PU FOAM 38 - PART A

2 PART POLYURETHANE RIGID FOAM

Material Safety Data Sheet

1. Identification of the substance / preparation and the company

Trade name	:	PU Foam 38 Part A
Company	:	AMT Composites (PTY) Ltd 6 Director Road, Aeroport, Spartan Ext.2 Kempton Park, 1619
Telephone	:	+27 11 392 4232
Telefax	:	+27 11 974 4198
E -mail	:	jo.jacinto@amtcomposites.co.za

Emergency telephone number

+27 82 801 1116 (Jo Jacinto)

+27 82 905 6977 (Steven Coetzee)

2. Composition

Information on ingredients : Polyol preparation of POLYETHER POLYOLS, SILICONE SURFACTANT, AMINE CATALYST & METHYL FORMATE.

3. Hazards identification

Hazard warning not required.

4. First Aid Measures

Skin Contact	:	After contact with skin, wash with plenty of water and soap.
Eye Contact	:	Contamination of the eyes must be treated by thorough irrigation with water, with the eyelids held open. A doctor (or eye specialist) should be consulted immediately.
Swallowing	:	Should the product be swallowed seek medical advice.

5. Fire Fighting Measures

Extinguishing media: CO2, foam, dry powder; in case of larger fires, water spray should be used.
Containers will develop high pressure when heated

6. Accidental Release Measures

Do not empty into drains. Take up with absorbent for chemicals or, is necessary with dry sand.

7. Handling And Storage

Handling: Observe the usual precautionary measures for chemicals.
Storage: Keep the container tightly closed and dry. Avoid exposure to temperatures above 200°C.
Keep away from foodstuffs, drinks and tobacco.
Water pollution – slightly hazardous to water

AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232

www.amtcomposites.co.za
AMT NATAL
DURBAN
TEL: +27 31 705 2034

Publish Date 13/07/2023
AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

8. Exposure Controls / Personal Protection

Hand protection: protective gloves made of PVC
Eye protection: goggles / face protection
Keep working clothes separate. Wash hands before breaks and at end of work.

9. Physical & Chemical Properties

Form	: liquid
Colour	: straw
Odour	: slight odour
Setting point	: -2°C
Boiling Range	: N/A
Density	: 1,1 gm/cm3
Vapour pressure	: 7 mbar at 20°C
Viscosity	: 300 mPas at 25°C
Solubility in water	: miscible
pH value	: N/A
Flash point	: 71°C (PMOC ASTM D93)
Explosive limits	: not determined

10. Stability And Reactivity

Thermal decomposition: does not occur until flash point reached.
Hazardous decomposition products: No hazardous decomposition products when stored and handled correctly.

11. Toxicological Information

In analogy to test for similarly composed products : D50 oral, rat : >5000 mg / kg
Effect on the eyes : No chemical irritation established.
Effect on skin : No chemical irritation established

12. Ecological Information

Do not allow to escape into waters, wastewater or soil

13. Disposal Considerations

Waste: May be transported to controlled incinerator if local official regulations are observed

14. Transport Information

GGVSee / IMDG Code : - UN No : - MFAG : - Ems : -
PG : - MPO : -
GGVE / GGVS : Class - No. - RID / ADR : Class : - No. -
ADNR : Class - No. - Cat ICAD / IATA-DGR : not restr.
Declaration for land shipment : -
Declaration for sea shipment : -
Declaration for shipment by air : -
Other information :
Not dangerous cargo. Keep separate from foodstuffs. Keep drums cool and dry

15. Regulatory Information

No labelling is required.

AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232

www.amtcomposites.co.za
AMT NATAL
DURBAN
TEL: +27 31 705 2034

Publish Date 13/07/2023
AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

16. Other Information

N/A

Guarantee

This PolyUrethane system is provided as is without any guarantees or warranty. In association with the product, AMT Composites PTY LTD makes no warranties of any kind, either express or implied, including but not limited to warranties of merchantability, fitness for a particular purpose, of title, or of non infringement of third party rights. Use of the product by a user is at the user's risk.

NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A SPECIFIC PURPOSE, THE PRODUCTS TO WHICH THE INFORMATION MENTIONS MAY BE USED WITHOUT INFRINGING THE INTELLECTUAL PROPERTY RIGHTS OF OTHERS, OR OF ANY OTHER NATURE ARE MADE WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION MENTIONS. IN NO CASE SHALL THE INFORMATION BE CONSIDERED A PART OF OUR TERMS AND CONDITIONS OF SALE."

Disclaimer

Any information, data, advice or recommendation's for processing materials or products supplied by AMT Composites is given in good faith. It remains at all time the responsibility of the customer to ensure that the products and materials recommended are suitable for the production method used, and purpose intended.

Copyright

All rights reserved, including intellectual property rights. Changes to technical data reserved. Delivery subject to availability. Any liability that the data and illustrations are complete, actual or correct is excluded. Designations may be trademarks and/or copyrights of the respective manufacturer, the use of which by third parties for their own purposes may infringe the rights of such owner.
©2018 AMT Composites

AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232

www.amtcomposites.co.za
AMT NATAL
DURBAN
TEL: +27 31 705 2034

AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

Publish Date 13/07/2023

Identification of the substance / preparation and the company

Trade name	:	PU Foam 38 / 60 Part B
Company	:	AMT Composites (PTY) Ltd 6 Director Road, Aeroport, Spartan Ext.2 Kempton Park, 1619
Telephone	:	+27 11 392 4232
Telefax	:	+27 11 974 4198
E -mail	:	jo.jacinto@amtcomposites.co.za

Emergency telephone number

+27 82 801 1116 (Jo Jacinto)

+27 82 905 6977 (Steven Coetzee)

1. Composition / Information on ingredients

diphenylmethane−diisocyanate, isomers and homologues
weight %: approx. 100
CAS No.: 9016−87−9 Index No.: −−
EEC No.: −−
Classification: Xn R20; Xi R36/37/38; R42/43
Specific threshold concentration
Xn ; R 42 = from 0,1 %
Xn ; R 42/43 = from 1 %
Xn ; R 36/37/38−42/43 = from 5 %
Xn ; R 20−36/37/38−42/43 = from 25 %

2. Hazards identification

Classification of the substance or mixture
I SUMMARY OF HAZARD IN AN EMERGENCY SITUATION
Liquid. Combustible.
Harmful by inhalation.
Irritating to eyes.
Irritating to respiratory system.
Irritating to skin.
May cause SENSITISATION by inhalation.
May cause SENSITISATION by skin contact.
Danger of cumulative effects.
Limited evidence of a carcinogenic effect.
Harmful: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed.

Classification 111 Eye Irritation Category 2A, Respiratory Sensitizer Category 1, Specific target organ toxicity - repeated exposure Category 2, Acute Toxicity (Inhalation) Category 4, Specific target organ toxicity - single exposure Category 3 (respiratory tract irritation), Skin Corrosion/Irritation Category 2, Skin Sensitizer Category 1, Carcinogenicity Category 2

Label elements
Hazard pictogram(s)

Signal Word - Danger

AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232

www.amtcomposites.co.za
AMT NATAL
DURBAN
TEL: +27 31 705 2034

Publish Date 13/07/2023

AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

Hazard statement(s)
H319 Causes serious eye irritation.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H373 May cause damage to organs through prolonged or repeated exposure. (Respiratory system) (Dermal)
H332 Harmful if inhaled.
H335 May cause respiratory irritation.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H351 Suspected of causing cancer.

Precautionary statement(s) Prevention
P201 Obtain special instructions before use.
P260 Do not breathe mist/vapours/spray.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P284 [In case of inadequate ventilation] wear respiratory protection.
P261 Avoid breathing mist/vapours/spray.
P202 Do not handle until all safety precautions have been read and understood.
P264 Wash all exposed external body areas thoroughly after handling.
P272 Contaminated work clothing should not be allowed out of the workplace.

Precautionary statement(s) Response
P308+P313 IF exposed or concerned: Get medical advice/ attention.
P321 Specific treatment (see advice on this label).
P342+P311 If experiencing respiratory symptoms: Call a POISON CENTER/doctor/physician/first aider.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312 Call a POISON CENTER/doctor/physician/first aider/if you feel unwell.
P314 Get medical advice/attention if you feel unwell.
P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
P337+P313 If eye irritation persists: Get medical advice/attention.
P302+P352 IF ON SKIN: Wash with plenty of water.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P332+P313 If skin irritation occurs: Get medical advice/attention.
P362+P364 Take off contaminated clothing and wash it before reuse.

Inhaled
Evidence shows, or practical experience predicts, that the material produces irritation of the respiratory system, in a substantial number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system.
The material has NOT been classified by EC Directives or other classification systems as 'harmful by inhalation'. This is because of the lack of corroborating animal or human evidence. In the absence of such evidence, care should be taken nevertheless to ensure exposure is kept to a minimum and that suitable control measures be used, in an occupational setting to control vapours, fumes and aerosols.
The vapour/mist may be highly irritating to the upper respiratory tract and lungs; the response may be severe enough to produce bronchitis and pulmonary oedema. Possible neurological symptoms arising from isocyanate exposure include headache, insomnia, euphoria, ataxia, anxiety neurosis, depression and paranoia. Gastrointestinal disturbances are characterised by nausea and vomiting. Pulmonary sensitisation may produce asthmatic reactions ranging from minor breathing difficulties to severe allergic attacks; this may occur following a single acute exposure or may develop without warning for several hours after exposure. Sensitized people can react to very low doses, and should not be allowed to work in situations allowing exposure to this material. Continued exposure of sensitised persons may lead to possible long term respiratory impairment. Inhalation hazard is increased at higher temperatures.

AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232

www.amtcomposites.co.za
AMT NATAL
DURBAN
TEL: +27 31 705 2034

Publish Date 13/07/2023
AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

Ingestion
The material has NOT been classified by EC Directives or other classification systems as 'harmful by ingestion'. This is because of the lack of corroborating animal or human evidence. The material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (e.g., liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern.

Skin Contact
Evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis.
The material may accentuate any pre-existing dermatitis condition
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.
Open cuts, abraded or irritated skin should not be exposed to this material
Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

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

Chronic
On the basis, primarily, of animal experiments, concern has been expressed that the material may produce carcinogenic or mutagenic effects; in respect of the available information, however, there presently exists inadequate data for making a satisfactory assessment.
Repeated or long-term occupational exposure is likely to produce cumulative health effects involving organs or biochemical systems. Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.
Practical evidence shows that inhalation of the material is capable of inducing a sensitisation reaction in a substantial number of individuals at a greater frequency than would be expected from the response of a normal population.
Pulmonary sensitisation, resulting in hyperactive airway dysfunction and pulmonary allergy may be accompanied by fatigue, malaise and aching. Significant symptoms of exposure may persist for extended periods, even after exposure ceases. Symptoms can be activated by a variety of nonspecific environmental stimuli such as automobile exhaust, perfumes and passive smoking.
Practical experience shows that skin contact with the material is capable either of inducing a sensitisation reaction in a substantial number of individuals, and/or of producing a positive response in experimental animals.
Persons with a history of asthma or other respiratory problems or are known to be sensitised, should not be engaged in any work involving the handling of isocyanates.
The chemistry of reaction of isocyanates, as evidenced by MDI, in biological milieu is such that in the event of a true exposure of small MDI doses to the mouth, reactions will commence at once with biological macromolecules in the buccal region and will continue along the digestive tract prior to reaching the stomach. Reaction products will be a variety of polyureas and macromolecular conjugates with for example mucus, proteins and cell components.

AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232

www.amtcomposites.co.za
AMT NATAL
DURBAN
TEL: +27 31 705 2034

AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

Publish Date 13/07/2023

This is corroborated by the results from an MDI inhalation study. Following an inhalation exposure of rats to radiolabelled MDI, 79% of the dose was excreted in faeces. The faecal excretion in these animals was considered entirely due to ingestion of radioactivity from grooming and ingestion of deposited material from the nasopharyngeal region via the mucociliary escalator, i.e., not following systemic absorption. The faecal radioactivity was tentatively identified as mixed molecular weight polyureas derived from MDI. Diamine was not present. Thus, for MDI and diisocyanates in general the oral gavage dosing route is inappropriate for toxicological studies and risk assessment.
It is expected that oral gavage dosing will result in a similar outcome to that produced by TOI or MDI, that is (1) reaction with stomach contents and (2) polymerization to solid polyureas.
Reaction with stomach contents is very plausibly described in case reports of accidental ingestion of polymeric MDI based glue in domestic animals. Extensive polymerization and CO2 liberation resulting in an expansion of the gastric content is described in the stomach, without apparent acute chemical toxicity
Polyurea formation in organic and aqueous phases has been described. In this generally accepted chemistry of hydrolysis of an isocyanate the initially produced carbamate decarboxylates to an amine which. The amine, as a reactive intermediate, then reacts very readily with the present isocyanate to produce a solid and inert polyurea. This urea formation acts as a pH buffer in the stomach, thus promoting transformation of the diisocyanate into polyurea, even under the acidic conditions.
At the resorptive tissues in the small intestine, these high molecular reaction products are likely to be of very low bioavailability, which is substantiated by the absence of systemic toxicity in acute oral bioassays with rats at the OECD limit dose (LC50>2 g/kg bw).
The respiratory tract may be regarded as the main entry for systemically available isocyanates as evidenced following MDI exposures.
A detailed summary on urinary, plasma and in vitro metabolite studies is provided below. Taken together, all available studies provide convincing evidence that MDI-protein adduct and MDI-metabolite formation proceeds:
via formation of a labile isocyanate glutathione (GSH)-adduct, then transfer to a more stable adduct with larger proteins, and
without formation of free MDA. MDA reported as a metabolite is actually formed by analytical workup procedures (strong acid or base hydrolysis) and is not an identified metabolite in urine or blood
Isocyanate vapours/mists are irritating to the upper respiratory tract and lungs; the response may be severe enough to produce bronchitis with wheezing, gasping and severe distress, even sudden loss of consciousness, and pulmonary oedema. Possible neurological symptoms arising from isocyanate exposure include headache, insomnia, euphoria, ataxia, anxiety neurosis, depression and paranoia. Gastrointestinal disturbances are characterised by nausea and vomiting. Pulmonary sensitisation may produce asthmatic reactions ranging from minor breathing difficulties to severe allergic attacks; this may occur following a single acute exposure or may develop without warning after a period of tolerance. A respiratory response may occur following minor skin contact. Skin sensitisation is possible and may result in allergic dermatitis responses including rash, itching, hives and swelling of extremities.
Isocyanate-containing vapours/ mists may cause inflammation of eyes and nasal passages.
Onset of symptoms may be immediate or delayed for several hours after exposure. Sensitised people can react to very low levels of airborne isocyanates. Unprotected or sensitised persons should not be allowed to work in situations allowing exposure to this material.

3. Composition / Information on ingredients

Fire FightingAlert Fire Brigade and tell them location and nature of hazard. Wear full body protective clothing with breathing apparatus.
Prevent, by any means available, spillage from entering drains or water course. Use water delivered as a fine spray to control fire and cool adjacent area.
Avoid spraying water onto liquid pools.
DO NOT approach containers suspected to be hot.
Cool fire exposed containers with water spray from a protected location. If safe to do so, remove containers from path of fire.

Fire/Explosion Hazard: Combustible.
Moderate fire hazard when exposed to heat or flame.
When heated to high temperatures decomposes rapidly generating vapour which pressures and may then rupture containers with release of flammable and highly toxic isocyanate vapour.
Burns with acrid black smoke and poisonous fumes.

AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232

www.amtcomposites.co.za
AMT NATAL
DURBAN
TEL: +27 31 705 2034

Publish Date 13/07/2023
AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

Due to reaction with water producing CO2-gas, a hazardous build-up of pressure could result if contaminated containers are re-sealed. Combustion yields traces of highly toxic hydrogen cyanide HCN, plus toxic nitrogen oxides NOx and carbon monoxide.
Combustion products include:
carbon dioxide (CO2) hydrogen cyanide isocyanates
and minor amounts of nitrogen oxides (NOx)
other pyrolysis products typical of burning organic material. May emit corrosive fumes.
When heated at high temperatures many isocyanates decompose rapidly generating a vapour which pressurises containers, possibly to the point of rupture. Release of toxic and/or flammable isocyanate vapours may then occur

4. First Aid Measures

Eye Contact If this product comes in contact with the eyes: Wash out immediately with fresh running water.
Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
Seek medical attention without delay; if pain persists or recurs seek medical attention. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

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

Inhalation If fumes or combustion products are inhaled remove from contaminated area. Lay patient down. Keep warm and rested.
Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
Transport to hospital, or doctor, without delay.
Following uptake by inhalation, move person to an area free from risk of further exposure. Oxygen or artificial respiration should be administered as needed. Asthmatic-type symptoms may develop and may be immediate or delayed up to several hours. Treatment is essentially symptomatic. A physician should be consulted.

Ingestion Immediately give a glass of water.
First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

Advise for rescue team (PPE requirement for rescue personnel)

Indication of any immediate medical attention and special treatment needed
For sub-chronic and chronic exposures to isocyanates:
This material may be a potent pulmonary sensitiser which causes bronchospasm even in patients without prior airway hyperreactivity. Clinical symptoms of exposure involve mucosal irritation of respiratory and gastrointestinal tracts.
Conjunctiva! irritation, skin inflammation (erythema, pain vesiculation) and gastrointestinal disturbances occur soon after exposure. Pulmonary symptoms include cough, burning, substernal pain and dyspnoea.
Some cross-sensitivity occurs between different isocyanates.
Noncardiogenic pulmonary oedema and bronchospasm are the most serious consequences of exposure. Markedly symptomatic patients should receive oxygen, ventilatory support and an intravenous line.
Treatment for asthma includes inhaled sympathomimetics (epinephrine [adrenalin], terbutaline) and steroids.
Activated charcoal (1 g/kg) and a cathartic (sorbitol, magnesium citrate) may be useful for ingestion.
Mydriatics, systemic analgesics and topical antibiotics (Sulamyd) may be used for corneal abrasions. There is no effective therapy for sensitised workers.
[Ellenhorn and Barceloux; Medical Toxicology)

www.amtcomposites.co.za
Publish Date 13/07/2023
AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232
AMT NATAL
DURBAN
TEL: +27 31 705 2034
AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

NOTE: Isocyanates cause airway restriction in naive individuals with the degree of response dependant on the concentration and duration of exposure. They induce smooth muscle contraction which leads to broncho constrictive episodes. Acute changes in lung function, such as decreased FEV1, may not represent sensitivity. [Karol & Jin, Frontiers in Molecular Toxicology, pp 56-61, 1992)
Personnel who work with isocyanates, isocyanate prepolymers or polyisocyanates should have a pre-placement medical examination and periodic examinations thereafter, including a pulmonary function test. Anyone with a medical history of chronic respiratory disease, asthmatic or bronchial attacks, indications of allergic responses, recurrent eczema or sensitisation conditions of the skin should not handle or work with isocyanates. Anyone who develops chronic respiratory distress when working with isocyanates should be removed from exposure and examined by a physician. Further exposure must be avoided if a sensitivity to isocyanates or polyisocyanates has developed.

5. FireFighting Measures

Small quantities of water in contact with hot liquid may react violently with generation of a large volume of rapidly expanding hot sticky semi-solid foam. Presents additional hazard when fire fighting in a confined space.
Cooling with flooding quantities of water reduces this risk.
Water spray or fog may cause frothing and should be used in large quantities. Foam.
Dry chemical powder.
BCF (where regulations permit). Carbon dioxide.
Water spray or fog - large fires only.
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

Advice for firefighters

Fire Fighting Alert Fire Brigade and tell them location and nature of hazard. Wear full body protective clothing with breathing apparatus.
Prevent, by any means available, spillage from entering drains or water course. Use water delivered as a fine spray to control fire and cool adjacent area.
Avoid spraying water onto liquid pools.
DO NOT approach containers suspected to be hot.
Cool fire exposed containers with water spray from a protected location. If safe to do so, remove containers from path of fire.

Fire/Explosion Hazard Combustible.
Moderate fire hazard when exposed to heat or flame.
When heated to high temperatures decomposes rapidly generating vapour which pressures and may then rupture containers with release of flammable and highly toxic isocyanate vapour.
Burns with acrid black smoke and poisonous fumes.
Due to reaction with water producing CO2-gas, a hazardous build-up of pressure could result if contaminated containers are re-sealed. Combustion yields traces of highly toxic hydrogen cyanide HCN, plus toxic nitrogen oxides NOx and carbon monoxide.
Combustion products include:
carbon dioxide (CO_2) hydrogen cyanide isocyanates
and minor amounts of nitrogen oxides (NOx)
other pyrolysis products typical of burning organic material. May emit corrosive fumes.
When heated at high temperatures many isocyanates decompose rapidly generating a vapour which pressurises containers, possibly to the point of rupture. Release of toxic and/or flammable isocyanate vapours may then occur.

6. Accidental Release Measures

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

www.amtcomposites.co.za
Publish Date 13/07/2023
AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232
AMT NATAL
DURBAN
TEL: +27 31 705 2034
AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

Major Spills Chemical Class: cyanates and isocyanates
Sorbent type – cross linked polymer, wood fibre particulate, polypropylene particulate, foamed glass pillow.
Liquid Isocyanates and high isocyanate vapour concentrations will penetrate seals on self-contained breathing apparatus - SCBA should be used inside encapsulating suit where this exposure may occur.
For isocyanate spills of less than 40 litres (2 m2):
Evacuate area from everybody not dealing with the emergency, keep them upwind and prevent further access, remove ignition sources and, if inside building, ventilate area as well as possible.
Notify supervision and others as necessary.
Put on personal protective equipment (suitable respiratory protection, face and eye protection, protective suit, gloves and impermeable boots).
Control source of leakage (where applicable).
Dike the spill to prevent spreading and to contain additions of decontaminating solution. Prevent the material from entering drains.
Estimate spill pool volume or area.
Absorb and decontaminate. - Completely cover the spill with wet sand, wet earth, vermiculite or other similar absorbent. - Add neutraliser (for suitable formulations: see below) to the adsorbent materials (equal to that of estimated spill pool volume). Intensify contact between spill, absorbent and neutraliser by carefully mixing with a rake and allow to react for 15 minutes
Shovel absorbent/decontaminant solution mixture into a steel drum.
Decontaminate surface. - Pour an equal amount of neutraliser solution over contaminated surface. - Scrub area with a stiff bristle brush, using moderate pressure. - Completely cover decontaminant with vermiculite or other similar absorbent. - After 5 minutes, shovel absorbent/decontamination solution mixture into the same steel drum used above.
Monitor for residual isocyanate. If surface is decontaminated, proceed to next step. If contamination persists, repeat decontaminate procedure immediately above
Place loosely covered drum (release of carbon dioxide) outside for at least 72 hours. Label waste-containing drum appropriately. Remove waste materials for incineration.
Decontaminate and remove personal protective equipment. Return to normal operation.
Conduct accident investigation and consider measures to prevent reoccurrence.

Decontamination:
Treat isocyanate spills with sufficient amounts of isocyanate decontaminant preparation ('neutralising fluid'). Isocyanates and polyisocyanates are generally not miscible with water. Liquid surfactants are necessary to allow better dispersion of isocyanate and neutralising fluids/ preparations. Alkaline neutralisers react faster than water/surfactant mixtures alone.
Typically, such a preparation may consist of:
Sawdust: 20 parts by weight Kieselguhr 40 parts by weight plus a mixture of {ammonia (s.g. 0.880) 8% v/v non-ionic surfactant 2% v/v water 90% v/v}.
Let stand for 24 hours
Three commonly used neutralising fluids each exhibit advantages in different situations.
Formulation A ·
liquid surfactant 0.2-2%
sodium carbonate 5-10%
water to 100%
Formulation B
liquid surfactant 0.2-2%
concentrated ammonia 3-8%
water to 100%
Formulation C
ethanol, isopropanol or butanol 50% concentrated ammonia 5%
water to 100%

After application of any of these formulae, let stand for 24 hours.

Formulation B reacts faster than Formulation A. However, ammonia-based neutralisers should be used only under well-ventilated conditions to avoid overexposure to ammonia or if members of the emergency team wear suitable respiratory protection. Formulation C is especially suitable for cleaning of equipment from unreacted isocyanate and neutralizing under freezing conditions. Regard has to be taken to the flammability of the alcoholic solution. Avoid contamination with water, alkalis and detergent solutions.

www.amtcomposites.co.za
Publish Date 13/07/2023
AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232
AMT NATAL
DURBAN
TEL: +27 31 705 2034
AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

Material reacts with water and generates gas, pressurises containers with even drum rupture resulting.
DO NOT reseal container if contamination is suspected. Open all containers with care.
Moderate hazard.
Clear area of personnel and move upwind.
Alert Fire Brigade and tell them location and nature of hazard. Wear breathing apparatus plus protective gloves.
Prevent, by any means available, spillage from entering drains or water course. No smoking, naked lights or ignition sources.
Increase ventilation.
Stop leak if safe to do so.
Contain spill with sand, earth or vermiculite.
Collect recoverable product into labelled containers for recycling. Absorb remaining product with sand, earth or vermiculite.
Collect solid residues and seal in labelled drums for disposal. Wash area and prevent runoff into drains.
If contamination of drains or waterways occurs, advise emergency services.

7. Handling And Storage

Safe handling Avoid all personal contact, including inhalation.
Wear protective clothing when risk of exposure occurs. Use in a well-ventilated area.
Prevent concentration in hollows and sumps.
DO NOT enter confined spaces until atmosphere has been checked. Avoid smoking, naked lights or ignition sources.
Avoid contact with incompatible materials. When handling, DO NOT eat, drink or smoke.
Keep containers securely sealed when not in use. Avoid physical damage to containers.
Always wash hands with soap and water after handling. Work clothes should be laundered separately.
Use good occupational work practice.
Observe manufacturer's storage and handling recommendations contained within this SOS.
Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.
DO NOT allow clothing wet with material to stay in contact with skin
Other information for commercial quantities of isocyanates:
Isocyanates should be stored in adequately bunded areas. Nothing else should be kept within the same bunding.
Pre-polymers need not be segregated. Drums of isocyanates should be stored under cover, out of direct sunlight, protected from rain, protected from physical damage and well away from moisture, acids and alkalis.
Where isocyanates are stored at elevated temperatures to prevent solidifying, adequate controls should be installed to prevent the high temperatures and precautions against fire should be taken.
Where stored in tanks, the more reactive isocyanates should be blanketed with a non-reactive gas such as nitrogen and equipped with absorptive type breather valve (to prevent vapour emissions).
Transfer systems for isocyanates in bulk storage should be fully enclosed and use pump or vacuum systems.
Warning signs, in appropriate languages, should be posted where necessary.
Areas in which polyurethane foam products are stored should be supplied with good general ventilation. Residual amounts of unreacted isocyanate may be present in the finished foam, resulting in hazardous atmospheric concentrations.

Store in original containers.

Keep containers securely sealed.
No smoking, naked lights or ignition sources. Store in a cool, dry, well-ventilated area.
Store away from incompatible materials and foodstuff containers.
Protect containers against physical damage and check regularly for leaks.
Observe manufacture s storage and handling recommendations contained within this SOS.

Suitable container Metal can or drum
Packaging as recommended by manufacturer.
Check all containers are clearly labelled and free from leaks.
Storage incompatibility: Avoid cross contamination between the two liquid parts of product (kit).

www.amtcomposites.co.za
Publish Date 13/07/2023
AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232
AMT NATAL
DURBAN
TEL: +27 31 705 2034
AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

If two-part products are mixed or allowed to mix in proportions other than manufacturer's recommendation, polymerisation with gelation and evolution of heat (exotherm) may occur.
This excess heat may generate toxic vapour
Avoid reaction with water, alcohols and detergent solutions. Isocyanates are electrophiles, and as such they are reactive toward a variety of nucleophiles including alcohols, amines, and even water. Upon treatment with an alcohol, an isocyanate forms a urethane linkage. If a
di-isocyanate is treated with a compound containing two or more hydroxyl groups, such as a diol or a polyol, polymer chains are formed, which are known as polyurethanes. Reaction between a di-isocyanate and a compound containing two or more amine groups, produces long polymer chains known as polyureas.
Isocyanates and diisocyanatos are incompatible with many classes of compounds, reacting exothermically to release toxic gases.
Reactions with amines, strong bases, aldehydes, alcohols, alkali metals, ketones, mercaptans, strong oxidisers, hydrides, phenols, and peroxides can cause vigorous releases of heat. Acids and bases initiate polymerisation reactions in these materials.
Isocyanates also can react with themselves. Aliphatic di-isocyanates can form trimers, which are structurally related to cyanuric acid. Isocyanates participate in Diels-Alder reactions, functioning as dienophiles
Isocyanates easily form adducts with carbodiimides, isothiocyanates, ketenes, or with substrates containing activated CC or CN bonds.
Some isocyanates react with water to form amines and liberate carbon dioxide. This reaction may also generate large volumes of foam and heat. Foaming spaces may produce pressure in confined spaces or containers. Gas generation may pressurise drums to the point of rupture.
Do NOT reseal container if contamination is expected Open all containers with care
Base-catalysed reactions of isocyanates with alcohols should be carried out in inert solvents. Such reactions in the absence of solvents often occur with explosive violence,
Isocyanates will attack and embrittle some plastics and rubbers.
The isocyanate anion is a pseudohalide (syn pseudo halogen) whose chemistry, resembling that of the true halogens, allows it to substitute for halogens in several classes of chemical compounds. The behaviour and chemical properties of the several pseudohalides are identical to that of the true halide ions.

A range of exothermic decomposition energies for isocyanates is given as 20-30 kJ/mol.
The relationship between energy of decomposition and processing hazards has been the subject of discussion; it is suggested that values of energy released per unit of mass, rather than on a molar basis (Jig) be used in the assessment.
For example, in 'open vessel processes' (with man-hole size openings, in an industrial setting), substances with exothermic decomposition energies below 500 Jig are unlikely to present a danger, whilst those in 'closed vessel processes' (opening is a safety valve or bursting disk) present some danger where the decomposition energy exceeds 150 Jig.
BRETHERICK: Handbook of Reactive Chemical Hazards, 4th Edition

8. Exposure Controls / Personal Protection

polymeric diphenylmethane diisocyanate
Polymethylene polyphenyl isocyanate; (Polymeric diphenylmethane diisocyanate)
0.15 mg/m3
3.6 mg/m3
22 mg/m3
4.4'-diphenylmethane diisocyanate (MDI)
Methylene diphenyl diisocyanate; (Diphenylmethane diisocyanate; MDI)
0.45 mg/m3
Not Available
Not Available
4.4'-diphenylmethane diisocyanate (MDI)
Methylenebis(isocyanato-benzene), 1,1'-; (Diphenyl methane diisocyanate)
29 mg/m3
40 mg/m3
240 mg/m3
Ingredient Original IDLH Revised IDLH
polymeric diphenylmethane diisocyanate
Not Available
Not Available
4,4'-diphenylmethane diisocyanate (MDI)
75 mg/m3
Not Available

AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232

www.amtcomposites.co.za
AMT NATAL
DURBAN
TEL: +27 31 705 2034

Publish Date 13/07/2023
AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

I OCCUPATIONAL EXPOSURE BANDING
Ingredient Occupational Exposure Band Rating Occupational Exposure Band Limit
polymeric diphenylmethane diisocyanate
E
5 0.1 ppm

Notes: Occupational exposure banding is a process of assigning chemicals into specific categories or bands based on a chemical's potency and the adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that are expected to protect worker health.
isocyanates:
Some jurisdictions require that health surveillance be conducted on occupationally exposed workers. This should emphasise: demography, occupational and medical history and health advice
completion of a standardised respiratory questionnaire physical examination of the respiratory system and skin standardised respiratory function tests such as FEV1, FVC and FEV1/FVC
Various portable or stationary instruments are available for the continuous measurement of isocyanates in the air. All of them function on the principle of colorimetric evaluation of an indicator paper strip. They are operating continuously and unattended. Paper tape systems are easy to use and do not require skilled analysts to operate them. They give rapid results and are therefore suitable for leak detection and in emergency situations. However, they may read incorrect at very high or very low humidity, are unsuitable for aerosols
and may not be accepted for purposes of regulatory compliance.
Air monitoring of isocyanates requires sound analytical knowledge. In order to obtain reliable results only laboratories with experience in that specific area should be engaged with such measurements
In the evaluation of the German MAK Commission the justification of the OEL for 4,4'- MDI/ pMDI is established based on the isocyanate (NCO) group which is common to the monomeric, oligomeric and the polymeric MDIs. This NCO group is highly reactive (see toxicokinetic and category justification for details). Due to this high reactivity of the functional NCO group towards nucleophilic biomolecules the primary health effect of MDI is irritation at the point of contact, which can be demonstrated by the numerous acute, subacute and chronic bioassays, and sensitization.
The most sensitive health effect resulting from acute inhalation exposure to respirable aerosols of MDI is irritation to predominately the bronchio-alveolar part of the respiratory tract. After inhalation exposure, MDI reacts with nucleophilic low and higher-molecular components of the liquid films that cover the airways, glutathione (GSH) represents the most important nucleophile in quantitative terms. The low-molecular adducts or conjugates of MDI are absorbed and direct transcarbamoylation results in plasma protein adducts (albumin, haemoglobin). All observed health effects resulting from exposure to respirable aerosols in acute, subchronic or chronic bioassays and human studies can be allocated to primary alveolar reactivity (respiratory irritation and/or sensitization). No systemic effect other than secondary to primary irritation has been described.
Biomonitoring for exposure to diisocyanates typically looks to assay derivatives (diamines) following hydrolysis of biological fluids and is routinely employed to measure occupational exposure to MDI and other diisocyanates. For diamine analysis, samples of urine are typically used, although blood samples can also be used. However, these markers are not specific for the diisocyanate exposure. The urine biomarkers (after acid or base hydrolysis) reflected recent exposures whereas certain haemoglobin (Hb) biomarkers did not necessarily correlate with the urine biomarkers, and were considered to reflect overall exposures over a longer term. The hydrolysis methods and conditions used release differing amounts of the diamine analyte.
Hydrolysis analytes are at low concentrations and proportionally little of the dose is in urine or blood, and that there is no standardised method for measuring biomarkers in hydrolyzed urine. Investigation of diisocyanate specific biomarkers has focused on the conjugated molecules in blood. Typically, conjugates with Hb or albumin (Alb) have been assessed, and there has been progress in application of experiments in animals to biomonitoring of human exposures to MDI.
The role for glutathione as an intermediary in transport of diisocyanates is now supported by good evidence using various model compounds. The most probable reactions of isocyanates with biological macromolecules are with the amine (mixed urea), the hydroxyl (carbamate) and the sulphydryl (thiolytic acid ester) and that latter is of a reversible nature. The thiocarbamate bond of isocyanate-sulphydryl is reversible, and various authors have found release and transfer of MDI moieties from thiocarbamate conjugates to other nucleophiles, notably protein. The conjugates were shown to be recognised by serum lgG from MDI exposed workers, demonstrating a nonenzymatic, thiol-mediated transcarbamolyating mechanism to protein.

AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232

www.amtcomposites.co.za
AMT NATAL
DURBAN
TEL: +27 31 705 2034

Publish Date 13/07/2023

AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

The methods to identify and quantify MDI-adducts to plasma proteins particularly albumin (Alb) and to haemoglobin (Hb) have now been applied to biological monitoring, particularly useful since the amount of adducts would be indicative of an integrated exposure. In addition, these adducts are specific for MDI exposure. However, the total amount of the analyte MDA, retrievable from Hb-adducts and urinary precursors, accounts for less than 0.5 % of the applied dose of MDI, and the lack of linearity of biomarker to exposure dose makes uncertain the extrapolation from the yield of biomarkers in urine or blood towards inhalative MDI exposure. The use of protein adducts for biomonitoring appears to overcome some of these difficulties and benefits from specificity of the analyte. To date no diisocyanate specific urinary biomarker has been identified. For blood, the MDI-specific methods developed are: Hb-conjugate derived hydantoin, Alb-lysine conjugates and peptide conjugates. On the basis of limits of detection, the Hb-hydantoin method is most sensitive compared to the Alb-lysine method which in turn is more sensitive than the signature peptide method. The Hb-hydantoin method covers a longer period of exposure than the Alb-lysine, due to the longer half-life of the erythrocyte compared to serum albumin.
for diphenylmethane diisocyanate (methylene bisphenyl isocyanate; MDI) Odour Threshold Value: 0.39 ppm
IDLH Level: 10 mg/m3
Mean MDI exposures of less than 0.003 ppm appear to have no acute or chronic effect on pulmonary function.
MDI produces identical toxicological responses to those produced by TOI and the recommended TLV-TWA is identical for the two isocyanates. Exposure at or below the recommended value is thought to protect the worker against pulmonary function decrements as well as to minimise the potential for respiratory tract sensitisation.
Individuals who may be hypersusceptible or otherwise unusually responsive to exposure to certain industrial chemicals may not adequately protected from adverse health effects caused by MDI at the recommended TLVTWA.
Ceiling values recommended by NIOSH and OSHA are synonymous with normal excursions allowable for exposures to the TLV-TWA (in excess of 3 x
TLV-TWA for no more than a total of 30 minutes during a work day but in any case, not exceeding 5 x TLV-TWA).
Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Welldesigned engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.
The basic types of engineering controls are:
Process controls which involve changing the way a job activity or process is done to reduce the risk.
Enclosure and/or isolation of emission source which keeps a selected hazard 'physically' away from the worker and ventilation that strategically 'adds' and 'removes' air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.
Employers may need to use multiple types of controls to prevent employee overexposure.
Spraying of material or material in admixture with other components must be carried out in conditions conforming to local state regulations (AS/NZS 4114, UNI EN 12215:2010, ANSI/AIHA 29.3-2007 or national equivalent).
Local exhaust ventilation with full face positive-pressure air supplied breathing apparatus (hood or helmet type) is required.
Spraying should be performed in a spray booth fitted with an effective exhaust system which complies with local environmental legislation. The spray booth area must be isolated from unprotected personnel whilst spraying is in progress and until all spraying mist has cleared.
NOTE: Isocyanate vapours will not be adequately absorbed by organic vapour respirators. Air contaminants generated in the workplace possess varying 'escape' velocities which, in turn, determine the 'capture velocities' of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant: Air Speed:
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion) 1-2.5 mis (200-500I/min.)

Within each range the appropriate value depends on:
Lower end of the range Upper end of the range
1: Room air currents minimal or favourable to capture 1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only 2: Contaminants of high toxicity
3: Intermittent, low production. 3: High production, heavy use
4: Large hood or large air mass in motion 4: Small hood-local control only.
Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 mis (800-2000 f/min.) for extraction of solvents generated by spraying at a point 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

www.amtcomposites.co.za
Publish Date 13/07/2023
AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232
AMT NATAL
DURBAN
TEL: +27 31 705 2034
AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

Personal Protection

Eye and face protection
Safety glasses with side shields. Chemical goggles.
Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59), [AS/NZS 1336 or national equivalent]

Hands/feet protection
The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.
Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.
The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application.
The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.
Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.
Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:
frequency and duration of contact,
chemical resistance of glove material,
glove thickness and dexterity
Select gloves tested to a relevant standard (e.g., Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).
When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use.
Contaminated gloves should be replaced.
As defined in ASTM F-739-96 in any application, gloves are rated as: Excellent when breakthrough time > 480 min Good when breakthrough time > 20 min Fair when breakthrough time < 20 min Poor when glove material degrades For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended.
It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times.
Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers' technical data should always be taken into account to ensure selection of the most appropriate glove for the task.
Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example:
Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of.
Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e., where there is abrasion or puncture potential

AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232

www.amtcomposites.co.za
AMT NATAL
DURBAN
TEL: +27 31 705 2034

Publish Date 13/07/2023
AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

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.
Isocyanate resistant materials include Teflon, Viton, nitrile rubber and some PVA gloves. Protective gloves and overalls should be worn as specified in the appropriate national standard.
Contaminated garments should be removed promptly and should not be re-used until they have been decontaminated. NOTE: Natural rubber, neoprene, PVC can be affected by isocyanates

Other protection
Overalls.
P.V.C. apron.
Barrier cream.
Skin cleansing cream. Eye wash unit.

Respiratory protection
Full face respirator with supplied air.
Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content.
The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators is considered appropriate.
Cartridge performance is affected by humidity. Cartridges should be changed after 2 hr of continuous use unless it is determined that the humidity is less than 75%, in which case, cartridges can be used for 4 hr. Used cartridges should be discarded daily, regardless of the length of time used
In certain circumstances, personal protection of the individual employee is necessary. Personal protective devices should be regarded as being supplementary to substitution and engineering control and should not be used in preference to them as they do nothing to eliminate the hazard.
However, in some situations, minimising exposure to isocyanates by enclosure and ventilation is not possible, and occupational exposure standards may be exceeded, particularly during on-site mixing of paints, spray-painting, foaming and maintenance of machine and ventilation systems. In these situations, air-line respirators or self-contained breathing apparatus complying with the appropriate national standard must be used.
Organic vapour respirators with particulate pre- filters and powered, air-purifying respirators are NOT suitable.
Personal protective equipment must be appropriately selected, individually fitted and workers trained in their correct use and maintenance. Personal protective equipment must be regularly checked and maintained to ensure that the worker is being protected.
Air- line respirators or self-contained breathing apparatus complying with the appropriate national standard should be used during the clean-up of spills and the repair or clean-up of contaminated equipment and similar situations which cause emergency exposures to hazardous atmospheric concentrations of isocyanate

9. Physical & Chemical Properties

Form: liquid
Colour: brown
Odour: earthy, musty
Pour point: < 0 °C DIN ISO 3016
Initial boiling point: > 300 °C at 1013 hPa
Density: approx. 1,23 g/cm³ at 20 °C DIN 51757
Vapour pressure: 1 hPa at 20 °C
12 hPa at 50 °C
diphenyl−methane−diisocyanate < 0,00001 mbar at 20 °C
Viscosity: approx. 200 mPa.s at 20 °C DIN 53019
Solubility in water: insoluble, reacts
pH value: not applicable
Flash point: > 200 °C DIN EN 22719
Ignition temperature: > 400 °C DIN 51794
Explosive limits: Limits not determined

AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232

www.amtcomposites.co.za
AMT NATAL
DURBAN
TEL: +27 31 705 2034

Publish Date 13/07/2023
AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

10. Stability And Reactivity

Thermal decomposition: Polymerises at about 200 °C with evolution of CO2.
Hazardous decomposition products: No hazardous decomposition products when stored and handled correctly.
Hazardous reactions:
Exothermic reaction with amines and alcohols; reacts with water forming
CO2, in closed containers risk of bursting owing to increase of pressure.
Hazardous reactions: No hazardous reaction when used as directed

11. Toxicological Information

Dermal (rabbit) LD50: >9400 mg/kgl2I Eye (rabbit): 100 mg - mild
Inhalation (rat) LC50: 367.95-558.98 mg/m3Air/4h[1] Inhalation: adverse effect observed (irritating)[1]
Oral (rat) LD50: 2000 mg/kg[2I Skin: adverse effect observed (irritating)l1l

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. 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.
Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnoea, cough and mucus production.
Allergic reactions which develop in the respiratory passages as bronchial asthma or rhino conjunctivitis, are mostly the result of reactions of the allergen with specific antibodies of the lgE class and belong in their reaction rates to the manifestation of the immediate type. In addition to the allergen-specific potential for causing respiratory sensitisation, the amount of the allergen, the exposure period and the genetically determined disposition of the exposed person are likely to be decisive. Factors which increase the sensitivity of the mucosa may play a role in predisposing a person to allergy. They may be genetically determined or acquired, for example, during infections or exposure to irritant substances.
Immunologically the low molecular weight substances become complete allergens in the organism either by binding to peptides or proteins (haptens) or after metabolism (prohaptens).
Particular attention is drawn to so-called atopic diathesis which is characterised by an increased susceptibility to allergic rhinitis, allergic bronchial asthma and atopic eczema (neurodermatitis) which is associated with increased lgE synthesis.
Exogenous allergic alveolitis is induced essentially by allergen specific immune-complexes of the lgG type; cellmediated reactions (T lymphocytes) may be involved. Such allergy is of the delayed type with onset up to four hours following exposure.
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.
Isocyanate vapours/mists are irritating to the upper respiratory tract and lungs; the response may be severe enough to produce bronchitis with wheezing, gasping and severe distress, even sudden loss of consciousness, and pulmonary oedema. Possible neurological symptoms arising from isocyanate exposure include headache, insomnia, euphoria, ataxia, anxiety neurosis, depression and paranoia. Gastrointestinal disturbances are characterised by nausea and vomiting. Pulmonary sensitisation may produce asthmatic reactions ranging from minor breathing difficulties to severe allergic attacks; this may occur following a single acute exposure or may develop without warning after a period of tolerance. A respiratory response may occur following minor skin contact. Skin sensitisation is possible and may result in allergic dermatitis responses including rash, itching, hives and swelling of extremities.
Isocyanate-containing vapours/ mists may cause inflammation of eyes and nasal passages.
Onset of symptoms may be immediate or delayed for several hours after exposure. Sensitised people can react to very low levels of airborne isocyanates. Unprotected or sensitised persons should not be allowed to work in situations allowing exposure to this material.
The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

www.amtcomposites.co.za
Publish Date 13/07/2023
AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232
AMT NATAL
DURBAN
TEL: +27 31 705 2034
AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

for diisocyanates:
In general, there appears to be little or no difference between aromatic and aliphatic diisocyanates as toxicants. In addition, there are insufficient data available to make any major distinctions between polymeric (<1000 MW) and monomeric diisocyanates. Based on repeated dose studies in animals by the inhalation route, both aromatic and aliphatic diisocyanates appear to be of high concern for pulmonary toxicity at low exposure levels. Based upon a very limited data set, it appears that diisocyanate prepolymers exhibit the same respiratory tract effects as the monomers in repeated dose studies. There is also evidence that both aromatic and aliphatic diisocyanates are acutely toxic via the inhalation route. Most members of the diisocyanate category have not been tested for carcinogenic potential. Though the aromatic diisocyanates tested positive and the one aliphatic diisocyanate tested negative in one species, it is premature to make any generalizations about the carcinogenic potential of aromatic versus aliphatic diisocyanates. In the absence of more human data, it would be prudent at this time to assume that both aromatic and aliphatic diisocyanates are respiratory sensitisers. Diisocyanates are moderate to strong dermal sensitisers in animal studies. Skin irritation studies performed on rabbits and guinea pigs indicate no difference in the effects of aromatic versus aliphatic diisocyanates.

For monomers, effects on the respiratory tract (lungs and nasal cavities) were observed in animal studies at exposure concentrations of less than
0.005 mg/L. The experimental animal data available on prepolymeric diisocyanates show similar adverse effects at levels that range from 0.002 mg/L to 0.026 mg/L.
There is also evidence that both aromatic and aliphatic diisocyanates are acutely toxic via the inhalation route

Oncogenicity: Most members of the diisocyanate category have not been tested for carcinogenic potential. Commercially available Poly-MDI was tested in a 2-year inhalation study in rats. The tested material contained 47% aromatic 4,4'-methylenediphenyl diisocyanate (MDI) and 53% higher molecular weight oligomers. Interim sacrifices at one year showed that males and females in the highest dose group (6 mglm3) had treatment related histological changes in the nasal cavity, lungs and mediastinal lymph nodes. The incidence and severity of degeneration and basal cell hyperplasia of the olfactory epithelium and Bowman's gland hyperplasia were increased in males at the mid and high doses and in females at the high dose following the two-year exposure period. Pulmonary adenomas were found in 6 males and 2 females, and pulmonary adenocarcinoma in one male in the high dose group. However, aliphatic hexamethylene diisocyanate (HDI) was found not to be carcinogenic in a two-year repeated dose study in rats by the inhalation route. HDI has not been tested in mice by the inhalation route.

Though the oral route is not an expected route of exposure to humans, it should be noted that in two-year repeated dose studies by the oral route, aromatic toluene diisocyanate (TOI) and 3,3'-dimethoxy-benzidine-4,4'-diisocyanate (dianisidine diisocyanate, DADI) were found to be carcinogenic in rodents. TOI induced a statistically significant increase in the incidence of liver tumours in rats and mice as well as dose-related hemangiosarcoma's of the circulatory system and has been classified by the Agency as a B2 carcinogen. DADI was found to be carcinogenic in rats, but not in mice, with a statistically increase in the incidence of pancreatic tumours observed.

Respiratory and Dermal Sensitization: Based on the available toxicity data in animals and epidemiologic studies of humans, aromatic diisocyanates such as TOI and MDI are strong respiratory sensitisers. Aliphatic diisocyanates are generally not active in animal models for respiratory sensitization. However, HDI and possibly isophorone diisocyanate (IPDI), are reported to be associated with respiratory sensitization in humans. Symptoms resulting from occupational exposure to HDI include shortness of breath, increased bronchoconstriction reaction to histamine challenges, asthmatic reactions, wheezing and coughing. Two case reports of human exposure to IPDI by inhalation suggest IPDI is a respiratory sensitiser in humans. In view of the information from case reports in humans, it would be prudent at this time to assume that both aromatic and aliphatic diisocyanates are respiratory sensitisers. Studies in both human and mice using TOI, HDI, MDI and dicyclohexylmethane- 4,4'-diisocyanate (HMDI) suggest cross-reactivity with the other diisocyanates, irrespective of whether the challenge compound was an aliphatic or aromatic diisocyanate. Diisocyanates are moderate to strong dermal sensitisers in animal studies. There seems to be little or no difference in the level of reactivity between aromatic and aliphatic diisocyanates.

Dermal Irritation: Skin irritation studies performed on rabbits and guinea pigs indicate no difference in the effects of aromatic versus aliphatic diisocyanates. The level of irritation ranged from slightly to severely

irritating to the skin. One chemical, hydrogenated MDI (1,1-methylenebis- 4-isocyanatocyclohexane), was found to be corrosive to the skin in guinea pigs.

The substance is classified by IARC as Group 3:

NOT classifiable as to its carcinogenicity to humans.
Evidence of carcinogenicity may be inadequate or limited in animal testing.

12. Ecological Information

Persistence water 25 C -low – half-life 20 hours
Persistence Air – low – half life 1 day

www.amtcomposites.co.za
AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232
AMT NATAL
DURBAN
TEL: +27 31 705 2034
AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669
Publish Date 13/07/2023

13. Disposal Considerations

Containers may still present a chemical hazard/ danger when empty. Return to supplier for reuse/ recycling if possible.
Otherwise:
If container cannot be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
Where possible retain label warnings and SOS and observe all notices pertaining to the product.
Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
A Hierarchy of Controls seems to be common - the user should investigate: Reduction
Reuse Recycling
Disposal (if all else fails)
This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf-life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.
DO NOT allow wash water from cleaning or process equipment to enter drains. It may be necessary to collect all wash water for treatment before disposal.
In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
Where in doubt contact the responsible authority.
DO NOT recycle spilled material.
Consult State Land Waste Management Authority for disposal.
Neutralise spill material carefully and decontaminate empty containers and spill residues with 10% ammonia solution plus detergent or a proprietary decontaminant prior to disposal.
DO NOT seal or stopper drums being decontaminated as CO2 gas is generated and may pressurise containers.
Puncture containers to prevent re-use.
Bury or incinerate residues at an approved site

14. Transport Information

Labels Required
Marine Pollutant NO
Land transport {UN): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS
Air transport {ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS
Sea transport {IMDG-Code / GGVSee): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS
Transport in bulk according to Annex II of MARPOL and the IBC code
Not Applicable

15. Regulatory Information

Labelling in accordance with Annex I of directive 67/548/EEC and its amendments and adaptations:
Symbol: Xn, hazard description: harmful
Contains: diphenylmethane−diisocyanate, isomers and homologues
R 20: Harmful by inhalation.
R 36/37/38: Irritating to eyes, respiratory system and skin.
R 42/43: May cause sensitization by inhalation and skin contact.
S 23: Do not breathe vapour/spray.
S 36/37: Wear suitable protective clothing and gloves.
S 45: In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
TRGS 905−classific on:
Tech. ("polymer") MDI (pMDI) CAS No.: 9016−87−9 (in the form of respirable aerosols, measured as the alveolar aerosol content) cancerogenic, category 3
Any existing national regulations on the handling of isocyanates must be observed.
Swiss law of poison: class of poison 3; BAG−T−No. 614463.Not dangerous cargo. Irrit ng to skin and eyes.
Avoid temperatures below
+10 °C. Avoid heat above +50 °C. Keep dry. Keep away from foodstuffs, acids and alkalis.

16. Other Information

N/A

www.amtcomposites.co.za
Publish Date 13/07/2023
AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232
AMT NATAL
DURBAN
TEL: +27 31 705 2034
AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

Guarantee

This PolyUrethane system is provided as is without any guarantees or warranty. In association with the product, AMT Composites PTY LTD makes no warranties of any kind, either express or implied, including but not limited to warranties of merchantability, fitness for a particular purpose, of title, or of non infringement of third party rights. Use of the product by a user is at the user's risk.

NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A SPECIFIC PURPOSE, THE PRODUCTS TO WHICH THE INFORMATION MENTIONS MAY BE USED WITHOUT INFRINGING THE INTELLECTUAL PROPERTY RIGHTS OF OTHERS, OR OF ANY OTHER NATURE ARE MADE WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION MENTIONS. IN NO CASE SHALL THE INFORMATION BE CONSIDERED A PART OF OUR TERMS AND CONDITIONS OF SALE."

Disclaimer

Any information, data, advice or recommendation's for processing materials or products supplied by AMT Composites is given in good faith. It remains at all time the responsibility of the customer to ensure that the products and materials recommended are suitable for the production method used, and purpose intended.

Copyright

All rights reserved, including intellectual property rights. Changes to technical data reserved. Delivery subject to availability. Any liability that the data and illustrations are complete, actual or correct is excluded. Designations may be trademarks and/or copyrights of the respective manufacturer, the use of which by third parties for their own purposes may infringe the rights of such owner.
©2018 AMT Composites

AMT HEAD OFFICE
JOHANNESBURG
TEL: +27 11 392 4232

www.amtcomposites.co.za
AMT NATAL
DURBAN
TEL: +27 31 705 2034

AMT CAPE
CAPE TOWN
TEL: +27 21 511 2669

Publish Date 13/07/2023