaired fertility occurring at around the same dose levels as other toxic effects but which is not a secondary non-specific consequence of other toxic effects. There is sufficient evidence to provide a strong presumption that human exposure to the material may result in developmental toxicity, generally on the basis of: - clear results in appropriate 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. The various phthalates have different uses, chemical structures and toxicity profiles. It is therefore difficult to generalise about the safety of all phthalates as a group. The main health concern associated with some phthalates is that animal studies have shown that high regular doses can affect the reproductive system in developing young, particularly males. While there is no significant risk to the general population, young children may experience higher exposures than the general population if they chew or suck on phthalate-containing toys, or if they ingest phthalates over a long period from other products containing high levels of phthalates. In animal tests, phthalates have been shown to "feminise" male animals, increasing the likelihood of small or undeveloped testes, undescended testicles, and low sperm counts. A 2005 study also linked higher foetal exposure to phthalates through the mother's blood with increased risk of developmental abnormalities in male infants. Higher phthalate levels are also associated with lower testosterone production and reduced sperm count in men. One study suggested that high levels of phthalates may be connected to the current obesity epidemic in children. It was found that obese children show greater exposure to phthalates than non-obese children. It was reported that the obesity risk increases according to the level of the chemical found in the children's bloodstream. In a national cross-section of U.S. men, concentrations of several prevalent phthalate metabolites showed statistically significant correlations with abnormal obesity and insulin resistance. A further study found that people with elevated phthalate levels had roughly twice the risk of developing diabetes compared with those with lower levels. This study also found that phthalates were associated with disrupted insulin production. Much of the current research on effects of phthalate exposure has been focused towards children and men's health, however, women may be at higher risk for potential adverse health effects of phthalates due to increased cosmetic use. According to in vivo and observational studies there is an association between phthalate exposure and endocrine disruption leading to development of breast cancer. This finding may be associated with the demethylation of the oestrogen receptor complex in breast cancer cells. A Russian study describes exposure by workers to mixed phthalates (and other plasticisers) - pain, numbness and spasms in the upper and lower extremities were related to duration of exposures. Symptoms usually developed after the sixth or seventh year of work. Neurological studies revealed the development of polyneuritis in about 30% of the workers involved in this study. About 30% of the workforce showed depression of the vestibular receptors. Because the study described mixed exposures it is difficult to determine what, if any, unique role was played by the phthalates. Increased incidences of anovulatory reproductive cycles and low oestrogen concentrations were reported among Russian women working with phthalate plasticisers; the abnormal cycles were associated with spontaneous abortion. The specific phthalates implicated, dose levels and other data were not reported. It has been alleged that the phthalates mimic or interfere with sex packaging) and are used as ingredients in paints, inks and adhesives. Their potential for

Safety Data Sheet



entering the human body is marked. They have been added to a list of chemicals (including alkyl phenolics, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and dioxins) which are implicated in reducing sperm counts and fertility in males a phenomenon which has apparently arisen since the mid 1960s. Phthalates are generally considered to be in a class of endocrine disruptors known as "xenoestrogens," for their ability to mimic the effect of oestrogen on the body. Although the human foetus is "bathed" in naturally occurring oestrogens during pregnancy it is suggested that it has developed a protective mechanism against natural oestrogens but is not safe from synthetic variants. These tend to accumulate in body fats which sets them apart from the natural product. During early pregnancy, fats are broken down and may flood the body with concentrated pollutants. Human phthalate exposure during pregnancy results in decreased anogenital distance among baby boys. Boys born to mothers with the highest levels of phthalates were 7 times more likely to have a shortened anogenital distance. While anogenital distance is routinely used as a measure of foetal exposure to endocrine disruptors in animals, this parameter is rarely assessed in humans, and its significance is unknown. One study also found that female animals exposed to higher levels of phthalates experienced increased risk of miscarriage, a common symptom of excessive estrogen levels in human women, and stillbirth. Prematurity may also be linked to phthalate exposure. Another study found a link between exposure to phthalates and increased rates of childhood obesity. In adult human men, phthalates have been linked to greater waist circumference and higher insulin resistance, a common precursor to type 2 (adult onset) diabetes. They have been linked to thyroid irregularities, asthma, and skin allergies in both sexes. Though the exact mechanism is unclear, studies have linked higher rates of respiratory infections and other symptoms in children living in houses with vinyl floors. One possible explanation is inhalation of dust tainted by phthalates, which are used in cosmetics such as nail polishes and hand creams precisely because of their ability to bind to human tissues. Animal studies have shown increased risks of certain birth defects (including the genital abnormalities and, in rats, extra ribs) and low birth rates in rats whose mothers were fed higher levels of phthalates. These effects on foetal development are of particular concern because young women of childbearing age often have higher than average phthalate levels in the body thanks to their use of cosmetics, many of which contain phthalates. The EU has applied limitations to the use of several phthalates in general food contact applications (packaging and closures) and medical device applications. The USA has introduced regulation of phthalate esters as components of children's toys and childcare articles for children under the age of 12 that could be 'placed in the mouth'. Endocrine disruptors such as phthalates can be added to the effects of other endocrine disruptors, so even very small amounts can interact with other chemicals to have cumulative, adverse "cocktail effects". Large amounts of specific phthalates fed to rodents have been shown to damage their liver and testes, and initial rodent studies also indicated hepatocarcinogenicity. Later studies on primates showed that the mechanism is specific to rodents - humans are resistant to the effect. Studies conducted on mice exposed to phthalates in utero did not result in metabolic disorder in adults. However, "At least one phthalate, monoethylhexyl phthalate (MEHP) has been found to interact with all three peroxisome proliferator-activated receptors (PPARs). PPARs are members of the nuclear receptor superfamily involved in lipid and carbohydrate metabolism. Prenatal exposure to phthalates may affect children's mental, motor and behavioral development during the preschool year. A 2009 study found that prenatal phthalate exposure was related to low birth weight in infants. Low birth weight is the leading cause of death in children under 5 years of age and increases the risk of cardiovascular and metabolic disease in adulthood. Another study found that women who deliver prematurely have, on average, up to three times the phthalate level in their urine compared to women who carry to term. Several findings point to a statistically significant correlation between urine phthalate concentrations in children and symptoms of attention deficit hyperactivity disorder (ADHD). Persons with a history of asthma or other respiratory problems or are known to be sensitised, should not be engaged in any work involving the handling of isocyanates. The chemistry of reaction of isocyanates, as evidenced by MDI, in biological milieu is such that in the event of a true exposure of small MDI doses to the mouth, reactions will commence at once with biological macromolecules in the buccal region and will continue along the digestive tract prior to reaching the stomach. Reaction products will be a variety of polyureas and macromolecular conjugates with for example mucus, proteins and cell components. This is corroborated by the results from an MDI inhalation study. Following an inhalation exposure of rats to radiolabelled MDI, 79% of the dose was excreted in faeces. The faecal excretion in these animals was considered entirely due to ingestion of radioactivity from grooming and ingestion of deposited material from the nasopharyngeal region via the mucociliary escalator, i.e. not following systemic absorption. The faecal radioactivity was tentatively identified as mixed molecular weight polyureas derived from MDI. Diamine was not present. Thus, for MDI and diisocyanates in general the oral gavage dosing route is inappropriate for toxicological studies and risk assessment. It is expected that oral gavage dosing will result in a similar outcome to that produced by TDI or MDI, that is (1) reaction with stomach contents and (2) polymerization to solid polyureas. Reaction with stomach contents is very plausibly described in case reports of accidental ingestion of polymeric MDI based glue in domestic animals. Extensive polymerization and CO₂ liberation resulting in an expansion of the gastric content is described in the stomach, without apparent acute chemical toxicity. Polyurea formation in organic and aqueous phases has been described. In this generally accepted chemistry of hydrolysis of an isocyanate the initially produced carbamate decarboxylates to an amine which. The amine, as a reactive intermediate, then reacts very readily with the present isocyanate to produce a solid and inert

Safety Data Sheet

polyurea. This urea formation acts as a pH buffer in the stomach, thus promoting transformation of the diisocyanate into polyurea, even under the acidic conditions. At the absorptive tissues in the small intestine, these high molecular reaction products are likely to be of very low bioavailability, which is substantiated by the absence of systemic toxicity in acute oral bioassays with rats at the OECD limit dose (LC50 > 2 g/kg bw). The respiratory tract may be regarded as the main entry for systemically available isocyanates as evidenced following MDI exposures. A detailed summary on urinary, plasma and in vitro metabolite studies is provided below. Taken together, all available studies provide convincing evidence that MDI-protein adduct and MDI-metabolite formation proceeds: via formation of a labile isocyanate glutathione (GSH)-adduct, then transfer to a more stable adduct with larger proteins, and without formation of free MDA. MDA reported as a metabolite is actually formed by analytical workup procedures (strong acid or base hydrolysis) and is not an identified metabolite in urine or blood. A 90-day inhalation study in rats with polymeric MDI (6 hours/day, 5 days/week) produced moderate to severe hyperplastic inflammatory lesions in the nasal cavities and lungs at levels of 8 mg/m³ or greater. Rats exposed for two years to a respirable aerosol of polymeric MDI exhibited chronic pulmonary irritation at high concentrations. Only at the highest level (6 mg/m³), was there a significant incidence of a benign tumour of the lung (adenoma) and one malignant tumour (adenocarcinoma). There were no lung tumours at 1 mg/m³ and no effects at 0.2 mg/m³. Overall, the tumour incidence, both benign and malignant and the number of animals with the tumours were not different from controls. The increased incidence of lung tumours is associated with prolonged respiratory irritation and the concurrent accumulation of yellow material in the lung, which occurred throughout the study. In the absence of prolonged exposure to high concentrations leading to chronic irritation and lung damage, it is highly unlikely that tumour formation will occur. 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. With most allergens, removal of the offending agent results in the individual becoming asymptomatic. Toluene diisocyanate (TDI)-induced asthma may continue for months or even years after exposure ceases. This may be due to a non-allergenic condition known as reactive airway dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Evidence of carcinogenic potential of commercial grade TDI in female mice included induction of haemangiomas in the spleen and subcutaneous tissues, hepatocellular adenomas, and haemangiosarcomas in the liver, ovary and peritoneum. Ingestion of commercial grade TDI produced subcutaneous fibromas, pancreatic acinar cell adenomas, mammary gland fibroadenomas and subcutaneous fibromas and fibrosarcomas in female rats. No treatment related tumours were induced in male mice.

12. ECOLOGICAL INFORMATION

Avoid contaminating waterways.

Acute aquatic hazard: This material has been classified as a Category Acute 2 Hazard. Acute toxicity estimate (based on ingredients): > 1 ≤ 10 mg/L

diisononyl phthalate 48hr EC50 (crustacea): >0.086mg/l
titanium dioxide 48hr EC50 (crustacea): 1.9mg/l
calcium oxide 48hr EC50 (crustacea): 49.1mg/l
toluene diisocyanate 48hr EC50 (crustacea): 12.5mg/l
toluene-2,6-diisocyanate 48hr EC50 (crustacea): 12.5mg/l
limestone 72hr EC50 (algae): >14mg/l
diisononyl phthalate 72hr EC50 (algae): >88mg/l
titanium dioxide 72hr EC50 (algae): 3.75-7.58mg/l
calcium oxide 72hr EC50 (algae): >14mg/l
4,4'-diphenylmethane diisocyanate (MDI) 72hr EC50 (algae): >1640mg/l
toluene-2,6-diisocyanate 72hr EC50 (algae): 37.121mg/l
naphtha petroleum, heavy, hydrotreated 96hr EC50 (algae): 64mg/l
diisononyl phthalate 96hr EC50 (algae): >2.8mg/l
titanium dioxide 96hr EC50 (algae): 179.05mg/l
toluene diisocyanate 96hr EC50 (algae): 3230mg/l
limestone 96hr LC50 (fish): >165200mg/L
diisononyl phthalate 96hr LC50 (fish): >0.1mg/l
titanium dioxide 96hr LC50 (fish): 1.85-3.06mg/l
calcium oxide 96hr LC50 (fish): 50.6mg/l
4,4'-diphenylmethane diisocyanate (MDI) 96hr LC50 (fish): 95.24-134.37mg/l
toluene diisocyanate 96hr LC50 (fish): ~0.4mg/l
toluene-2,6-diisocyanate 96hr LC50 (fish): 164mg/l

Safety Data Sheet



Long-term aquatic hazard: This material has been classified as not hazardous for chronic aquatic exposure. Non-rapidly or rapidly degradable substance for which there are adequate chronic toxicity data available OR in the absence of chronic toxicity data, Acute toxicity estimate (based on ingredients): >100 mg/L, where the substance is not rapidly degradable and/or BCF < 500 and/or log K_{ow} < 4.

Ecotoxicity: No information available.

Persistence and degradability: Ingredient: diisononyl phthalate Persistence: Water/Soil: HIGH Persistence: Air: HIGH Ingredient: titanium dioxide Persistence: Water/Soil: HIGH Persistence: Air: HIGH Ingredient: 4,4'-diphenylmethane diisocyanate (MDI) Persistence: Water/Soil: LOW (Half-life = 1 days) Persistence: Air: LOW (Half-life = 0.24 days) Ingredient: silane Persistence: Water/Soil: LOW Persistence: Air: LOW Ingredient: toluene diisocyanate Persistence: Water/Soil: LOW (Half-life = 1 days) Persistence: Air: LOW (Half-life = 0.13 days) Ingredient: toluene-2,6-diisocyanate Persistence: Water/Soil: LOW (Half-life = 1 days) Persistence: Air: LOW (Half-life = 0.13 days)

diisononyl phthalate Half-life in air: HIGH
titanium dioxide Half-life in air: HIGH
4,4'-diphenylmethane diisocyanate (MDI) Half-life in air: LOW (Half-life = 0.24 days)
silane Half-life in air: LOW
toluene diisocyanate Half-life in air: LOW (Half-life = 0.13 days)
toluene-2,6-diisocyanate Half-life in air: LOW (Half-life = 0.13 days)
diisononyl phthalate Half-life in soil: HIGH
titanium dioxide Half-life in soil: HIGH
4,4'-diphenylmethane diisocyanate (MDI) Half-life in soil: LOW (Half-life = 1 days)
silane Half-life in soil: LOW
toluene diisocyanate Half-life in soil: LOW (Half-life = 1 days)
toluene-2,6-diisocyanate Half-life in soil: LOW (Half-life = 1 days)
diisononyl phthalate Half-life in water: HIGH
titanium dioxide Half-life in water: HIGH
4,4'-diphenylmethane diisocyanate (MDI) Half-life in water: LOW (Half-life = 1 days)
silane Half-life in water: LOW
toluene diisocyanate Half-life in water: LOW (Half-life = 1 days)
toluene-2,6-diisocyanate Half-life in water: LOW (Half-life = 0.13 days)

Bioaccumulative potential: Risk of bioaccumulation in an aquatic species is low. Ingredient: diisononyl phthalate Bioaccumulation: LOW (BCF = 183.8) Ingredient: titanium dioxide Bioaccumulation: LOW (BCF = 10) Ingredient: 4,4'-diphenylmethane diisocyanate (MDI) Bioaccumulation: LOW (BCF = 15) Ingredient: silane Bioaccumulation: LOW (LogKOW = 0.5294) Ingredient: toluene diisocyanate: LOW (LogKOW = 5) Ingredient: toluene-2,6-diisocyanate Bioaccumulation: LOW (LogKOW = 3.7403)

Mobility: Low mobility in soil. Ingredient: diisononyl phthalate Mobility: LOW (KOC = 467200) Ingredient: titanium dioxide Mobility: LOW (KOC = 23.74) Ingredient: 4,4'-diphenylmethane diisocyanate (MDI) Mobility: LOW (KOC = 376200) Ingredient: toluene diisocyanate Mobility: LOW (KOC = 9114) Ingredient: silane Mobility: LOW (KOC = 14.3) Ingredient: toluene-2,6-diisocyanate Mobility: LOW (KOC = 9303)

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 SDS and observe all notices pertaining to the product. • 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 • DO NOT recycle spilled material. • Consult State Land Waste Management Authority for disposal. • Neutralise spill material carefully and decontaminate empty containers and spill residues with 10% ammonia solution plus detergent or a proprietary decontaminant prior to disposal. • DO NOT seal or stopper drums being decontaminated as CO₂ gas is generated and may pressurise containers. • Puncture containers to prevent re-use • Bury or incinerate residues at an approved site.

14. TRANSPORT INFORMATION

ROAD AND RAIL TRANSPORT

Classified as Dangerous Goods by the criteria of the "Australian Code for the Transport of Dangerous Goods by Road & Rail" and the "New Zealand NZS5433: Transport of Dangerous Goods on Land".



UN No: 2810
Dangerous Goods Class: 6.1
Packing Group: II
Hazchem Code: 2X
Emergency Response Guide No: 36
Limited Quantities 100 ml

Proper Shipping Name: TOXIC LIQUID, ORGANIC, N.O.S. (CONTAINS TOLUENE DIISOCYANATE AND TOLUENE-2,6-DIISOCYANATE)

Segregation Dangerous Goods: Not to be loaded with explosives (Class 1), nitromethane, food and food packaging in any quantity. Note 1: Dangerous Goods of Class 6 which are fire risk substances are incompatible with dangerous goods of Class 1, Class 5.1 and Class 5.2. Note 2: Dangerous Goods of Class 6 which are cyanides are incompatible with acids. Exemptions may apply.

MARINE TRANSPORT

Classified as Dangerous Goods by the criteria of the International Maritime Dangerous Goods Code (IMDG Code) for transport by sea. This material is classified as a Marine Pollutant (P) according to the International Maritime Dangerous Goods Code.



UN No: 2810
Dangerous Goods Class: 6.1
Packing Group: II

Proper Shipping Name: TOXIC LIQUID, ORGANIC, N.O.S. (CONTAINS TOLUENE DIISOCYANATE AND TOLUENE-2,6-DIISOCYANATE)

AIR TRANSPORT

Classified as Dangerous Goods by the criteria of the International Air Transport Association (IATA) Dangerous Goods Regulations for transport by air.



UN No: 2810
Dangerous Goods Class: 6.1
Packing Group: II

Safety Data Sheet



Proper Shipping Name: TOXIC LIQUID, ORGANIC, N.O.S. (CONTAINS TOLUENE DIISOCYANATE AND TOLUENE-2,6-DIISOCYANATE)

15. REGULATORY INFORMATION

This material is not subject to the following international agreements:

- Montreal Protocol (Ozone depleting substances)
- The Stockholm Convention (Persistent Organic Pollutants)
- The Rotterdam Convention (Prior Informed Consent)
- Basel Convention (Hazardous Waste)
- International Convention for the Prevention of Pollution from Ships (MARPOL)

This material/constituent(s) is covered by the following requirements:

The Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) established under the Therapeutic Goods Act (Commonwealth): .

16. OTHER INFORMATION

Reason for issue: First Issue

This information was prepared in good faith from the best information available at the time of issue. It is based on the present level of research and to this extent we believe it is accurate. However, no guarantee of accuracy is made or implied and since conditions of use are beyond our control, all information relevant to usage is offered without warranty. The manufacturer will not be held responsible for any unauthorised use of this information or for any modified or altered versions.

If you are an employer it is your duty to tell your employees, and any others that may be affected, of any hazards described in this sheet and of any precautions that should be taken.

Safety Data Sheets are updated frequently. Please ensure you have a current copy.