

A-109



SAFETY DATA SHEET

SECTION 1: PRODUCT & COMPANY INFORMATION

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| Distributed By Demilec 3315 E. Division Street, Arlington, TX 76011 Phone: 817-640-4900 / Fax: 817-633-2000 Email: Info@Demilec.com / Website: www.Demilec.com | Product Trade Name: A-109 Chemical Name: Diphenylmethane Diisocyanate (MDI) Chemical Family: Aromatic Isocyanate Product Use: Component of a Polyurethane System |
| Emergency Telephone: CHEMTREC 800-424-9300 or CANUTEC 613-996-6666 | |

SECTION 2: HAZARDS IDENTIFICATION

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| Physical State / Color / Odor | Liquid / Yellow / Not Available | |
| EMERGENCY OVERVIEW / WARNING | | |
| OSHA / HCS Status | This material is classified hazardous under OSHA Hazard Communication Standard (29 CFR 1910.1200). | |
| Physical / Chemical Hazards | Toxic vapors may be released during burning or thermal decomposition. Closed container may forcibly rupture under extreme heat or when contents have been contaminated with water. Use cold water spray to cool fire exposed containers to minimize the risk of rupture. | |
| Human Health Hazard | Harmful by inhalation. Irritating to eyes, respiratory system and skin. May cause sensitization by inhalation and skin contact. This product is respiratory irritant and potential respiratory sensitizer: repeated inhalation of vapor or aerosol at levels above the occupational exposure limit could cause respiratory sensitization. A hyper reactive response to even minimal concentrations of MDI may develop in sensitized persons. The onset of the respiratory symptoms may be delayed for several hours after exposure. Lung damage and respiratory sensitization may be permanent. | |

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

| INGREDIENTS | CAS # | % |
|---|-----------|----------|
| Methylenediphenyldiisocyanate, Isomers and Homologues | 9016-87-9 | 60 - 100 |
| 4,4' Diphenylmethane Diisocyanate | 101-68-8 | 30 - 60 |

SECTION 4: FIRST AID MEASURES

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| Eye Contact | Immediately flush eyes with running water for a minimum of 15 minutes. Use lukewarm water if possible. Hold eyelids open during flushing. Obtain medical attention immediately. |
| Skin Contact | In case of contact, immediately remove contaminated clothing and shoes. Immediately flush skin with soap and water. Use lukewarm water if possible. Wash contaminated clothing and shoes thoroughly before reuse. For severe exposures, immediately get under safety shower and start rinsing. If the irritation develops, obtain medical attention. |
| Inhalation | Move to an area free from further exposure. Obtain medical attention immediately. If breathing is difficult, qualified personnel should administer artificial respiration or oxygen. Asthmatic symptoms may develop and may be immediate or delayed up to several hours. Extreme asthmatic reactions can be life threatening. |
| Ingestion | DO NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If patient is conscious, wash out mouth with water. Get immediate medical attention. |
| Protection of First-aiders | No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. |
| Notes to Physician | Eyes: Stain for evidence of corneal injury. If cornea is burned, instill antibiotic/steroid preparation as needed. Workplace vapors could produce reversible corneal epithelial edema impairing vision. Skin: this compound is a skin sensitizer. Treat symptomatically as for contact dermatitis or thermal burn. Ingestion: treat symptomatically. There is no specific antidote. Inducing vomiting is contraindicated because of the irritating nature of compound. Inhalation: treatment is essentially symptomatic. An individual having a dermal or pulmonary sensitization reaction to this material should be removed from further exposure to any diisocyanate. Following severe exposure the patient should be kept under medical review for at least 48 hours. |

| SECTION 5: FIRE FIGHTING MEASURES | |
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| Suitable Extinguishing Media | Dry chemical, carbon dioxide (CO ₂), foam, water spray for large fires. |
| Hazardous Products of Thermal Decomposition | Combustion products may include carbon monoxide, carbon dioxide, nitrogen oxides, hydrocarbons and HCN. |
| Special Fire Fighting Procedures | Firefighter should be equipped with self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode to protect against potentially toxic and irritating fumes generated by thermal decomposition or combustion during a fire. They should wear appropriate protective equipment such as PVC boots, gloves, safety helmet and protective clothing. Avoid contact with product. Exposure to heated diisocyanate can be extremely dangerous. Decontaminate equipment and clothing prior to reuse. |
| Unusual Fire / Explosion Hazards | A hazardous pressure buildup could result due to reaction with water producing CO ₂ gas if contaminated containers are resealed. Containers may burst if overheated. Use cold water spray to cool fire exposed containers to minimize the risk of rupture. Large fires can be extinguished with large volumes of water applied from a safe distance, since reaction between water and hot diisocyanate can be vigorous. |

| SECTION 6: ACCIDENTAL RELEASE MEASURES | |
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| Spill and Leak Procedures | Evacuate all non-emergency personnel. Isolate the area and prevent access. Eliminate all sources of ignition. Notify management. Use protective equipment. Control sources of the leak. Ventilate. Clean-up should be performed by trained personnel. |
| Methods for Cleaning-up | Environmental Precautions: Contain the spill to prevent spread into drains, sewers, water supplies, or soil. Major Spill or Leak: Released material may be pumped into closed, but not sealed metal containers for disposal. Process can generate heat. People dealing with major spillage should wear full protective clothing including respiratory protection. Use suitable protective equipment. Minor Spill or Leak: Cover spill area with sand, earth or any suitable absorbent material. Saturate absorbent material with neutralization solution and mix. Wait 15 minutes. Collect material in open-head metal containers. Repeat applications of decontamination solution, with scrubbing, followed by absorbent until the surface is decontaminated. Check for residual surface contamination. Swipe® test kits have been used for this purpose. Apply lid loosely and allow containers to vent for 72 hours to let carbon dioxide to escape. Wash the spillage area with water. Test atmosphere for MDI vapor. |
| Neutralization Solutions | <ul style="list-style-type: none"> a mixture of 75% water, 20% non-ionic surfactant and 5% n-propanol a mixture of 80% water with 20% non-ionic surfactant a mixture of 90% water, 3-8% ammonium hydroxide or concentrated ammonia and 2% detergent |

| SECTION 7: HANDLING & STORAGE | |
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| Storage Temperature | 59 - 86°F (15 - 30°C) |
| Storage Life | 6 months |
| Handling | Do not breathe vapor, mists or dusts. Avoid contact with skin and eyes. Use adequate ventilation to keep airborne isocyanate levels below the exposure limits. The efficiency of the ventilation system must be monitored regularly because of the possibility of blockage. When the product is sprayed, heated, or used in confined space, suitable respiratory protection equipment with positive air supply is required. Keep equipment clean. This material can produce asthmatic sensitization upon either single inhalation exposure to a relatively high concentration or upon repeated inhalation exposures to lower concentrations. Individuals with lung or breathing problems or prior allergic reactions to isocyanates must not be exposed to vapors and mist. Do not breathe smoke and gases created by overheating or burning this material. Decomposition products can be highly toxic and irritating. Keep stocks of decontaminant readily available. Employee education and training in the safe use and handling of this product are required under the OSHA Hazard Communication Standard 29 CFR 1910.1200. |
| Storage | Store in tightly closed containers to prevent moisture contamination. Due to reaction with water producing CO ₂ gas, a hazardous build up of pressure could result if contaminated containers are resealed. Do not reseal container if contamination is suspected. Uncontaminated containers, free of moisture, may be resealed only after placing under a nitrogen blanket. |
| Packaging Containers | Suitable: steel, stainless steel. Unsuitable: copper, copper alloys or galvanized surfaces. |

| SECTION 8: EXPOSURE CONTROL / PERSONAL PROTECTION | | |
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| EXPOSURE LIMIT VALUES | | |
| For Product | N/A | |
| For Ingredients | OSHA-PEL | ACGIH-TLV |
| 4,4' Diphenylmethane Diisocyanate | CEIL: 0.02 ppm CEIL: 0.2 mg/m ³ | TWA: 0.005 ppm 8 hrs |
| ENVIRONMENTAL CONTROLS | | |

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| Occupational Exposure Controls | Provide exhaust ventilation or other engineering controls to keep the airborne vapors concentrations below their respective occupational exposure limits. Standard reference sources regarding industrial ventilation (e.g. ACGIH Industrial Ventilation Manual) should be used as a guide about adequate ventilation. To ensure that published exposure limits have not been exceeded, monitoring for airborne diisocyanate should become part of the overall employee exposure characterization program. NIOSH and OSHA have developed sampling and analytical methods and they are available upon request. MDI can only be smelled if the occupational exposure limit has been exceeded considerably. |
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| Environmental Exposure Controls | Emissions from ventilation or work process equipment should be checked to ensure compliance with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels. |
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PERSONAL PROTECTIVE EQUIPMENT

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| Eye Protection | Eye protection is required when directly handling liquid product. Safety eyewear such as chemical safety goggles or 8" face shield should be used when there is a greater risk of liquid splash. Contact lenses should not be worn when working with this chemical. |
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| Skin Protection | Avoid all contact with skin. Cover exposed skin area with appropriate clothing to prevent skin contact. Use chemical resistant gloves such as nitrile/butadiene rubber ("nitrile" or "NBR"), butyl rubber, polyvinyl chloride ("PVC" or "vinyl"), polychloroprene (neoprene). Protective gloves should be worn when handling freshly made polyurethane products to avoid contact with trace residual materials that may be hazardous in contact with skin. Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Animal tests and other research indicate that skin contact with MDI can play a role in causing isocyanate sensitization and respiratory reaction. |
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| Respiratory Protection | Airborne MDI concentrations greater than the ACGIH TLV-TWA (TWA) or OSHA PEL-C (PEL) can occur in inadequately ventilated environments when MDI is sprayed, aerosolized or heated. In such cases, respiratory protection must be worn. The type of protection selected must comply with the requirements set forth in OSHA's Respiratory Protection Standard (29 CFR 1910.134). The type of available protection include: 1) an atmosphere-supplying respirator such as a self-contained breathing apparatus (SCBA) or a supplied air respirator (SAR) in the positive pressure or continuous flow mode, or 2) an air purifying respirator (APR). If an APR is selected then: a) cartridge must be equipped with an end-of-service life indicator (ESLI) certified by NIOSH, or (b) a change out of schedule, based on objective information or data that will ensure that the cartridges are changed out before the end of their service life, must be developed and implemented. The basis for the change out of schedule must be described in the written respirator program. Further, if an APR is selected, the airborne diisocyanate concentration must be no greater than 10 times the TLV or PEL. The recommended APR cartridge is an organic vapor/particulate filter combination cartridge (OV/P100). |
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| Medical Surveillance | All applicants assigned to an isocyanate work area should undergo a pre-placement medical evaluation. A history of asthma, bronchitis, eczema or respiratory allergies such as hay fever, are possible reasons for medical exclusion from isocyanate areas. Once a worker has been diagnosed as sensitized to any isocyanate, no further exposure can be permitted. The Occupational Exposure Limits do not apply to previously sensitized individuals. A comprehensive annual medical surveillance program should be instituted for all employees who are potentially exposed to diisocyanates. |
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| Additional Protective Measures | Ensure that eyewash stations and safety showers are close to the workstation. Educate and train employees in the safe use and handling of this product. Follow all label instructions. |
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SECTION 9: PHYSICAL & CHEMICAL PROPERTIES

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| Physical State | Yellow liquid |
| Odor | N/A |
| Viscosity @ 77°F (25°C) | 400 - 500 cps |
| Specific Gravity @ 77°F (25°C) | 1.13 - 1.17 |
| Flash Point | Closed cup: > 302°F (150°C) Open cup: 446°F (230°C) |
| Auto-Ignition Temperature | > 1112°F (600°C) |
| Boiling Point | > 572°F (300°C) |
| Bulk Density | N/A |
| pH | N/A |
| Vapor Pressure | N/A |
| Vapor Density (Air=1) | N/A |
| Solubility in Water | N/A |

SECTION 10: STABILITY & REACTIVITY

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| Incompatibility | Stable at room temperature. This product will react and release heat with any materials containing active hydrogen. The reaction is accelerated and can be violent at higher temperatures if the miscibility of the |
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| | reaction partners is good or is supported by stirring or by the presence of solvents. MDI is insoluble with and heavier than water and sinks to the bottom, but reacts slowly at the interface. A solid water-insoluble layer of polyurea is formed at the interface by liberating CO ₂ . |
| Conditions / Materials to Avoid | Avoid high temperatures. Avoid water, alcohols, amines, bases, copper alloys |
| Hazardous Polymerization | May occur at elevated temperatures (350°F (177°C)), in the presence of alkalies, tertiary amines and metal compounds. |
| Hazardous Products of Decomposition | Isocyanate vapors and other irritating, highly toxic gases such as carbon dioxide, carbon monoxide, nitrogen oxides, hydrocarbons and HCN. |

SECTION 11: TOXICOLOGICAL INFORMATION

| | Acute Oral Toxicity, LD50 (Rat) | Acute Inhalation Toxicity, LC50 (Rat) | Acute Dermal Toxicity, LD50 (Rabbit) | Repeated Dose Toxicity (Rat) |
|-----------------------------------|---------------------------------|---|--------------------------------------|---|
| 4,4' Diphenylmethane Diisocyanate | N/A | 369 mg/m ³ (4 hr) > 2240 mg/m ³ (1 hr) | > 10,000 mg/kg | 90 days, inhalation: NOAEL: 0.3 mg/m ³ (18 hrs/day 5 days/week) Irritation to lungs & nasal cavities |

POTENTIAL ACUTE HEALTH EFFECTS

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| Eye Contact | Irritating to eyes |
| Skin Contact | Irritating to skin. May cause sensitization by skin contact. |
| Inhalation | Product is a respiratory irritant and potential respiratory sensitizer. Repeated inhalation of vapors or aerosols at levels above the occupational exposure limit could cause respiratory sensitization. Symptoms may include irritation to eyes, nose, throat and lungs, possibly combined with dryness of the throat, tightness of chest and difficulty in breathing. The onset of the respiratory symptoms may be delayed for several hours after exposure. A hyper-reactive response to even minimal concentrations of MDI may develop in sensitized persons. |
| Ingestion | Low oral toxicity. Ingestion may cause irritation of gastrointestinal tract. |

POTENTIAL CHRONIC HEALTH EFFECTS

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| Target Organs | Lungs, upper respiratory tract, skin |
| Carcinogenic Effects | A study was conducted where groups of rats were exposed for 2 years to a respirable polymeric MDI aerosol at concentrations of 0, 0.2, 1 or 6 mg/m ³ . No adverse effects were observed at 0.2 mg/m ³ . At the 1 mg/m ³ , minimal nasal and lung irritant effects were seen. Only at the top concentration (6 mg/m ³) there was an increased incidence of benign tumor of the lung. One malignant pulmonary tumor was seen in the 6 mg/m ³ group. MDI administration to rats in this study did not change the distribution and incidence of tumors from those seen in control animals. The increased incidence of lung tumors is associated with prolonged respiratory irritation and the concurrent accumulation of yellow material in the lung. In the absence of prolonged exposure to high concentrations leading to chronic irritation and lung damage, it is highly unlikely that tumor formation will occur. |
| Mutagenic Effects | There is no substantial evidence of mutagenic potential. |
| Reproductive Effects | No adverse reproductive effects are anticipated. No birth defects were seen in two independent animal (rat) studies. Fetotoxicity was observed at doses that were extremely toxic (including lethal) to the mother. Fetotoxicity was not observed at doses that were not maternally toxic. The doses used in these studies were maximal respirable concentrations well in excess of the defined occupational exposure limits. |

SECTION 12: ECOLOGICAL INFORMATION

AQUATIC TOXICITY DATA FOR COMPONENTS TOXICITY

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| 4,4' Diphenylmethane Diisocyanate | Acute & Prolonged Toxicity to Fish: LC50: > 500 mg/l (24 hrs) (zebra fish) Acute & Prolonged Toxicity to Invertebrates: EC50: > 500 mg/l (24 hrs) (daphnia magna) |
| Mobility | By considering the production and use of substance, it is unlikely that significant environmental exposure in the air or water will arise. Immiscible with water but will react and produce inert and non-biodegradable solids. Conversion to soluble products, including diamino-diphenylmethane (MDA) is very low under the optimal laboratory conditions of good dispersion and low concentration. In air, the predominant degradation process is predicted to be relatively rapid OH attack, by calculation and by analogy with related diisocyanates. |
| Other Adverse Effects | By comparison with an analogous product, the following values are anticipated. The measured ecotoxicity is that of the hydrolyzed product, generally under conditions maximizing production of soluble species. Even so, the observed ecotoxicity is low/very low. A pond study showed gross contamination caused no significant toxic effects on a wide variety of flora in all trophic levels (including fish), no detectable diamino-diphenylmethane (MDA), and no evidence of bioaccumulation of MDI or |

SECTION 13: DISPOSAL CONSIDERATION

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| Waste Disposal Method | The generation of waste should be avoided or minimized whenever possible. Waste must be disposed of in compliance with federal, state, provincial and local environmental control regulations. Dispose of surplus and non-recyclable products via licensed waste disposal contractor. Incineration is the preferred method. If incinerated, toxic and corrosive combustion gases must be properly handled. |
| Empty Container Precautions | Empty containers retain product residue (liquid and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. |
| Demilec has no control over the management practices or manufacturing processes of parties handling or using this material. The information presented here pertains only to the product as shipped in its original condition as described in SDS Section 3 (Ingredients). | |

SECTION 14: TRANSPORTATION INFORMATION

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| Technical Shipping Name | A-109 |
| Land Transport / DOT Classification | Other regulated substances, liquid, N.O.S. (Methylene Diphenyl Diisocyanate) UN Number: NA3082 / Class 9 / Packaging Group III |
| Sea Transport / IMDG Classification | Non-regulated |
| Air Transport / ICAO / IATA Classification | Non-regulated |
| TDG Classification | Non-regulated |
| Emergency Telephone Number | CHEMTREC 800-424-9300 or CANUTEC 613-996-6666 |

SECTION 15: REGULATORY INFORMATION**U.S. FEDERAL REGULATIONS**

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| OSHA Hazcom Standard Rating | This material is classified as hazardous under OSHA Hazard Communication Standard (29 CFR 1910.1200) | | |
| HSC Classification | Toxic / Irritant / Sensitizer | | |
| US. Toxic Substances Control Act / TSCA | All ingredients are listed on the TSCA Inventory | | |
| US. EPA CERCLA Hazardous Substances (40 CFR 302) | 4,4' Diphenylmethane Diisocyanate (CAS 101-68-8) has a 5,000 lbs RQ. Any spill or release above the RQ must be reported to the National Response Center (800-424-8802). | | |
| SARA Section 311/312 Hazard Categories | Acute Health Hazard, Chronic Health Hazard | | |
| US. EPA EPCRA SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A) | Non-regulated | | |
| US. EPA EPCRA SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required | 4,4' Diphenylmethane Diisocyanate: 30 - 60% | | |
| US. EPA RCRA Composite List of Hazardous Wastes and Appendix VIII Hazardous Constituents (40 CFR 261) | If discarded in its purchased form, this product will not be a hazardous waste either by listing or by characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste (40 CFR 261.20-24). | | |
| State Regulations | The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the SDS may also be applicable to state requirements. For details on your regulatory requirements you should contact appropriate agency in your state. | | |
| California Prop. 65 | No ingredients listed | | |
| Massachusetts, New Jersey or Pennsylvania Right to Know Substances Lists | COMPONENTS | CAS # | WEIGHT % |
| | 4,4' Diphenylmethane Diisocyanate | 101-68-8 | 30 - 60 |
| New Jersey Environmental Hazardous Substances List and/or New Jersey RTK Special Hazardous Substances Lists | COMPONENTS | CAS # | WEIGHT % |
| | 4,4' Diphenylmethane Diisocyanate | 101-68-8 | 30 - 60 |
| CANADA | | | |

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| WHMIS | Class D-2A / Material causing other toxic effects (very toxic) Class D-2B / Material causing other toxic effects (toxic) |
| CEPA (DSL) | Canada Inventory: All components are listed or exempted. |

SECTION 16: OTHER INFORMATION

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| HMIS Rating 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe | Health | 2 |
| | Fire Hazard | 1 |
| | Reactivity | 1 |
| NFPA Rating 0 - Insignificant; 1 - Slight; 2 - Moderate; 3 - High; 4 - Extreme | Health Hazard: 2 Flammability Hazard: 1 Instability Hazard: 1 | |

This product does not contain nor is it manufactured with ozone depleting substances.

Notice: The information herein is presented in good faith and believed to be accurate as of the effective date shown below. However, no warranty expressed or implied is given. Regulatory requirements are subject to change and may differ from one location to another; it is the user's responsibility to ensure that its activities comply with country, state, provincial and local laws. This product may present hazards and should be used with caution. While certain hazards are described in this publication, no guarantee is made that these are the only hazards that exist. Hazards, toxicity and behavior of the products may differ when used with other materials and are dependent upon manufacturing circumstances or other processes. Such hazards, toxicity and behavior should be determined by the user and made known to handlers, processors and end users.

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| Prepared By | Demilec - EHS Group |
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