1. Product and Supplier Identification

Product: Substrate Bonder SB100

Product Use: Bonding agent for acrylic and polyester sheets

Manufacturer: Integra Adhesives Inc.,

Unit 4, 33759 Morey Avenue
Abbotsford, BC, Canada, V2S 2W5
Telephone: +1(604) 850-1321
Facsimile: +1(604) 850-1354
Emergency Telephone Number: +1(604) 986-4617

Supplier:

2. Composition

<table>
<thead>
<tr>
<th>Component</th>
<th>% (w/w)</th>
<th>LD₅₀</th>
<th>LC₅₀</th>
<th>Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphenylmethane Diisocyanate (isomers and homologues) CAS No 9016-87-9</td>
<td>50 – 70</td>
<td>&gt;10000 mg/kg (rat/oral)</td>
<td>490 mg/m³ (rat/4hr)</td>
<td>ACGIH¹ TLV-TWA: 0.005 ppm (MDI, a component of this chemical) Sensitizer</td>
</tr>
<tr>
<td>Diphenylmethane-4,4’- Diisocyanate CAS No 101-68-8</td>
<td>30 - 50</td>
<td>&gt;10000 mg/kg (rat/oral)</td>
<td>490 mg/m³ (rat/4hr)</td>
<td>ACGIH TLV-TWA: 0.005 ppm Sensitizer</td>
</tr>
<tr>
<td>Inert Ingredients or those below disclosure requirements</td>
<td>0</td>
<td>N. App</td>
<td>N. App</td>
<td>N Applicable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>% (w/w)</th>
<th>LD₅₀</th>
<th>LC₅₀</th>
<th>Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,2-Oxybisethanol CAS No 111-46-6</td>
<td>1 - 10</td>
<td>7710 mg/kg (rat/oral)</td>
<td>N/av</td>
<td>ACGIH¹ TLV: 5 mg/m³</td>
</tr>
<tr>
<td>Inert Ingredients or those below disclosure requirements</td>
<td>90-99</td>
<td>N/ap</td>
<td>N/ap</td>
<td>N/ap</td>
</tr>
</tbody>
</table>
3. Hazards Identification

Routes of Entry:

Skin Contact: Yes (Part A)  Eye Contact: Yes (Part B)
Ingestion: Yes (Part A)  Inhalation: Yes (Part A)

Emergency Overview: Off white, viscous liquid with a characteristic earthy, musty odour. Can probably burn if strongly heated. Can decompose at high temperatures forming toxic gases, such as nitrogen oxides and hydrogen cyanide. May polymerize if heated above 50 deg C. Reacts with water. Closed containers may develop pressure and rupture on prolonged exposure to heat or if contaminated with water. VERY TOXIC. Aerosol may be fatal if inhaled. May cause lung injury - effects may be delayed. SKIN IRRITANT. Causing severe skin irritation. Respiratory Sensitizer! May cause severe allergic respiratory reaction. Skin sensitizer! May cause severe allergic skin reaction.

Acute Health Effects:

Inhalation: This product contains materials that are low in volatility. Therefore, airborne exposures are unlikely to occur unless the product is heated or forms an aerosol or mist during use. Short-term exposure to isocyanates can cause respiratory and mucous membrane irritation. Symptoms include eye and nose irritation, dry or sore throat, runny nose, shortness of breath, wheezing and laryngitis. Coughing with chest pain or tightness may also occur, frequently at night. These symptoms may occur during exposure or may be delayed by hours. Some people may become sensitized to this product.

Skin Contact: This product is may cause severe irritation to skin. In general isocyanates can cause skin discolouration and hardening of the skin after repeated exposures. Skin may become sensitized to this product.

Eye Contact: Ingredients in Part B may cause severe eye irritation.

Ingestion: There have been no reports of human ingestion of 4,4'-MDI. Animal studies indicate that the toxic effects of the ingestion of 4,4'-MDI are slight. Ingestion could result in irritation and corrosion of the mouth, throat, and digestive tract. Ingestion is not a typical route of occupational exposure.

Chronic Health Effects:

Respiratory sensitization has developed in people working with MDI. The sensitization is usually caused by a very large exposure or by multiple exposures. Although varying periods of exposure (1 day to years) may elapse before sensitization occurs, it develops more often during the first few months of exposure. Sensitized individuals react to very low levels of MDI (as low as 0.0014 ppm) that have no effect on unsensitized people. At first, the symptoms may appear to be a cold or mild hay fever. However, severe asthmatic symptoms can develop and include wheezing, chest tightness, shortness of breath, difficulty breathing and/or coughing. Fever, chills, general feelings of discomfort, headache and fatigue can also occur. Symptoms may occur immediately upon exposure, within an hour or several hours after exposure or both and/or at night. Typically the asthma improves with removal from exposure (e.g. weekends and vacations) and returns, in some cases, in the form of an "acute attack", on renewed exposure. Sensitized people who continue to work with MDI may develop symptoms sooner after each exposure. The number and severity of symptoms may increase.

Following removal from exposure, some workers may continue to have persistent respiratory problems such as asthmatic symptoms, bronchial problems and hypersensitivity to MDI. Others may recover fully and may gradually lose their sensitivity within several years.
Allergic contact dermatitis has developed from occupational contact with MDI. It has been proposed that a break-down (hydrolysis) product of MDI, 4,4’-methylene dianiline (MDA), is the real allergen rather than MDI. Following occupational contact with MDI, 3 of 4 people showed reaction to MDA as well as MDI, while one showed reaction to MDA only.

IARC has concluded that ingredients in this product are not classifiable as to its carcinogenicity to humans.

**Medical Conditions Aggravated by Exposure:**
Pre-existing eye, skin, respiratory tract disorders may be aggravated by exposure. Previous sensitization to MDI will cause sensitization attacks.

### 4. First Aid Measures

**Inhalation:** This chemical is very toxic and a respiratory sensitizer. Take proper precautions to ensure your own safety before attempting rescue (e.g. wear appropriate protective equipment, use the buddy system). Remove source of contamination or move victim to fresh air. If breathing is difficult, trained personnel should administer emergency oxygen. DO NOT allow victim to move about unnecessarily. Symptoms of pulmonary edema can be delayed up to 48 hours after exposure. If breathing has stopped, trained personnel should begin artificial respiration (AR) or, if the heart has stopped, cardiopulmonary resuscitation (CPR) or automated external defibrillation (AED) immediately. Avoid mouth-to-mouth contact by using mouth guards or shields. Quickly transport victim to an emergency care facility.

**Skin Contact:** Avoid direct contact. Wear chemical protective clothing, if necessary. Remove contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Quickly and gently blot or brush away excess chemical. Immediately wash gently and thoroughly with lukewarm, gently flowing water and non-abrasive soap for 15-20 minutes. Immediately obtain medical attention. Double bag, seal, label and leave contaminated clothing, shoes and leather goods at the scene for safe disposal.

**Eye Contact:** Avoid direct contact. Wear chemical protective gloves, if necessary. Quickly and gently blot or brush chemical off the face. Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 5 minutes, while holding the eyelid(s) open. If irritation persists or other symptoms develop, obtain medical advice.

**Ingestion:** NEVER give anything by mouth if victim is rapidly losing consciousness, is unconscious or convulsing. Have victim rinse mouth thoroughly with water. **Do not induce vomiting!** If vomiting occurs naturally, have victim rinse mouth with water again. Obtain medical advice.

**General Comments:** Provide general supportive measures (comfort, warmth, rest). Consult a doctor and/or the nearest Poison Control Centre for all exposures. Some first aid procedures recommended above require advanced first aid training. Protocols for undertaking advanced procedures must be developed in consultation with a doctor and routinely reviewed. All first aid procedures should be periodically reviewed by a doctor familiar with the material and its conditions of use in the workplace.

### 5. Fire Fighting Measures

**Part A**
- **Flash point:** 190°C TCC (Part A), 195°C TCC (Part B)
- **Autoignition Temperature:** 240°C (MDI)
- **Lower Explosive Limit:** N/av
- **Upper Explosion Limit:** N/av
- **Sensitivity to Impact:** No
- **Sensitivity to Static Discharge:** No

**Part B**
- **Flash point:** Not applicable
- **Autoignition Temperature:** Not applicable
- **Lower Explosive Limit:** Not applicable
- **Upper Explosion Limit:** Not applicable
- **Sensitivity to Impact:** No
Sensitivity to Static Discharge: No

Hazardous Combustion Products: Burning may produce oxides of carbon.

Extinguishing Media: Dry chemical powder, carbon dioxide, water-based foam, water spray, inert gas. No water-based extinguishers.

Fire Fighting Instructions: Evacuate area and fight fire from a safe distance or a protected location. Approach fire from upwind to avoid hazardous vapours and toxic decomposition products. Water or water-based foam, if used in very large quantities, may be effective for fighting fires involving 4,4'-methylene diphenyl disocyanate (4,4'-MDI). However, care must be taken since the reaction between water or water-based foam and hot 4,4'-MDI can be vigorous. Isolate materials not yet involved in the fire and protect personnel. Move containers from fire area if this can be done without risk. Otherwise, keep fire-exposed tanks or containers cool by spraying with water to minimize the risk of rupture, but avoid direct contact of 4,4'-MDI with water. Water spray or fog can be used to absorb heat and protect exposed material of structures. If a leak or spill has not ignited, use water spray to disperse the vapours and to protect personnel attempting to stop a leak. After the fire has been extinguished, the area should not be considered safe until a thorough inspection for residual isocyanate has been carried out by properly protected personnel. 4,4'-MDI and its decomposition products, such as hydrogen cyanide and nitrogen oxides, are extremely hazardous to health. Do not enter area without wearing specialized protective equipment suitable for the situation. Firefighter's normal protective clothing (Bunker Gear) will not provide adequate protection. Chemical resistant clothing (e.g. chemical splash suit) and positive pressure self-contained breathing apparatus (MSHA/NIOSH approved or equivalent) may be necessary.

6. Accidental Release Measures

Personal Protection: Wear adequate personal protection to prevent skin contact. See Section 8 for specific recommendations.

Environmental Precautions: Prevent release into waterways and sewers. Stop spill as soon as possible to prevent contamination of soil, groundwater, or surface water.

Cleanup Procedures: Restrict access to area until completion of clean-up. Ensure clean-up is conducted by trained personnel only. Wear adequate personal protective equipment. Extinguish or remove all ignition sources. Ventilate area. Notify government occupational health and safety and environmental agencies. Do not touch spilled material.

Stop or reduce leak if safe to do so. Small spills: Shovel into clean, dry, labelled, open containers. Move containers to safe, well-ventilated area. Wash down spill area with decontaminant solution described under "Handling". Allow to react at least 10 minutes. Decontaminate emergency equipment.

Do not get water inside containers or on spill material. Contaminated absorbent material may pose the same hazards as the spilled material.

7. Handling and Storage

Handling Procedures: Keep away from heat and all sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas, fumes, vapor, or spray. Follow safe work procedures and wear appropriate personal protective equipment.

Storage: Store in a dry, well-ventilated area out of direct sunlight and away from heat and ignition. Store within temperature range recommended by chemical manufacturer/supplier. Alarms that warn of temperatures higher or lower than recommended may be necessary. Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel. Keep storage area separate from work areas and protective equipment storage. Post warning signs. Inspect periodically for damage or leaks. Keep quantities stored as small as possible. Store away from incompatible materials, such as amines, alcohols, acids, bases, metal compounds.
8. Exposure Controls, Personal Protection

**Occupational Controls:** ACGIH TLV-TWA: 0.005ppm, Sensitizer (MDI)

**Engineering Controls:** If used indoors, ensure adequate non-sparking ventilation. Remove all sources of ignition and post “No Smoking” signs in the work place. Keep away from heat, and never weld, cut, or solder empty containers. Use adequate ventilation to reduce concentration to below TLV. If engineering controls and work practices are not effective in controlling exposure to MDI, then wear suitable personal protection equipment including approved respiratory protection. Have appropriate equipment available for use in emergencies such as spills or fire. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Refer to the CSA Standard Z94.4-02, "Selection, Use and Care of Respirators," available from the Canadian Standards Association

**Respiratory Protection:** NIOSH RECOMMENDATIONS FOR METHYLENEDIPHENYL DIISOCYANATE CONCENTRATIONS IN AIR:

- Up to 0.5 mg/m³: Any supplied-air respirator.
- Up to 1.25 mg/m³: Any supplied-air respirator operated in a continuous-flow mode.
- Up to 2.5 mg/m³: Any self-contained breathing apparatus with a full facepiece. Any supplied-air respirator with a full facepiece.
- Up to 75 mg/m³: Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Emergency or planned entry into unknown concentrations or IDLH conditions:

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.

**Escape:**

Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. Any appropriate escape-type, self-contained breathing apparatus

*NOTE: Substance causes eye irritation or damage; eye protection needed.

**Skin Protection:** Guidelines for MDI: Chemical protective gloves, coveralls, boots, and/or other resistant protective clothing. Where exposure to high levels of airborne MDI may occur, a chemical protective full-body encapsulating suit and respiratory protection may be required

**RECOMMENDED** (resistance to breakthrough longer than 8 hours): Butyl rubber, Viton(TM), Silver Shield/4H(TM) (polyethylene/ethylene vinyl alcohol), Tychem(TM) BR/LV, Tychem(TM) Responder(TM), Tychem(TM) TK.

**Eye and Face Protection:** Use chemical safety goggles.

**Footwear:** As recommended by worksite.

**Other:** Eyewash and showers should be located near work areas.
9. Physical and Chemical Properties

**Part A**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance:</td>
<td>Off white liquid, may be tinted</td>
</tr>
<tr>
<td>Odour:</td>
<td>Barely perceptible</td>
</tr>
<tr>
<td>pH:</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Vapour Pressure:</td>
<td>0.66 – 1.3 kPa</td>
</tr>
<tr>
<td>Solubility:</td>
<td>Insoluble, reacts with water</td>
</tr>
<tr>
<td>Vapour Density:</td>
<td>Heavier than air</td>
</tr>
<tr>
<td>Melting Point:</td>
<td>N/ap</td>
</tr>
<tr>
<td>Boiling Point:</td>
<td>&gt;316 °C</td>
</tr>
<tr>
<td>Freezing Point:</td>
<td>&lt; 0 °C</td>
</tr>
<tr>
<td>Relative Density:</td>
<td>1.22</td>
</tr>
<tr>
<td>Partition Coefficient:</td>
<td>No data</td>
</tr>
<tr>
<td>Evaporation Rate:</td>
<td>N/av.</td>
</tr>
</tbody>
</table>

**Part B**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance:</td>
<td>Off white liquid</td>
</tr>
<tr>
<td>Odour:</td>
<td>Barely perceptible</td>
</tr>
<tr>
<td>pH:</td>
<td>N/ap</td>
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<tr>
<td>Vapour Pressure:</td>
<td>1060.4 kPa</td>
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<tr>
<td>Solubility:</td>
<td>Slight solubility</td>
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<td>Vapour Density:</td>
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<td>N/ap</td>
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<td>Boiling Point:</td>
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<td>Freezing Point:</td>
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<td>Relative Density:</td>
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<tr>
<td>Partition Coefficient:</td>
<td>N/d</td>
</tr>
<tr>
<td>Evaporation Rate:</td>
<td>N/d</td>
</tr>
</tbody>
</table>

10. Stability and Reactivity

**Chemical Stability:** Normally stable. 4,4’-MDI is readily dimerized and trimerized by heat.

**Hazardous Polymerization:** 4,4’-MDI may undergo uncontrolled exothermic polymerization upon contact with incompatible materials, especially strong bases, such as triethylamine and sodium hydroxide, trialkyl phosphines, potassium acetate, many metal compounds soluble in organic media, or if heated above 204 deg C. The resulting pressure build-up could rupture closed containers.

**Incompatibility:** NOTE: Chemical reactions that could result in a hazardous situation (e.g. generation of flammable or toxic chemicals, fire or detonation) are listed here. Many of these reactions can be done safely if specific control measures (e.g. cooling of the reaction) are in place. Although not intended to be complete, an overview of important reactions involving common chemicals is provided to assist in the development of safe work practices.

- **WATER** - Reacts slowly, forming carbon dioxide and inert material comprised of non-toxic polyureas which could rupture closed containers. 4,4’-Methylene dianiline is formed as an intermediate product in this reaction. Above 50 deg C (122 deg F), the reaction may become progressively more vigorous.
- **AMINES, ALCOHOLS, ACIDS, BASES** - May react violently with generation of heat.
- **METAL COMPOUNDS** (e.g. organotin catalysts) - May polymerize with the generation of heat and pressure.
- **AMIDES, PHENOLS, MERCAPTANS, URETHANES, UREAS AND SURFACE ACTIVE COMPOUNDS** (surfactants, e.g. non-ionic detergents) - May react vigorously or violently with the generation of heat.

Part B: keep away from strong oxidizing agents, strong acids and strong bases.

**Hazardous Decomposition Products:** 4,4’-Methylene dianiline (formed by reaction of 4,4’-MDI with water), undetermined organic compounds in smoke.

11. Toxicological Information

<table>
<thead>
<tr>
<th>Exposure Type</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Exposure (LD₅₀)</td>
<td>See Section 2</td>
</tr>
<tr>
<td>Acute Exposure (LC₅₀)</td>
<td>See Section 2</td>
</tr>
<tr>
<td>Chronic Exposure</td>
<td>See Section 3</td>
</tr>
<tr>
<td>Exposure Limits</td>
<td>See Section 2</td>
</tr>
<tr>
<td>Irritancy</td>
<td>See Section 3</td>
</tr>
</tbody>
</table>
**Surface Bonder TXi**

**Sensitization:** Part A (MDI) is a skin and respiratory sensitizer. See Section 3.

**Neurotoxicity:** None observed.

**Carcinogenicity:** No ingredients listed by IARC

**Teratogenicity:** Not reported

**Reproductive Toxicity:** No evidence reported

**Mutagenicity:** No evidence reported

**Synergistic Products:** None known

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### 12. Ecological Information

**Environmental Toxicity:**

*Diphenylmethane-4,4'-Diisocyanate:*

No environmental test results were located.

*2,2-Oxybisethanol:*

<table>
<thead>
<tr>
<th>Test</th>
<th>Species</th>
<th>Conditions</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50</td>
<td>Xenopus laevis</td>
<td>freshwater, static, 20 deg C</td>
<td>3065000 ug/L for 48 hr</td>
</tr>
<tr>
<td>LC50</td>
<td>Daphnia magna</td>
<td>freshwater, static, 20-22 deg C, pH 7.6-7.7</td>
<td>10000000 ug/L for 24 hr</td>
</tr>
<tr>
<td>LC50</td>
<td>Carassius auratus</td>
<td>freshwater, static, 20 deg C, pH 7.0, dissolved oxygen &gt;4.0 mg/L</td>
<td>5000000 ug/L for 24 hr</td>
</tr>
<tr>
<td>LC50</td>
<td>Gambusia affinis</td>
<td>freshwater, static, 23-25 deg C, pH 7.9-8.5, alkalinity &lt;100 mg/L CaCO3, turbidity 600-1500 mg/L</td>
<td>&gt;32000000 ug/L for 96 hr</td>
</tr>
</tbody>
</table>

**Environmental Fate:**

*Diphenylmethane-4,4'-Diisocyanate:*

**TERRESTRIAL FATE:** When monomeric methylenebis(4-phenylisocyanate) is handled as a liquid (melting point 38 deg C), it will solidify on contact with soil. Methylenebis(4-phenylisocyanate) reacts readily with water; therefore, leaching will not occur. If released to soil in a spill situation, agglomerations of methylenebis(4-phenylisocyanate) react with water to form a hard crust of inert, water-insoluble material comprised of polyureas(1); the polyurea crusts can entrap monomeric methylenebis(4-phenylisocyanate) and prevent further contact with water, thereby increasing the persistence time.

**AQUATIC FATE:** Methylenebis(4-phenylisocyanate) was added to a model marine system and model river to simulate spill situations(1,2); methylenebis(4-phenylisocyanate) concns fell to a maximum of 5% of initial value within one day. Spills or agglomerations of methylenebis(4-phenylisocyanate) react with water to form a hard crust of inert, water-insoluble material comprised of polyureas; the polyurea crusts can entrap monomeric methylenebis(4-phenylisocyanate) and prevent further contact with water, thereby increasing the persistence time. Small aquatic releases of methylenebis(4-phenylisocyanate) will hydrolyze rapidly in water with an estimated half-life of a few minutes to a few hours.

**ATMOSPHERIC FATE:** According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere, methylenebis(4-phenylisocyanate), which has a vapor pressure of 5.0X10-6 mm Hg at 25 deg C, is expected to exist in both the vapor and particulate phases in the ambient atmosphere. Vapor-phase methylenebis(4-phenylisocyanate) is degraded in the
atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 33 hours, calculated from its rate constant of 11.6X10-12 cu cm/molecule-sec at 25 deg C determined using a structure estimation method. Reaction with atmospheric water vapor may increase the atmospheric degradation rate several fold. Particulate-phase methylenebis(4-phenylisocyanate) will be removed from the atmosphere by wet and dry deposition.

2,2-Oxybisethanol:

TERRESTRIAL FATE: Based on a classification scheme, an estimated Koc value of 1, determined from a structure estimation method, indicates that diethylene glycol is expected to have very high mobility in soil. Volatilization of diethylene glycol from moist soil surfaces is not expected to be an important fate process given an estimated Henry's Law constant of 2.0X10-9 atm-cu m/mole, using a fragment constant estimation method(3). Diethylene glycol is not expected to volatilize from dry soil surfaces based upon a vapor pressure of 5.7X10-3 mm Hg at 25 deg C. Diethylene glycol was readily biodegraded in a sandy loam suggesting that biodegradation is an important environmental fate process in soil.

AQUATIC FATE: Based on a classification scheme, an estimated Koc value of 1, determined from a structure estimation method, indicates that diethylene glycol is not expected to adsorb to suspended solids and sediment. Volatilization from water surfaces is not expected based upon an estimated Henry's Law constant of 2.0X10-9 atm-cu m/mole, developed using a fragment constant estimation method. According to a classification scheme, an estimated BCF of 3, from an estimated log Kow of -1.5 and a regression-derived equation, suggests the potential for bioconcentration in aquatic organisms is low. Diethylene glycol was biodegraded partially from river water within 7 days at 20 deg C, but under winter conditions of river flow and temperature (less than 8 deg C) degradation was minimal.

ATMOSPHERIC FATE: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere, diethylene glycol, which has a vapor pressure of 5.7X10-3 mm Hg at 25 deg C, is expected to exist solely as a vapor in the ambient atmosphere. Vapor-phase diethylene glycol is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 17 hrs, calculated from its rate constant of 3.0X10-11 cu cm/molecule-sec at 25 deg C. Diethylene glycol degraded 5.5% by light at a wavelength greater than 290 nm over a period of 17 hours and therefore may be susceptible to direct photolysis by sunlight.

Biodegradability: The rate constant for the vapor-phase reaction of methylenebis(4-phenylisocyanate) with photochemically-produced hydroxyl radicals has been estimated as 11.6X10-12 cu cm/molecule-sec at 25 deg C using a structure estimation method. This corresponds to an atmospheric half-life of about 11 hours at an atmospheric concentration of 5X10+5 hydroxyl radicals per cu cm.

When monomeric methylenebis(4-phenylisocyanate) comes in contact with water in a spill situation, it reacts with the water to form a hard crust of inert, water-insoluble material comprised mostly of polyureas. Methylenebis(4-phenylisocyanate) is reported to hydrolyze rapidly in water; however, a hydrolysis rate constant specific to methylenebis(4-phenylisocyanate) was not available. Based on available data and analogy to other isocyanates, the hydrolysis half-life is probably on the order of a few minutes to a few hours. Reaction with water is complex and usually involves several mechanisms; an initial unstable intermediate (acid) is formed that decomposes to the amine with liberation of carbon dioxide, and the amine can react with more methylenebis(4-phenylisocyanate) to form a polyurea. Atmospheric chamber studies with the similar compound TDI (toluene diisocyanate) have shown that vapor-phase degradation increased from 15% to about 20% per hour as a result of OH radical attack; the 15% per hour rate occurred in the dark (no hydroxyl radical) with a relative humidity of 7-70%; therefore, reaction with water vapor in air may be more important than OH radical reaction for methylenebis(4-phenylisocyanate) but this could also be a surface reaction in the chamber.

Bioconcentration: Methylenebis(4-phenylisocyanate) hydrolyzes rapidly in aqueous solution; therefore, bioconcentration will not be environmentally important. Exposure of carp to 0.00001% concns of methylenebis(4-phenylisocyanate) for an eight week period resulted in no accumulations of isocyanates.

13. Disposal Considerations

Review federal, provincial or state, and local government requirements prior to disposal. Store material for disposal as indicated in Storage Conditions. Disposal by controlled incineration may be acceptable.
14. Transport Information

Transport Canada (TDG): Not regulated
US DOT (CFR49): Not regulated
International Air Transport Association (IATA): Not regulated
International Maritime Dangerous Goods (IMDG): Not regulated

15. Regulatory Information

CANADIAN FEDERAL REGULATIONS:
CEPA, DOMESTIC SUBSTANCES LIST: All ingredients are listed
WHMIS CLASSIFICATION: Part A: D1A, D2A, D2B
Part B: D1B

UNITED STATES – FEDERAL REGULATIONS:
TOXIC SUBSTANCES CONTROL ACT (TSCA): All components are listed in the inventory.
OSHA, 29 CFR 1910, Subpart Z: Meets the criteria for a hazardous substance.
CERCLA, 40 CFR 302: No ingredients listed
SARA 302, 40 CFR 355: No ingredients are listed.
SARA 313, 40 CFR 372: Subject to reporting requirements: None
Proposition 65, California Safe Drinking Water and Toxicity Enforcement Act of 1986: No ingredients appear on the list of Carcinogens or Reproductive Toxins as published on the effective date of this Material Safety Data Sheet.

16. Other Information

Original Preparation Date: January 18, 2011
Prepared by: Kel-Ex Agencies Ltd., 319 Lynn Avenue, North Vancouver, B.C. V7J 2C4
Disclaimer: This Safety Data Sheet was prepared using information provided by CCINFO. The information in the Safety Data Sheet is offered for your consideration and guidance when exposed to this product. Integra Adhesives Inc., expressly disclaims all expressed or implied warranties and assumes no responsibilities for the accuracy or completeness of the data contained herein. The data in this SDS does not apply to use with any other product or in any other process.

This Safety Data Sheet may not be changed, or altered in any way without the expressed knowledge and permission of Integra Adhesives Inc.

Revisions: None