

## HEXAMINE

InterAtlas Chemical Inc.

Chemwatch: 1328

Version No: 7.1

Safety Data Sheet according to OSHA HazCom Standard (2024) requirements

Chemwatch Hazard Alert Code: 3

Initial Date: 29/08/2006

Revision Date: 23/12/2022

Print Date: 15/06/2026

S.GHS.USA.EN

### SECTION 1 Identification

#### Product Identifier

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product name                  | HEXAMINE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Chemical Name                 | Not Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Synonyms                      | C6-H12-N4; HMTA; hexamethylenetetramine; hexamethyleneamine; 1,3,5,7-tetraazatricyclo[3.3.1.1]-decane; 1,3,5,7-tetraaza-adamantane; Aminoform; Ammoform; Cystamin; Cystogen; Formin; Formamine; Ammonioformaldehyde; Metramine; Hexaform; Uritone; Hexilmethyleneamine; Urotropine; Resotropin; Urotropin; Methenamine GR; aceto HMT; Antihydral; Heterin; HexaB; Hexasan; Methenamin; Methenamine; NSC 26346; Noccelar H; Preparation AF; Sanceler H; Sanceler HT; Uramin; Uratrine; Urodeine; Vulkacit H; Xametrin; |
| Proper shipping name          | Hexamethylenetetramine                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Chemical formula              | C6-H12-N4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Other means of identification | Not Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| CAS number                    | 100-97-0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

#### Recommended use of the chemical and restrictions on use

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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| Relevant identified uses | Used in the manufacture of explosive compounds, sealing compounds, hide preservatives, phenol-formaldehyde resin cross-linking agents, corrosion inhibitors, and lubrication and insulation oils. It is also used in the manufacture of adhesives, dye fixatives, shrink-proof textiles, and protein modifiers. Other uses include antiseptics, pharmaceuticals, fuel tablets for camping stoves and organic synthesis. Decomposes on heating to form highly irritating and flammable formaldehyde and ammonia gases. As the mandelic acid salt (generic methenamine mandelate, USP) it is used for the treatment of urinary tract infection. It decomposes at an acidic pH to form formaldehyde and ammonia, and the formaldehyde is bactericidal; the mandelic acid adds to this effect. Urinary acidity is typically ensured by co-administering vitamin C (ascorbic acid) or ammonium chloride. Its use had temporarily been reduced in the late 1990s, due to adverse effects, particularly chemically-induced hemorrhagic cystitis in overdose, but its use has now been re-approved because of the prevalence of antibiotic resistance to more commonly used drugs. This drug is particularly suitable for long-term prophylactic treatment of urinary tract infection, because bacteria do not develop resistance to formaldehyde. It should not be used in the presence of renal insufficiency. Methenamine in the form of cream and spray is successfully used for treatment of excessive sweating and concomitant odor. Together with 1,3,5-trioxane, hexamethylenetetramine is a component of hexamine fuel tablets used by campers, hobbyists, the military and relief organizations for heating camping food or military rations. It burns smokelessly, has a high energy density of 30.0 megajoules per kilogram (MJ/kg), does not liquify while burning, and leaves no ashes, although its fumes are toxic. Standardized 0.149 g tablets of methenamine (hexamine) are used by fire-protection laboratories as a clean and reproducible fire source to test the flammability of carpets and rugs. Methenamine silver stains are used for staining in histology. Hexamine is also used as a food additive as a preservative (INS number 239). It is approved for usage for this purpose in the EU, where it is listed under E number E239, however it is not approved in the USA, Russia, Australia, or New Zealand. A versatile reagent in organic synthesis. It is used in the Duff reaction (formylation of arenes) the Sommelet reaction (converting benzyl halides to aldehydes), [14] and in the Delepine reaction (synthesis of amines from alkyl halides). Hexamethylenetetramine is the base component to produce RDX and, consequently, C-4 as well as Octogen, hexamine dinitrate and HMTD. It has been proposed that hexamethylenetetramine could work as a molecular building block for self-assembled molecular crystals [-Intermediate -] Intermediate. |
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#### Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

|                         |                                                                            |
|-------------------------|----------------------------------------------------------------------------|
| Registered company name | InterAtlas Chemical Inc.                                                   |
| Address                 | 63 Church Street, Suite 301, St. Catharines Ontario L2R 3C4 Canada         |
| Telephone               | 905-684-9991                                                               |
| Fax                     | 905-684-4504                                                               |
| Website                 | <a href="http://www.interatlaschemical.com">www.interatlaschemical.com</a> |
| Email                   | Not Available                                                              |

#### Emergency phone number

|                                     |                                |                                     |
|-------------------------------------|--------------------------------|-------------------------------------|
| Association / Organisation          | CHEMTREC, US                   | CHEMWATCH EMERGENCY RESPONSE (24/7) |
| Emergency telephone number(s)       | 800-424-9300                   | +1 855-237-5573 (ID#: 1328)         |
| Other emergency telephone number(s) | International: +1-703-527-3887 | +61 3 9573 3188                     |

### SECTION 2 Hazard(s) identification

#### Classification of the substance or mixture

NFPA 704 diamond



Note: The hazard category numbers found in GHS classification in section 2 of this SDSs are NOT to be used to fill in the NFPA 704 diamond. Blue = Health, Red = Fire, Yellow = Reactivity and White = Special (Oxidizer or water reactive substances)

|                       |                                                                                                      |
|-----------------------|------------------------------------------------------------------------------------------------------|
| <b>Classification</b> | Flammable Solids Category 1, Sensitisation (Skin) Category 1, Sensitisation (Respiratory) Category 1 |
|-----------------------|------------------------------------------------------------------------------------------------------|

#### Label elements

|                            |                                                                                                                                                                     |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Hazard pictogram(s)</b> |   |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                    |               |
|--------------------|---------------|
| <b>Signal word</b> | <b>Danger</b> |
|--------------------|---------------|

#### Hazard statement(s)

|             |                                                                            |
|-------------|----------------------------------------------------------------------------|
| <b>H228</b> | Flammable solid.                                                           |
| <b>H317</b> | May cause an allergic skin reaction.                                       |
| <b>H334</b> | May cause allergy or asthma symptoms or breathing difficulties if inhaled. |

#### Hazard(s) not otherwise classified

Not Applicable

#### Precautionary statement(s) Prevention

|             |                                                                                                |
|-------------|------------------------------------------------------------------------------------------------|
| <b>P210</b> | Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. |
| <b>P261</b> | Avoid breathing dust/fumes.                                                                    |
| <b>P284</b> | [In case of inadequate ventilation] wear respiratory protection.                               |
| <b>P240</b> | Ground and bond container and receiving equipment.                                             |
| <b>P241</b> | Use explosion-proof electrical/ventilating/lighting/intrinsically safe equipment.              |
| <b>P272</b> | Contaminated work clothing must not be allowed out of the workplace.                           |
| <b>P280</b> | Wear protective gloves and protective clothing.                                                |

#### Precautionary statement(s) Response

|                  |                                                                                          |
|------------------|------------------------------------------------------------------------------------------|
| <b>P304+P340</b> | IF INHALED: Remove person to fresh air and keep comfortable for breathing.               |
| <b>P342+P311</b> | If experiencing respiratory symptoms: Call a POISON CENTER/doctor/physician/first aider. |
| <b>P370+P378</b> | In case of fire: Use water jets to extinguish.                                           |
| <b>P302+P352</b> | IF ON SKIN: Wash with plenty of water.                                                   |
| <b>P333+P313</b> | If skin irritation or rash occurs: Get medical advice/attention.                         |
| <b>P362+P364</b> | Take off contaminated clothing and wash it before reuse.                                 |

#### Precautionary statement(s) Storage

Not Applicable

#### Precautionary statement(s) Disposal

|             |                                                                                                                                  |
|-------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>P501</b> | Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation. |
|-------------|----------------------------------------------------------------------------------------------------------------------------------|

No further product hazard information.

### SECTION 3 Composition / information on ingredients

#### Substances

| CAS No        | %[weight] | Name                                        |
|---------------|-----------|---------------------------------------------|
| 100-97-0      | >=98      | <u>hexamine</u>                             |
| Not Available |           | NOTE: Slowly decomposes in water to produce |
| 50-00-0       |           | <u>formaldehyde</u>                         |
| 1336-21-6     |           | <u>ammonia</u>                              |

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

#### Mixtures

See section above for composition of Substances

### SECTION 4 First-aid measures

#### Description of first aid measures

Continued...

|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Eye Contact  | <p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> <li>▶ Wash out immediately with fresh running water.</li> <li>▶ 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.</li> <li>▶ Seek medical attention without delay; if pain persists or recurs seek medical attention.</li> <li>▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.</li> </ul>                                            |
| Skin Contact | <p>If skin contact occurs:</p> <ul style="list-style-type: none"> <li>▶ Immediately remove all contaminated clothing, including footwear.</li> <li>▶ Flush skin and hair with running water (and soap if available).</li> <li>▶ Seek medical attention in event of irritation.</li> </ul>                                                                                                                                                                                                                                                                                              |
| Inhalation   | <ul style="list-style-type: none"> <li>▶ If dust is inhaled, remove from contaminated area.</li> <li>▶ Encourage patient to blow nose to ensure clear passage of breathing.</li> <li>▶ If irritation or discomfort persists seek medical attention.</li> </ul>                                                                                                                                                                                                                                                                                                                         |
| Ingestion    | <ul style="list-style-type: none"> <li>▶ If swallowed do <b>NOT</b> induce vomiting.</li> <li>▶ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.</li> <li>▶ Observe the patient carefully.</li> <li>▶ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.</li> <li>▶ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.</li> <li>▶ Seek medical advice.</li> </ul> |

### Most important symptoms and effects, both acute and delayed

See Section 11

### Indication of any immediate medical attention and special treatment needed

May decompose in acid environment of stomach.

For acute or short-term repeated exposures to formaldehyde:

#### INGESTION:

- ▶ Patients present early with severe corrosion of the gastro-intestinal tract and systemic effects.
- ▶ Inflammation and ulceration may progress to strictures.
- ▶ Severe acidosis results from rapid conversion of formaldehyde to formic acid. Coma, hypotension, renal failure and apnoea complicate ingestion.
- ▶ Decontaminate by dilution with milk or water containing ammonium acetate; vomiting should be induced. Follow with gastric lavage using a weak ammonia solution (converts formaldehyde to relatively inert pentamethylenetetramine)
- ▶ Gastric lavage is warranted only in first 15 minutes following ingestion.

#### SKIN:

- ▶ Formaldehyde can combine with epidermal protein to produce a hapten-protein couple capable of sensitising T-lymphocytes. Subsequent exposures cause a type IV hypersensitivity reaction (i.e allergic contact dermatitis). [Ellenhorn & Barceloux: Medical Toxicology]

for irritant gas exposures:

- ▶ the presence of the agent when it is inhaled is evanescent (of short duration) and therefore, cannot be washed away or otherwise removed
- ▶ arterial blood gases are of primary importance to aid in determination of the extent of damage. Never discharge a patient significantly exposed to an irritant gas without obtaining an arterial blood sample.
- ▶ supportive measures include suctioning (intubation may be required), volume cycle ventilator support (positive and expiratory pressure (PEEP), steroids and antibiotics, after a culture is taken
- ▶ If the eyes are involved, an ophthalmologic consultation is recommended

Occupational Medicine: Third Edition; Zenz, Dickerson, Horvath 1994 Pub: Mosby

For acute or short term repeated exposures to ammonia and its solutions:

- ▶ Mild to moderate inhalation exposures produce headache, cough, bronchospasm, nausea, vomiting, pharyngeal and retrosternal pain and conjunctivitis. Severe inhalation produces laryngospasm, signs of upper airway obstruction (stridor, hoarseness, difficulty in speaking) and, in excessively, high doses, pulmonary oedema.
- ▶ Warm humidified air may soothe bronchial irritation.
- ▶ Test all patients with conjunctival irritation for corneal abrasion (fluorescein stain, slit lamp exam)
- ▶ Dyspneic patients should receive a chest X-ray and arterial blood gases to detect pulmonary oedema.

## SECTION 5 Fire-fighting measures

### Extinguishing media

For **SMALL FIRES**:

Dry chemical, CO2, water spray or foam.

For **LARGE FIRES**:

Water-spray, fog or foam.

### Special hazards arising from the substrate or mixture

|                      |                                                                                                                                          |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Fire Incompatibility | ▶ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------|

### Special protective equipment and precautions for fire-fighters

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fire Fighting         | <ul style="list-style-type: none"> <li>▶ Alert Fire Brigade and tell them location and nature of hazard.</li> <li>▶ Wear breathing apparatus plus protective gloves.</li> <li>▶ Prevent, by any means available, spillage from entering drains or water course.</li> <li>▶ Fight fire from a safe distance, with adequate cover.</li> <li>▶ If safe, switch off electrical equipment until vapour fire hazard removed.</li> <li>▶ Use water delivered as a fine spray to control fire and cool adjacent area.</li> <li>▶ Avoid spraying water onto liquid pools.</li> <li>▶ <b>DO NOT</b> approach containers suspected to be hot.</li> <li>▶ Cool fire exposed containers with water spray from a protected location.</li> <li>▶ If safe to do so, remove containers from path of fire.</li> </ul>                                                                               |
| Fire/Explosion Hazard | <ul style="list-style-type: none"> <li>▶ Flammable solid which burns and propagates flame easily, even when partly wetted with water.</li> <li>▶ Any source of ignition, i.e. friction, heat, sparks or flame, may cause fire or explosion.</li> <li>▶ May burn fiercely</li> <li>▶ May form explosive mixtures with air.</li> <li>▶ May <b>REIGNITE</b> after fire is extinguished.</li> <li>▶ Containers may explode on heating.</li> <li>▶ Solids may melt and flow when heated or involved in a fire.</li> <li>▶ Runoff may pollute waterways.</li> <li>▶ Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air.</li> <li>▶ Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.</li> </ul> |

Continued...

- ▶ Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport, thereby providing a source of ignition.
  - ▶ Decomposition products may be irritating, poisonous or corrosive.
- Combustion products include:
- ▶ carbon monoxide (CO)
  - ▶ carbon dioxide (CO<sub>2</sub>)
- formaldehyde  
nitrogen oxides (NO<sub>x</sub>)
- ▶ other pyrolysis products typical of burning organic material.

## SECTION 6 Accidental release measures

### Personal precautions, protective equipment and emergency procedures

See section 8

### Environmental precautions

See section 12

### Methods and material for containment and cleaning up

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|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Minor Spills | <ul style="list-style-type: none"> <li>▶ Remove all ignition sources.</li> <li>▶ <b>DO NOT touch or walk through spilled material.</b></li> <li>▶ Clean up all spills immediately.</li> <li>▶ Avoid contact with skin and eyes.</li> <li>▶ Prevent dust cloud.</li> <li>▶ With clean shovel (preferably non-sparking) place material into clean, dry container and cover loosely.</li> <li>▶ Move containers from spill area.</li> <li>▶ Control personal contact with the substance, by using protective equipment.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Major Spills | <ul style="list-style-type: none"> <li>▶ Clear area of personnel and move upwind.</li> <li>▶ Alert Fire Brigade and tell them location and nature of hazard.</li> <li>▶ <b>DO NOT touch or walk through spilled material.</b></li> <li>▶ Control personal contact with the substance, by using protective equipment.</li> <li>▶ Prevent, by any means available, spillage from entering drains or water course.</li> <li>▶ No smoking, naked lights or ignition sources.</li> <li>▶ Increase ventilation.</li> <li>▶ Stop leak if safe to do so.</li> <li>▶ Contain or cover with sand, earth or vermiculite.</li> <li>▶ Use only spark-free shovels and explosion proof equipment.</li> <li>▶ Collect recoverable product into labelled containers for recycling.</li> <li>▶ Collect solid residues and seal in labelled drums for disposal.</li> <li>▶ Wash area with water and dike for later disposal; prevent runoff into drains.</li> <li>▶ After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.</li> <li>▶ If contamination of drains or waterways occurs, advise emergency services.</li> </ul> |

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

## SECTION 7 Handling and storage

### Precautions for safe handling

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| Safe handling | <ul style="list-style-type: none"> <li>▶ Avoid skin contact, including inhalation.</li> <li>▶ Wear protective clothing when risk of overexposure occurs.</li> <li>▶ Use in a well-ventilated area.</li> <li>▶ Prevent concentration in hollows and sumps.</li> <li>▶ <b>DO NOT enter confined spaces until atmosphere has been checked.</b></li> <li>▶ <b>DO NOT</b> allow material to come in direct contact with human skin or eyes.</li> <li>▶ <b>DO NOT</b> allow material to come in contact with exposed food or food contact surfaces.</li> <li>▶ Suitable PPE must be worn at all times.</li> <li>▶ Avoid smoking, naked lights or ignition sources.</li> <li>▶ <b>When handling, DO NOT eat, drink or smoke.</b></li> <li>▶ Avoid contact with incompatible materials.</li> <li>▶ Keep containers securely sealed when not in use.</li> <li>▶ Avoid physical damage to containers.</li> <li>▶ Always wash hands with soap and water after handling.</li> <li>▶ Working clothes should be laundered separately. Launder contaminated clothing before re-use.</li> <li>▶ Use good occupational work practice.</li> <li>▶ Observe manufacturer's storage and handling recommendations contained within this SDS.</li> <li>▶ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.</li> <li>▶ Organic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidizing medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary explosions)</li> <li>▶ Minimise airborne dust and eliminate all ignition sources. Keep away from heat, hot surfaces, sparks, and flame.</li> <li>▶ Establish good housekeeping practices.</li> <li>▶ Remove dust accumulations on a regular basis by vacuuming or gentle sweeping to avoid creating dust clouds.</li> <li>▶ Use continuous suction at points of dust generation to capture and minimise the accumulation of dusts. Particular attention should be given to overhead and hidden horizontal surfaces to minimise the probability of a "secondary" explosion. According to NFPA Standard 654, dust layers 1/32 in. (0.8 mm) thick can be sufficient to warrant immediate cleaning of the area.</li> <li>▶ Do not use air hoses for cleaning.</li> <li>▶ Minimise dry sweeping to avoid generation of dust clouds. Vacuum dust-accumulating surfaces and remove to a chemical disposal area. Vacuums with explosion-proof motors should be used.</li> <li>▶ Control sources of static electricity. Dusts or their packages may accumulate static charges, and static discharge can be a source of ignition.</li> <li>▶ Solids handling systems must be designed in accordance with applicable standards (e.g. NFPA including 654 and 77) and other national guidance.</li> <li>▶ Do not empty directly into flammable solvents or in the presence of flammable vapors.</li> <li>▶ The operator, the packaging container and all equipment must be grounded with electrical bonding and grounding systems. Plastic bags and plastics cannot be grounded, and antistatic bags do not completely protect against development of static charges.</li> </ul> <p>Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.</p> <ul style="list-style-type: none"> <li>▶ <b>Do NOT cut, drill, grind or weld such containers.</b></li> </ul> |
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## HEXAMINE

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|                   | <ul style="list-style-type: none"> <li>In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Other information | <p><b>FOR MINOR QUANTITIES:</b></p> <ul style="list-style-type: none"> <li>Store in an indoor fireproof cabinet or in a room of noncombustible construction.</li> <li>Provide adequate portable fire-extinguishers in or near the storage area.</li> </ul> <p><b>FOR PACKAGE STORAGE:</b></p> <ul style="list-style-type: none"> <li>Store in original containers in approved flame-proof area.</li> <li>No smoking, naked lights, heat or ignition sources.</li> <li><b>DO NOT store in pits, depressions, basements or areas where vapours may be trapped.</b></li> <li>Keep containers securely sealed.</li> <li>Store away from incompatible materials in a cool, dry, well ventilated area.</li> <li>Protect containers against physical damage and check regularly for leaks.</li> <li>Protect containers from exposure to weather and from direct sunlight unless: (a) the packages are of metal or plastic construction; (b) the packages are securely closed are not opened for any purpose while in the area where they are stored and (c) adequate precautions are taken to ensure that rain water, which might become contaminated by the dangerous goods, is collected and disposed of safely.</li> <li>Ensure proper stock-control measures are maintained to prevent prolonged storage of dangerous goods.</li> <li>Observe manufacturer's storage and handling recommendations contained within this SDS.</li> </ul> |

### Conditions for safe storage, including any incompatibilities

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| Suitable container      | <ul style="list-style-type: none"> <li>Glass container is suitable for laboratory quantities</li> </ul> <p>For low viscosity materials and solids:<br/>Drums and jerricans must be of the non-removable head type.<br/>Where a can is to be used as an inner package, the can must have a screwed enclosure.<br/>For materials with a viscosity of at least 2680 cSt. (23 deg. C):</p> <ul style="list-style-type: none"> <li>Removable head packaging and</li> <li>cans with friction closures may be used.</li> </ul> <p>-</p> <p>Where combination packages are used, there must be sufficient inert absorbent material to absorb completely any leakage that may occur, unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.<br/>All combination packages for Packing group I and II must contain cushioning material.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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| Storage incompatibility | <p>Hexamine (hexamethylenetetramine):</p> <ul style="list-style-type: none"> <li>is hygroscopic and heat sensitive</li> <li>is weakly basic in aqueous solution</li> <li>reacts violently with strong oxidisers, sodium peroxide, nitric acid, 1-bromopentaborane(9) (may explode above 194 deg C), cellulose nitrate of high surface area, iodine (deflagrates at 138 deg C), iodoform (may explode above 175 deg C)</li> <li>may form heat-sensitive explosive materials with digold ketenide</li> <li>is incompatible with acids, acid halides, acrylates, alcohols, substituted allyls, aldehydes, alkylene oxides, anhydrides including maleic anhydride, cresols, caprolactam solution, epichlorohydrin, epoxides including butyl glycidyl ether, isocyanates, glycols, halogenated organics, ketones, peroxides, phenols, vinyl acetate</li> <li>may increase explosive sensitivity of nitromethane</li> <li>may generate flammable hydrogen gas on contact with strong reducing agents including hydrides, nitrides and sulfides</li> <li>attacks copper and copper alloys</li> <li>when heated above 200 deg C decomposes producing toxic and corrosive gases including hydrogen cyanide, ammonia and formaldehyde</li> </ul> <p>Formaldehyde:</p> <ul style="list-style-type: none"> <li>is a strong reducing agent</li> <li>may polymerise in air unless properly inhibited (usually with methanol up to 15%) and stored at controlled temperatures</li> <li>will polymerize with active organic material such as phenol</li> <li>reacts violently with strong oxidisers, hydrogen peroxide, potassium permanganate, acrylonitrile, caustics (sodium hydroxide, yielding formic acid and flammable hydrogen), magnesium carbonate, nitromethane, nitrogen oxides (especially at elevated temperatures), peroxyformic acid</li> <li>is incompatible with strong acids (hydrochloric acid forms carcinogenic bis(chloromethyl)ether*), amines, ammonia, aniline, bisulfides, gelatin, iodine, magnesite, phenol, some monomers, tannins, salts of copper, iron, silver.</li> <li>acid catalysis can produce impurities: methylal, methyl formate</li> </ul> <p>Aqueous solutions of formaldehyde:</p> <ul style="list-style-type: none"> <li>slowly oxidise in air to produce formic acid</li> <li>attack carbon steel</li> </ul> <p>Concentrated solutions containing formaldehyde are:</p> <ul style="list-style-type: none"> <li>unstable, both oxidising slowly to form formic acid and polymerising; in dilute aqueous solutions formaldehyde appears as monomeric hydrate (methylene glycol) - the more concentrated the solution the more polyoxymethylene glycol occurs as oligomers and polymers (methanol and amine-containing compounds inhibit polymer formation)</li> <li>readily subject to polymerisation, at room temperature, in the presence of air and moisture, to form paraformaldehyde (8-100 units of formaldehyde), a solid mixture of linear polyoxymethylene glycols containing 90-99% formaldehyde; a cyclic trimer, trioxane (CH<sub>2</sub>O)<sub>3</sub>, may also form</li> </ul> <p>Flammable and/or toxic gases are generated by the combination of aldehydes with azo, diazo compounds, dithiocarbamates, nitrides, and strong reducing agents</p> <p>*The empirical equation may be used to determine the concentration of bis(chloromethyl)ether (BCME) formed by reaction with HCl:<br/>log(BCME)ppb = -2.25 + 0.67• log(HCHO) ppm + 0.77• log(HCl)ppm<br/>Assume values for formaldehyde, in air, of 1 ppm and for HCl of 5 ppm, resulting BCME concentration, in air, would be 0.02 ppb.</p> <p>For ammonia:</p> <ul style="list-style-type: none"> <li>Ammonia forms explosive mixtures with oxygen, chlorine, bromine, fluorine, iodine, mercury, platinum and silver.</li> <li>Fire and/or explosion may follow contact with acetaldehyde, acrolein, aldehydes, alkylene oxides, amides, antimony, boron, boron halides, bromine chloride, chloric acid, chlorine monoxide, o-chloronitrobenzene, 1-chloro-2,4-nitrobenzene, chlorosilane, chloromelamine, chromium trioxide, chromyl chloride, epichlorohydrin, hexachloromelamine, hypochlorites (do NOT mix ammonia with liquid household bleach), isocyanates, nitrogen tetroxide, nitrogen trichloride, nitryl chloride, organic anhydrides, phosphorous trioxide, potassium ferricyanide, potassium mercuric cyanide, silver chloride, stibine, tellurium halides, tellurium hydropentachloride, tetramethylammonium amide, trimethylammonium amide, trioxigen difluoride, vinyl acetate.</li> <li>Shock-, temperature-, and pressure sensitive compounds are formed with antimony, chlorine, germanium compounds, halogens, heavy metals, hydrocarbons, mercury oxide, silver compounds (azides, chlorides, nitrates, oxides).</li> <li>Vapours or solutions of ammonia are corrosive to copper, copper alloys, galvanised metal and aluminium. Mixtures of ammonia and air lying within the explosive limits can occur above aqueous solutions of varying strengths.</li> <li>Avoid contact with sodium hydroxide, iron and cadmium.</li> <li>Several incidents involving sudden "boiling" (occasionally violent) of a concentrated solution (d, 0.880, 35 wt %) have occurred when screw-capped winchesters are opened. These are attributable to supersaturation of the solution with gas caused by increases in temperature subsequent to preparation and bottling. The effect is particularly marked with winchesters filled in winter and opened in summer.</li> <li>Ammonia polymerises violently with ethylene oxide.</li> <li>Ammonia attacks some coatings, plastics and rubber.</li> <li>Attacks copper, bronze, brass, aluminium, steel and their alloys.</li> <li>Avoid reaction with oxidising agents</li> </ul> |



X — Must not be stored together  
0 — May be stored together with specific preventions  
+ — May be stored together

**Note:** Depending on other risk factors, compatibility assessment based on the table above may not be relevant to storage situations, particularly where large volumes of dangerous goods are stored and handled. Reference should be made to the Safety Data Sheets for each substance or article and risks assessed accordingly.

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

| Source                                               | Ingredient   | Material name              | TWA       | STEL          | Peak                | Notes                                                         |
|------------------------------------------------------|--------------|----------------------------|-----------|---------------|---------------------|---------------------------------------------------------------|
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | formaldehyde | Formaldehyde               | 0.75 ppm  | 2 ppm         | Not Available       | Not Available                                                 |
| US NIOSH Recommended Exposure Limits (RELs)          | formaldehyde | Formalin (as formaldehyde) | 0.016 ppm | Not Available | 0.1 (15-minute) ppm | Ca; See Appendix A - NIOSH Potential Occupational Carcinogens |
| US NIOSH Recommended Exposure Limits (RELs)          | formaldehyde | Formaldehyde               | 0.016 ppm | Not Available | 0.1 (15-minute) ppm | Ca; See Appendix A - NIOSH Potential Occupational Carcinogens |

Emergency Limits

| Ingredient   | TEEL-1        | TEEL-2        | TEEL-3        |
|--------------|---------------|---------------|---------------|
| hexamine     | 55 mg/m3      | 610 mg/m3     | 3,600 mg/m3   |
| formaldehyde | Not Available | Not Available | Not Available |
| ammonia      | 61 ppm        | 330 ppm       | 2,300 ppm     |

| Ingredient   | Original IDLH | Revised IDLH  |
|--------------|---------------|---------------|
| hexamine     | Not Available | Not Available |
| formaldehyde | 20 ppm        | Not Available |
| ammonia      | Not Available | Not Available |

Exposure controls

|                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                      |            |                                                                                                                                                                |                            |                                                                                                                                                      |                              |                        |                        |                                                       |                                 |                                                           |                                  |                                  |                               |                                           |                                  |
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| <b>Appropriate engineering controls</b>                                                                                                                        | <p>For large scale or continuous use:</p> <ul style="list-style-type: none"><li>▶ Spark-free, earthed ventilation system, venting directly to the outside and separate from usual ventilation systems</li><li>▶ Provide dust collectors with explosion vents</li></ul> <p>CARE: Explosive vapour air mixtures may be present on opening vessels which have contained liquid ammonia. Fatalities have occurred 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:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>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.</p> <p>Employers may need to use multiple types of controls to prevent employee overexposure.</p> <ul style="list-style-type: none"><li>▶ Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.</li><li>▶ Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.</li><li>▶ If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered.</li></ul> <p>Such protection might consist of:</p> <p>(a): particle dust respirators, if necessary, combined with an absorption cartridge;</p> <p>(b): filter respirators with absorption cartridge or canister of the right type;</p> <p>(c): fresh-air hoods or masks</p> <ul style="list-style-type: none"><li>▶ Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.</li><li>▶ Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.</li></ul> <p>Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.</p> <table><tr><td>Type of Contaminant:</td><td>Air Speed:</td></tr><tr><td>direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)</td><td>1-2.5 m/s (200-500 ft/min)</td></tr><tr><td>grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).</td><td>2.5-10 m/s (500-2000 ft/min)</td></tr></table> <p>Within each range the appropriate value depends on:</p> <table><tr><td>Lower end of the range</td><td>Upper end of the range</td></tr><tr><td>1: Room air currents minimal or favourable to capture</td><td>1: Disturbing room air currents</td></tr><tr><td>2: Contaminants of low toxicity or of nuisance value only</td><td>2: Contaminants of high toxicity</td></tr><tr><td>3: Intermittent, low production.</td><td>3: High production, heavy use</td></tr><tr><td>4: Large hood or large air mass in motion</td><td>4: Small hood-local control only</td></tr></table> | 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 ft/min) | grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion). | 2.5-10 m/s (500-2000 ft/min) | 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 |
| 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 ft/min)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                      |            |                                                                                                                                                                |                            |                                                                                                                                                      |                              |                        |                        |                                                       |                                 |                                                           |                                  |                                  |                               |                                           |                                  |
| grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).           | 2.5-10 m/s (500-2000 ft/min)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                      |            |                                                                                                                                                                |                            |                                                                                                                                                      |                              |                        |                        |                                                       |                                 |                                                           |                                  |                                  |                               |                                           |                                  |
| 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                      |            |                                                                                                                                                                |                            |                                                                                                                                                      |                              |                        |                        |                                                       |                                 |                                                           |                                  |                                  |                               |                                           |                                  |

## HEXAMINE

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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 4-10 m/s (800-2000 ft/min) for extraction of crusher dusts generated 2 metres 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Individual protection measures, such as personal protective equipment |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Eye and face protection                                               | <ul style="list-style-type: none"> <li>▶ Safety glasses with side shields.</li> <li>▶ Chemical goggles.[AS/NZS 1337.1, EN166 or national equivalent]</li> <li>▶ 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].</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Skin protection                                                       | See Hand protection below                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Hands/feet protection                                                 | <p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>▶ 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.</li> <li>▶ Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.</li> </ul> <p>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.</p> <p>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.</p> <p>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.</p> <p>Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:</p> <ul style="list-style-type: none"> <li>· frequency and duration of contact,</li> <li>· chemical resistance of glove material,</li> <li>· glove thickness and</li> <li>· dexterity</li> </ul> <p>Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).</p> <ul style="list-style-type: none"> <li>· 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.</li> <li>· 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.</li> <li>· Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use.</li> <li>· Contaminated gloves should be replaced.</li> </ul> <p>As defined in ASTM F-739-96 in any application, gloves are rated as:</p> <ul style="list-style-type: none"> <li>· Excellent when breakthrough time &gt; 480 min</li> <li>· Good when breakthrough time &gt; 20 min</li> <li>· Fair when breakthrough time &lt; 20 min</li> <li>· Poor when glove material degrades</li> </ul> <p>For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended.</p> <p>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.</p> <p>Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers technical data should always be taken into account to ensure selection of the most appropriate glove for the task.</p> <p>Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example:</p> <ul style="list-style-type: none"> <li>· 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.</li> <li>· 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</li> </ul> <p>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.</p> <ul style="list-style-type: none"> <li>▶ Wear physical protective gloves, e.g. leather.</li> <li>▶ Wear safety footwear.</li> </ul> |
| Body protection                                                       | See Other protection below                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Other protection                                                      | <ul style="list-style-type: none"> <li>▶ Overalls.</li> <li>▶ Eyewash unit.</li> <li>▶ Barrier cream.</li> <li>▶ Skin cleansing cream.</li> <li>▶ Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.</li> <li>▶ For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets).</li> <li>▶ Non sparking safety or conductive footwear should be considered. Conductive footwear describes a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot and shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds. Electrical resistance must range between 0 to 500,000 ohms. Conductive shoes should be stored in lockers close to the room in which they are worn. Personnel who have been issued conductive footwear should not wear them from their place of work to their homes and return.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## Recommended material(s)

## GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:

"Forsberg Clothing Performance Index".

The effect(s) of the following substance(s) are taken into account in the **computer-generated** selection:

HEXAMINE

| Material | CPI |
|----------|-----|
|----------|-----|

## Respiratory protection

Type BKAX-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

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.

Continued...

|                  |   |
|------------------|---|
| BUTYL            | A |
| NEOPRENE         | A |
| NEOPRENE/NATURAL | A |
| NATURAL+NEOPRENE | B |
| NITRILE          | B |
| HYPALON          | C |
| NATURAL RUBBER   | C |
| NITRILE+PVC      | C |
| PE               | C |
| PE/EVAL/PE       | C |
| PVC              | C |
| TEFLON           | C |
| VITON            | C |

\* CPI - Chemwatch Performance Index  
A: Best Selection  
B: Satisfactory; may degrade after 4 hours continuous immersion  
C: Poor to Dangerous Choice for other than short term immersion  
**NOTE:** As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -  
\* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

| Required minimum protection factor | Maximum gas/vapour concentration present in air p.p.m. (by volume) | Half-face Respirator | Full-Face Respirator  |
|------------------------------------|--------------------------------------------------------------------|----------------------|-----------------------|
| up to 10                           | 1000                                                               | BKAX-AUS / Class1 P2 | -                     |
| up to 50                           | 1000                                                               | -                    | BKAX-AUS / Class 1 P2 |
| up to 50                           | 5000                                                               | Airline *            | -                     |
| up to 100                          | 5000                                                               | -                    | BKAX-2 P2             |
| up to 100                          | 10000                                                              | -                    | BKAX-3 P2             |
| 100+                               |                                                                    |                      | Airline**             |

\* - Continuous Flow \*\* - Continuous-flow or positive pressure demand  
A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)  
· Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.  
· The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).  
· Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory protection. These may be government mandated or vendor recommended.  
· Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.  
· Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU)  
· Use approved positive flow mask if significant quantities of dust becomes airborne.  
· Try to avoid creating dust conditions.

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                     |                |
|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|----------------|
| Appearance                                     | White powder or colourless crystals. Mild ammonia odour. Soluble in water, alcohol, acetone and chloroform. Aqueous solutions slowly dissociate releasing formaldehyde and ammonia. The molecule has a symmetric tetrahedral cage-like structure, similar to adamantane, whose four "corners" are nitrogen atoms and "edges" are methylene bridges. Although the molecular shape defines a cage, no void space is available at the interior for binding other atoms or molecules, unlike crown ethers or larger cryptand structures. The molecule behaves like an amine base, undergoing protonation and N-alkylation |                                                     |                |
| Physical state                                 | Divided Solid                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Relative density (Water = 1)                        | 1.33 @ 20 C    |
| Odour                                          | Not Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Partition coefficient n-octanol / water             | Not Available  |
| Odour threshold                                | Not Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Auto-ignition temperature (°C)                      | 390            |
| pH (as supplied)                               | Not Applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Decomposition temperature (°C)                      | Not Available  |
| Melting point / freezing point (°C)            | 285-295 (Decomp)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Viscosity (cSt)                                     | Not Applicable |
| Initial boiling point and boiling range (°C)   | 263 (Sublimes.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Molecular weight (g/mol)                            | 140.19         |
| Flash point (°C)                               | 250                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Taste                                               | Not Available  |
| Evaporation rate                               | Not Applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Explosive properties                                | Not Available  |
| Flammability                                   | HIGHLY FLAMMABLE.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Oxidising properties                                | Not Available  |
| Upper Explosive Limit (%)                      | Not Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Surface Tension (dyn/cm or mN/m)                    | Not Applicable |
| Lower Explosive Limit (%)                      | Not Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Volatile Component (%vol)                           | Not Applicable |
| Vapour pressure (kPa)                          | Not Applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Gas group                                           | Not Available  |
| Solubility in water                            | Miscible                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | pH as a solution (1%)                               | 8.4 (0.2M aq)  |
| Vapour density (Air = 1)                       | 4.9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | VOC g/L                                             | Not Available  |
| Heat of Combustion (kJ/g)                      | Not Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Ignition Distance (cm)                              | Not Available  |
| Flame Height (cm)                              | Not Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Flame Duration (s)                                  | Not Available  |
| Enclosed Space Ignition Time Equivalent (s/m3) | Not Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Enclosed Space Ignition Deflagration Density (g/m3) | Not Available  |
| Nanoform Solubility                            | Not Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Nanoform Particle Characteristics                   | Not Available  |
| Particle Size                                  | Not Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                     |                |

SECTION 10 Stability and reactivity

|            |               |
|------------|---------------|
| Reactivity | See section 7 |
|------------|---------------|

|                                    |                                                                                                                                                                                                  |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chemical stability                 | <ul style="list-style-type: none"><li>▶ Unstable in the presence of incompatible materials.</li><li>▶ Product is considered stable.</li><li>▶ Hazardous polymerisation will not occur.</li></ul> |
| Possibility of hazardous reactions | See section 7                                                                                                                                                                                    |
| Conditions to avoid                | See section 7                                                                                                                                                                                    |
| Incompatible materials             | See section 7                                                                                                                                                                                    |
| Hazardous decomposition products   | See section 5                                                                                                                                                                                    |

SECTION 11 Toxicological information

Information on toxicological effects

|                                      |                                                                                                         |
|--------------------------------------|---------------------------------------------------------------------------------------------------------|
| a) Acute Toxicity                    | Based on available data, the classification criteria are not met.                                       |
| b) Skin Irritation/Corrosion         | Based on available data, the classification criteria are not met.                                       |
| c) Serious Eye Damage/Irritation     | Based on available data, the classification criteria are not met.                                       |
| d) Respiratory or Skin sensitisation | There is sufficient evidence to classify this material as sensitising to skin or the respiratory system |
| e) Mutagenicity                      | Based on available data, the classification criteria are not met.                                       |
| f) Carcinogenicity                   | Based on available data, the classification criteria are not met.                                       |
| g) Reproductivity                    | Based on available data, the classification criteria are not met.                                       |
| h) STOT - Single Exposure            | Based on available data, the classification criteria are not met.                                       |
| i) STOT - Repeated Exposure          | Based on available data, the classification criteria are not met.                                       |
| j) Aspiration Hazard                 | Based on available data, the classification criteria are not met.                                       |

|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Inhaled      | <p>The material is not thought to produce either adverse health effects or irritation of the respiratory tract following inhalation (as classified by EC Directives using animal models). Nevertheless, adverse systemic effects have been produced following exposure of animals by at least one other route and good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.</p> <p>Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.</p> <p>If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.</p> <p>The highly irritant properties of ammonia vapour result as the gas dissolves in mucous fluids and forms irritant, even corrosive solutions. Inhalation of the ammonia fumes causes coughing, vomiting, reddening of lips, mouth, nose, throat and conjunctiva while higher concentrations can cause temporary blindness, restlessness, tightness in the chest, pulmonary oedema (lung damage), weak pulse and cyanosis.</p> <p>Inhalation of high concentrations of vapour may cause breathing difficulty, tightness in chest, pulmonary oedema and lung damage. Brief exposure to high concentrations &gt; 5000 ppm may cause death due to asphyxiation (suffocation) or fluid in the lungs.</p> <p>Prolonged or regular minor exposure to the vapour may cause persistent irritation of the eyes, nose and upper respiratory tract. Massive ammonia exposures may produce chronic airway hyperactivity and asthma with associated pulmonary function changes. The average nasal retention of ammonia by human subjects was found to be 83%.</p> |
| Ingestion    | <p>Ingestion of 1-2-gms can produce vomiting, diarrhoea, abdominal pain, inflammatory lesions in the renal tubules, renal pelvis and urinary bladder and albumin and blood in the urine.</p> <p>Accidental ingestion of the material may be damaging to the health of the individual.</p> <p>Large doses of ammonia or injected ammonium salts may produce diarrhoea and may be sufficiently absorbed to produce increased production of urine and systemic poisoning. Symptoms include weakening of facial muscle, tremor, anxiety, reduced muscle and limb control.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Skin Contact | <p>Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions.</p> <p>There is some evidence to suggest that this material can cause inflammation of the skin on contact in some persons.</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>Entry into the blood-stream, through, for example, cuts, abrasions 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.</p> <p>Mild skin reaction is seen with contact of the vapour of this material on moist skin. High concentrations or direct contact with solutions produces severe pain, a stinging sensation, burns and blisters and possible brown stains. Death could result from extensive burning. Vapour exposure may rarely, produce an itchy rash.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Eye          | <p>Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may cause transient discomfort characterised by tearing or conjunctival redness (as with windburn). Slight abrasive damage may also result.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Chronic      | <p>Inhaling this product is more likely to cause a sensitisation reaction in some persons compared to the general population.</p> <p>Skin contact with the material is more likely to cause a sensitisation reaction in some persons compared to the general population.</p> <p>Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.</p> <p>Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis, caused by particles less than 0.5 micron penetrating and remaining in the lung.</p> <p>Prolonged or repeated minor exposure to ammonia gas/vapour may cause long-term irritation to the eyes, nose and upper airway. Repeated exposure or prolonged contact may produce skin inflammation and conjunctivitis. Other effects may include ulcers in the mouth and disturbances to the bronchi and gastrointestinal tract. In animals, repeated exposure to sublethal levels produces adverse effects on the airways, liver, kidneys and spleen, as well as eye irritation and clouding of the cornea.</p> <p>Hexamine (also known as hexamethylenetetramine, HMT or HMTA) is a known skin sensitizer and some individuals develop skin irritation from contact with the solid, vapour or solution.</p> <p>Respiratory sensitisation may result in allergic/asthma like responses; from coughing and minor breathing difficulties to bronchitis with wheezing, gasping.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

|          |                                               |                                                                  |
|----------|-----------------------------------------------|------------------------------------------------------------------|
| HEXAMINE | TOXICITY                                      | IRRITATION                                                       |
|          | dermal (rat) LD50: >2000 mg/kg <sup>[1]</sup> | Eye: no adverse effect observed (not irritating) <sup>[1]</sup>  |
|          | Oral (Mouse) LD50; 569 mg/kg <sup>[2]</sup>   | Skin: no adverse effect observed (not irritating) <sup>[1]</sup> |

Legend: 1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. Value obtained from manufacturer's SDS. Unless otherwise

specified data extracted from RTECS - Register of Toxic Effect of chemical Substances

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HEXAMINE                | <p>Allergic reactions involving the respiratory tract are usually due to interactions between IgE antibodies and allergens and occur rapidly. Allergic potential of the allergen and period of exposure often determine the severity of symptoms. Some people may be genetically more prone than others, and exposure to other irritants may aggravate symptoms. Allergy causing activity is due to interactions with proteins. Attention should be paid to atopic diathesis, characterised by increased susceptibility to nasal inflammation, asthma and eczema. Exogenous allergic alveolitis is induced essentially by allergen specific immune-complexes of the IgG type; cell-mediated reactions (T lymphocytes) may be involved. Such allergy is of the delayed type with onset up to four hours following exposure. Formaldehyde generators (releasers) are often used as preservatives. The maximum authorised concentration of free formaldehyde is 0.2% and must be labelled with the warning sign "contains formaldehyde" where the concentration exceeds 0.05%.The use of formaldehyde-releasing preservatives ensures that the level of free formaldehyde in the products is always low but sufficient to inhibit microbial growth - it disrupts metabolism to cause death of the organism. However there is a concern that formaldehyde generators can produce amines capable of causing cancers (nitrosamines) when used in formulations containing amines.</p> <p>Large quantities of hexamine (syn. hexamethylenetetramine, HMT) are used in the foundry, tyre and rubber, and phenol/ formaldehyde resins industries and in other diverse applications. Excessive exposure to solid hexamine or its vapour has been reported to cause dermatitis and respiratory allergies. Although hexamine produces a positive Ames test, most animal studies have shown hexamine to be of very low genetic risk even in very high doses. The effectiveness of hexamine as an antibacterial agent has been attributed to its slow hydrolysis to ammonia and formaldehyde. Concerns have developed in industries which use hexamine at high temperatures over emissions of HCN, NH3, CO, CO2, nitrogen oxides, and formaldehyde. The studies reviewed are in general agreement that hexamine thermal decomposition in the temperature range of 300-800 degrees C is characterised by an increase in HCN and a decrease in NH3 emissions with increasing temperature. At temperatures of 200-300 degrees C hexamine decomposition is reported to produce mainly ammonia and formaldehyde. As the toxicological effects of hexamine appear to be due to the liberation of formaldehyde and its oxidation product, formic acid, much work has been done on formaldehyde and formates as well as on hexamine. The metabolic studies point to rapid conversion of formaldehyde to formate and then at a slower rate to water and carbon dioxide particularly by the liver and the erythrocytes. In man, very little formate is excreted in the urine after its oral ingestion. Only one of many long-term studies in mice conflicts with other studies in this species as well as in the rat. These long-term studies point to a dietary level of 1% hexamine as causing no effect in rodents. The teratogenicity study in dogs revealed a no effect level of 15 mg/kg. Other reproduction studies in rats using dietary levels from 0.1-1% hexamine revealed no adverse effects. Although there is production of local sarcomata in rats at the site of repeated injections, the probability of carcinogenic potential in food additive use appears to be excluded as a result of the findings in adequate studies using oral administration. In addition, the experiments on pregnant and lactating rats indicate the absence of carcinogenic effects in the offspring. However, in vitro formation of nitrosamine has been reported as a result of the interaction of nitrite with hexamethylenetetramine at pH 1-3</p> <p>Under acid conditions, or in the presence of proteins, hexamethylenetetramine decomposes gradually yielding ammonia and formaldehyde. There is a theoretical possibility that bis-chloromethyl ethers may be formed in the stomach from the reaction of formaldehyde with chloride ions. However, whilst this occurs readily in the gaseous phase it is much less likely in liquid phases. Because of these chemical and biochemical properties it is pertinent to consider biochemical information on formaldehyde and its metabolite formic acid in relation to the toxicological evaluation of hexamine</p> |
| FORMALDEHYDE            | <p>The material may cause severe skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin. Repeated exposures may produce severe ulceration.</p> <p><b>WARNING:</b> This substance has been classified by the IARC as Group 1: <b>CARCINOGENIC TO HUMANS</b>. Tenth Annual Report on Carcinogens: Substance anticipated to be Carcinogen<br/><b>[National Toxicology Program: U.S. Dep. of Health &amp; Human Services 2002]</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| HEXAMINE & FORMALDEHYDE | <p>The following information refers to contact allergens as a group and may not be specific to this product. Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitisation potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitising substance which is widely distributed can be a more important allergen than one with stronger sensitising potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| FORMALDEHYDE & AMMONIA  | <p>No significant acute toxicological data identified in literature search.</p> <p>The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.</p> <p>Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. On the other hand, industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and is completely reversible after exposure ceases. The disorder is characterized by difficulty breathing, cough and mucus production.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

|                                   |   |                          |   |
|-----------------------------------|---|--------------------------|---|
| Acute Toxicity                    | ✗ | Carcinogenicity          | ✗ |
| Skin Irritation/Corrosion         | ✗ | Reproductivity           | ✗ |
| Serious Eye Damage/Irritation     | ✗ | STOT - Single Exposure   | ✗ |
| Respiratory or Skin sensitisation | ✓ | STOT - Repeated Exposure | ✗ |
| Mutagenicity                      | ✗ | Aspiration Hazard        | ✗ |

Legend: ✗ – Data either not available or does not fill the criteria for classification  
✓ – Data available to make classification

SECTION 12 Ecological information

|          |           |                    |                               |                 |        |
|----------|-----------|--------------------|-------------------------------|-----------------|--------|
| Toxicity |           |                    |                               |                 |        |
| HEXAMINE | Endpoint  | Test Duration (hr) | Species                       | Value           | Source |
|          | NOEC(ECx) | 336h               | Algae or other aquatic plants | 1500mg/L        | 2      |
|          | EC50      | 48h                | Crustacea                     | 29868-43390mg/L | 4      |
|          | LC50      | 96h                | Fish                          | >10000mg/l      | 2      |

Continued...

**Legend:** *Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. US EPA, Ecotox database - Aquatic Toxicity Data 4. ECETOC Aquatic Hazard Assessment Data 5. NITE (Japan) - Bioconcentration Data 6. METI (Japan) - Bioconcentration Data 7. Vendor Data*

log Kow : -2.13- -2.34 BOD 5 if unstated: 0.015-0.026

For Ammonia:

Atmospheric Fate: Ammonia reacts rapidly with available acids (mainly sulfuric, nitric, and sometimes hydrochloric acid) to form the corresponding salts. Ammonia is persistent in the air.

Aquatic Fate: Biodegrades rapidly to nitrate, producing a high oxygen demand. Non-persistent in water (half-life 2 days).

Ecotoxicity: Moderately toxic to fish under normal temperature and pH conditions and harmful to aquatic life at low concentrations. Does not concentrate in food chain.

For Formaldehyde:

Environmental Fate: Formaldehyde is common in the environment as a contaminant of smoke and as photochemical smog. Concentrated solutions containing formaldehyde are unstable and oxidize slowly. In the presence of air and moisture, polymerization takes place readily in concentrated solutions at room temperature to form paraformaldehyde.

Atmospheric Fate: In the atmosphere, formaldehyde both photolysis and reacts with reactive free radicals (primarily hydroxyl radicals). Reaction with nitrate radicals, insignificant during the day, may be an important removal process at night. Air Quality Standards : <0.1 mg/m3 as a 30 min. average, indoor air, non-industrial buildings (WHO guideline).

Aquatic Fate: Due to its solubility, formaldehyde will efficiently transfer to rain and surface water and will biodegrade to low concentrations within days. Adsorption to sediment and volatilization are not expected to be significant routes of biodegradation.

Drinking Water Standard: Formaldehyde: 900 ug/L. (WHO guideline).

Terrestrial Fate: In soil, aqueous solutions of formaldehyde leach through the soil; at high concentrations adsorption to clay minerals may occur. Although biodegradable under both aerobic and anaerobic conditions the fate of formaldehyde in soil is unclear.

Ecotoxicity: Formaldehyde does not bioconcentrate in the food chain.

**DO NOT discharge into sewer or waterways.**

#### Persistence and degradability

| Ingredient   | Persistence: Water/Soil   | Persistence: Air            |
|--------------|---------------------------|-----------------------------|
| hexamine     | HIGH                      | HIGH                        |
| formaldehyde | LOW (Half-life = 14 days) | LOW (Half-life = 2.97 days) |

#### Bioaccumulative potential

| Ingredient   | Bioaccumulation      |
|--------------|----------------------|
| hexamine     | LOW (LogKOW = -4.15) |
| formaldehyde | LOW (LogKOW = 0.35)  |
| ammonia      | LOW (LogKOW = -2.66) |

#### Mobility in soil

| Ingredient   | Mobility             |
|--------------|----------------------|
| hexamine     | LOW (Log KOC = 54.7) |
| formaldehyde | HIGH (Log KOC = 1)   |

#### Other adverse effects

No evidence of ozone depleting properties were found in the current literature.

### SECTION 13 Disposal considerations

#### Waste treatment methods

|                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product / Packaging disposal</b> | <ul style="list-style-type: none"> <li>Containers may still present a chemical hazard/ danger when empty.</li> <li>Return to supplier for reuse/ recycling if possible.</li> </ul> <p>Otherwise:</p> <ul style="list-style-type: none"> <li>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.</li> <li>Where possible retain label warnings and SDS and observe all notices pertaining to the product.</li> </ul> <p>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.</p> <p>A Hierarchy of Controls seems to be common - the user should investigate:</p> <ul style="list-style-type: none"> <li>Reduction</li> <li>Reuse</li> <li>Recycling</li> <li>Disposal (if all else fails)</li> </ul> <p>This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. 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. In most instances the supplier of the material should be consulted.</p> <ul style="list-style-type: none"> <li><b>DO NOT allow wash water from cleaning or process equipment to enter drains.</b></li> <li>It may be necessary to collect all wash water for treatment before disposal.</li> <li>In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.</li> <li>Where in doubt contact the responsible authority.</li> </ul> |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### SECTION 14 Transport information

#### Labels Required

|                         |                                                                                     |
|-------------------------|-------------------------------------------------------------------------------------|
|                         |  |
| <b>Marine Pollutant</b> | NO                                                                                  |

Shipping container, transport vehicle placarding, and labeling may vary from the below information. This depends on the quantity shipped, the applicability of excepted quantity requirements, limited quantity requirements, and/or special provisions according to US DOT, IATA and IMDG regulations. In case of reshipment, it is the responsibility of the

shipper to determine the appropriate labels and markings in accordance with applicable transport regulations.

Land transport (DOT)

|                                    |                        |                        |
|------------------------------------|------------------------|------------------------|
| 14.1. UN number or ID number       | 1328                   |                        |
| 14.2. UN proper shipping name      | Hexamethylenetetramine |                        |
| 14.3. Transport hazard class(es)   | Class                  | 4.1                    |
|                                    | Subsidiary Hazard      | Not Applicable         |
| 14.4. Packing group                | III                    |                        |
| 14.5. Environmental hazard         | Not Applicable         |                        |
| 14.6. Special precautions for user | Hazard Label           | 4.1                    |
|                                    | Special provisions     | A1, IB8, IP3, T1, TP33 |
|                                    | Limited quantity       | 5 kg                   |

Air transport (ICAO-IATA / DGR)

|                                    |                                                           |                |
|------------------------------------|-----------------------------------------------------------|----------------|
| 14.1. UN number                    | 1328                                                      |                |
| 14.2. UN proper shipping name      | Hexamethylenetetramine                                    |                |
| 14.3. Transport hazard class(es)   | ICAO/IATA Class                                           | 4.1            |
|                                    | ICAO / IATA Subsidiary Hazard                             | Not Applicable |
|                                    | ERG Code                                                  | 3L             |
| 14.4. Packing group                | III                                                       |                |
| 14.5. Environmental hazard         | Not Applicable                                            |                |
| 14.6. Special precautions for user | Special provisions                                        | A803           |
|                                    | Cargo Only Packing Instructions                           | 449            |
|                                    | Cargo Only Maximum Qty / Pack                             | 100 kg         |
|                                    | Passenger and Cargo Packing Instructions                  | 446            |
|                                    | Passenger and Cargo Maximum Qty / Pack                    | 25 kg          |
|                                    | Passenger and Cargo Limited Quantity Packing Instructions | Y443           |
|                                    | Passenger and Cargo Limited Maximum Qty / Pack            | 10 kg          |

Sea transport (IMDG-Code / GGVSee)

|                                    |                        |                |
|------------------------------------|------------------------|----------------|
| 14.1. UN number                    | 1328                   |                |
| 14.2. UN proper shipping name      | HEXAMETHYLENETETRAMINE |                |
| 14.3. Transport hazard class(es)   | IMDG Class             | 4.1            |
|                                    | IMDG Subsidiary Hazard | Not Applicable |
| 14.4. Packing group                | III                    |                |
| 14.5. Environmental hazard         | Not Applicable         |                |
| 14.6. Special precautions for user | EMS Number             | F-A, S-G       |
|                                    | Special provisions     | Not Applicable |
|                                    | Limited Quantities     | 5 kg           |

14.7. Maritime transport in bulk according to IMO instruments

14.7.1. Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

14.7.2. Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

| Product name | Group          |
|--------------|----------------|
| hexamine     | Not Applicable |
| formaldehyde | Not Applicable |
| ammonia      | Not Applicable |

14.7.3. Transport in bulk in accordance with the IGC Code

| Product name | Ship Type      |
|--------------|----------------|
| hexamine     | Not Applicable |
| formaldehyde | Not Applicable |
| ammonia      | Not Applicable |

SECTION 15 Regulatory information

Safety, health and environmental regulations / legislation specific for the substance or mixture

|                                                                                                                                 |  |
|---------------------------------------------------------------------------------------------------------------------------------|--|
| hexamine is found on the following regulatory lists                                                                             |  |
| US - New Jersey Right to Know Hazardous Substances                                                                              |  |
| US DOE Temporary Emergency Exposure Limits (TEELs)                                                                              |  |
| US New York City Community Right-to-Know: List of Hazardous Substances                                                          |  |
| US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory                                                           |  |
| formaldehyde is found on the following regulatory lists                                                                         |  |
| Chemical Footprint Project - Chemicals of High Concern List                                                                     |  |
| International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs                                   |  |
| International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs - Group 1: Carcinogenic to humans |  |
| US - California Proposition 65 - Carcinogens                                                                                    |  |
| US - California Proposition 65 - No Significant Risk Levels (NSRLs) for Carcinogens                                             |  |
| US - California Safe Drinking Water and Toxic Enforcement Act of 1986 - Proposition 65 List                                     |  |
| US - California Substances Identified As Toxic Air Contaminants                                                                 |  |
| US - Massachusetts - Right To Know Listed Chemicals                                                                             |  |
| US - New Jersey Right to Know - Special Health Hazard Substance List (SHHSL): Carcinogens                                       |  |
| US - New Jersey Right to Know - Special Health Hazard Substance List (SHHSL): Corrosives                                        |  |
| US - New Jersey Right to Know - Special Health Hazard Substance List (SHHSL): Flammables                                        |  |
| US - New Jersey Right to Know - Special Health Hazard Substance List (SHHSL): Mutagens                                          |  |
| US - New Jersey Right to Know Hazardous Substances                                                                              |  |
| US - Pennsylvania - Hazardous Substance List                                                                                    |  |
| US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)                                                                    |  |
| US Clean Air Act - Hazardous Air Pollutants                                                                                     |  |
| US CWA (Clean Water Act) - List of Hazardous Substances                                                                         |  |
| US Department of Homeland Security (DHS) - Chemical Facility Anti-Terrorism Standards (CFATS) - Chemicals of Interest           |  |
| US DOE Temporary Emergency Exposure Limits (TEELs)                                                                              |  |
| US EPA Carcinogens Listing                                                                                                      |  |
| US EPA Integrated Risk Information System (IRIS)                                                                                |  |
| US EPA IRIS Carcinogens                                                                                                         |  |
| US EPA Pesticide Chemical Search - Antimicrobial                                                                                |  |
| US EPA Pesticide Chemical Search - Conventional Chemical                                                                        |  |
| US EPCRA Section 313 Chemical List                                                                                              |  |
| US National Toxicology Program (NTP) 15th Report Part A Known to be Human Carcinogens                                           |  |
| US New York City Community Right-to-Know: List of Hazardous Substances                                                          |  |
| US NIOSH Recommended Exposure Limits (RELs)                                                                                     |  |
| US OSHA Appendix A to § 1910.119—List of Highly Hazardous Chemicals, Toxics and Reactives (Mandatory)                           |  |
| US OSHA Carcinogens Listing                                                                                                     |  |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1                                                                            |  |
| US SARA Section 302 Extremely Hazardous Substances (40 CFR Part 355, Appendix A)                                                |  |
| US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory                                                           |  |
| ammonia is found on the following regulatory lists                                                                              |  |
| US - Massachusetts - Right To Know Listed Chemicals                                                                             |  |
| US - New Jersey Right to Know - Special Health Hazard Substance List (SHHSL): Corrosives                                        |  |
| US - New Jersey Right to Know Hazardous Substances                                                                              |  |
| US - Pennsylvania - Hazardous Substance List                                                                                    |  |
| US CWA (Clean Water Act) - List of Hazardous Substances                                                                         |  |
| US DOE Temporary Emergency Exposure Limits (TEELs)                                                                              |  |
| US New York City Community Right-to-Know: List of Hazardous Substances                                                          |  |
| US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory                                                           |  |

Additional Regulatory Information

Not Applicable

Federal Regulations

Superfund Amendments and Reauthorization Act of 1986 (SARA)

|                                                 |     |
|-------------------------------------------------|-----|
| Section 311/312 hazard categories               |     |
| Flammable (Gases, Aerosols, Liquids, or Solids) | Yes |
| Gas under pressure                              | No  |
| Explosive                                       | No  |
| Self-heating                                    | No  |
| Pyrophoric (Liquid or Solid)                    | No  |
| Pyrophoric Gas                                  | No  |
| Corrosive to metal                              | No  |
| Oxidizer (Liquid, Solid or Gas)                 | No  |
| Organic Peroxide                                | No  |
| Self-reactive                                   | No  |
| In contact with water emits flammable gas       | No  |
| Combustible Dust                                | No  |
| Carcinogenicity                                 | No  |

|                                                              |     |
|--------------------------------------------------------------|-----|
| Acute toxicity (any route of exposure)                       | No  |
| Reproductive toxicity                                        | No  |
| Skin Corrosion or Irritation                                 | No  |
| Respiratory or Skin Sensitization                            | Yes |
| Serious eye damage or eye irritation                         | No  |
| Specific target organ toxicity (single or repeated exposure) | No  |
| Aspiration Hazard                                            | No  |
| Germ cell mutagenicity                                       | No  |
| Simple Asphyxiant                                            | No  |
| Hazards Not Otherwise Classified                             | No  |

US. EPA CERCLA Hazardous Substances and Reportable Quantities (40 CFR 302.4)

| Name         | Reportable Quantity in Pounds (lb) | Reportable Quantity in kg |
|--------------|------------------------------------|---------------------------|
| formaldehyde | 100                                | 45.4                      |
| ammonia      | 1000                               | 454                       |

US. EPCRA Section 313 Toxic Release Inventory (TRI) (40 CFR 372)

None Reported

Additional Federal Regulatory Information

Not Applicable

State Regulations

US. California Proposition 65

 **WARNING:** This product can expose you to chemicals including **formaldehyde**, which is known to the State of California to cause cancer. For more information, go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

Additional State Regulatory Information

Not Applicable

National Inventory Status

| National Inventory                                | Status                                                                                                                                                                                                          |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Australia - AIIC / Australia Non-Industrial Use   | Yes                                                                                                                                                                                                             |
| Canada - DSL                                      | Yes                                                                                                                                                                                                             |
| Canada - NDSL                                     | No (hexamine; formaldehyde; ammonia)                                                                                                                                                                            |
| China - IECSC                                     | Yes                                                                                                                                                                                                             |
| Europe - EINEC / ELINCS / NLP                     | Yes                                                                                                                                                                                                             |
| Japan - ENCS                                      | Yes                                                                                                                                                                                                             |
| Korea - KECI                                      | Yes                                                                                                                                                                                                             |
| New Zealand - NZIoC                               | Yes                                                                                                                                                                                                             |
| Philippines - PICCS                               | Yes                                                                                                                                                                                                             |
| USA - TSCA                                        | All chemical substances in this product have been designated as TSCA Inventory 'Active'                                                                                                                         |
| Taiwan - TCSI                                     | Yes                                                                                                                                                                                                             |
| Mexico - INSQ                                     | Yes                                                                                                                                                                                                             |
| Vietnam - NCI                                     | Yes                                                                                                                                                                                                             |
| Russia - FBEPH                                    | Yes                                                                                                                                                                                                             |
| UAE - Control List (Banned/Restricted Substances) | No (hexamine; formaldehyde; ammonia)                                                                                                                                                                            |
| Legend:                                           | <b>Yes = All CAS declared ingredients are on the inventory</b><br><b>No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.</b> |

SECTION 16 Other information

|               |            |
|---------------|------------|
| Revision Date | 23/12/2022 |
| Initial Date  | 29/08/2006 |

SDS Version Summary

| Version | Date of Update | Sections Updated                                                                                                                                                                                                                                                                                                                                                         |
|---------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6.1     | 19/03/2019     | Physical and chemical properties - Appearance                                                                                                                                                                                                                                                                                                                            |
| 7.1     | 14/01/2022     | First Aid measures - Advice to Doctor, CAS Number, Hazards identification - Classification, Classification review due to GHS Revision change., Exposure controls / personal protection - Personal Protection (Respirator), Toxicological information - Toxicity and Irritation (Other), Identification of the substance / mixture and of the company / undertaking - Use |

### Other information

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.

The 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.

### Definitions and abbreviations

- PC - TWA: Permissible Concentration-Time Weighted Average
- PC - STEL: Permissible Concentration-Short Term Exposure Limit
- IARC: International Agency for Research on Cancer
- ACGIH: American Conference of Governmental Industrial Hygienists
- STEL: Short Term Exposure Limit
- TEEL: Temporary Emergency Exposure Limit,
- IDLH: Immediately Dangerous to Life or Health Concentrations
- ES: Exposure Standard
- OSF: Odour Safety Factor
- NOAEL: No Observed Adverse Effect Level
- LOAEL: Lowest Observed Adverse Effect Level
- TLV: Threshold Limit Value
- LOD: Limit Of Detection
- OTV: Odour Threshold Value
- BCF: BioConcentration Factors
- BEI: Biological Exposure Index
- DNEL: Derived No-Effect Level
- PNEC: Predicted no-effect concentration
- MARPOL: International Convention for the Prevention of Pollution from Ships
- IMSBC: International Maritime Solid Bulk Cargoes Code
- IGC: International Gas Carrier Code
- IBC: International Bulk Chemical Code
  
- AIIC: Australian Inventory of Industrial Chemicals
- DSL: Domestic Substances List
- NDSL: Non-Domestic Substances List
- IECSC: Inventory of Existing Chemical Substance in China
- EINECS: European INventory of Existing Commercial chemical Substances
- ELINCS: European List of Notified Chemical Substances
- NLP: No-Longer Polymers
- ENCS: Existing and New Chemical Substances Inventory
- KECI: Korea Existing Chemicals Inventory
- NZIoC: New Zealand Inventory of Chemicals
- PICCS: Philippine Inventory of Chemicals and Chemical Substances
- TSCA: Toxic Substances Control Act
- TCSI: Taiwan Chemical Substance Inventory
- INSQ: Inventario Nacional de Sustancias Químicas
- NCI: National Chemical Inventory
- FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

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