Safety Data Sheet

ORPR811

Section 1 – Identification

Oak Ridge Foam & Coating Systems, Inc
575 Commercial Ave
Green Lake, WI 54941
920-294-6800

Emergency Telephone: (800) 424-9300 Chemtrec
800-625-9577 (Oak Ridge Foam & Coating Systems, Inc)
BOTH NUMBERS ARE AVAILABLE DAYS, NIGHTS, WEEKENDS, & HOLIDAYS

GHS product identifier: **ORPR811**

Other means of identification: Not available.
Product type: Liquid.

Relevant identified uses of the substance or mixture and uses advised against
Product use: Component of a Polyurethane System

Supplier's details: Oak Ridge Foam & Coating Systems, Inc
575 Commercial Avenue
Green Lake, WI 54941

Email address of person responsible for this SDS: info@oakridgepoly.com

Emergency telephone number (24h/7 day): Chemtrec: (800) 424-9300 or (703) 527-3887

Section 2 – Hazards Identifiation

OSHA/HCS status: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture:

Acute Toxicity:Inhalation	4
Skin corrosion/irritation	2
Serious eye damage/eye irritation	2A
Respiratory Sensitization	1
Skin Sensitization	1
Specific Target Organ Toxicity (Single Exposure) [Respiratory Tract irritation]	3

GHS Label Elements
Hazard pictograms:

Signal word: Danger

Hazard Statements: Harmful if inhaled
Causes skin and eye irritation.
May cause allergy or asthma symptoms or breathing difficulties if inhaled.
May cause an allergic skin reaction.
May cause respiratory irritation.

Precautionary Statements: Wear protective gloves. Wear eye or face protection. In case of inadequate ventilation, wear respiratory protection. Use only outdoors or in a well-ventilated area. Avoid breathing vapor. Wash hands thoroughly after handling. Contaminated work clothing should not be allowed out of the workplace. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. If experiencing respiratory symptoms: Call a POISON CENTER or physician. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing. Wash contaminated clothing before reuse. If skin irritation or rash occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention. Store locked up. Dispose of contents and container in accordance with all local, regional, national and international regulations.

Other hazards which do not result in classification: Not available.

Section 3 – Hazards Identification

Hazardous Components

Weight Percent	Components	CAS-No.
30-60%	Isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	53862-89-8
13-30%	Diphenylmethane 4,4'-diisocyanate	101-68-8
3-7%	Isocyanic acid, polymethylenepolyphenylene ester	9016-87-9
13-30%	Propylene carbonate	108-32-7
7-13%	Diphenylmethane-2,4'-diisocyanate	70644-56-3
3-7%	Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1,2-ethanediyl),.alpha.-methyl-.omega.hydroxy-	70644-56-3

Any concentration shown as a range is to protect confidentiality or is due to batch variation.
Occupational exposure limits, if available, are listed in section 8.

Section 4 – First Aid Measures

Description of first aid measures

Eye contact: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get Medical attention immediately.

Inhalation: Move exposed person to fresh air. Get medical attention immediately. Treatment is symptomatic for primary irritation or bronchospasm. If breathing is laboured, oxygen should be administered by qualified personnel.

Skin contact: After contact with skin, wash immediately with plenty of warm soapy water: Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. An MDI study has demonstrated that a polyglycol-based skin cleanser (such as D-TamTm, PEG-400) or corn oil may be more effective than soap and water. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion: Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Provided the patient is conscious, wash out mouth with water. Get medical attention if symptoms appear.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact: Causes eye irritation

Inhalation: Harmful if inhaled. May cause respiratory irritation. This product is a respiratory irritant and potential respiratory sensitiser: repeated inhalation of vapour or aerosol at levels above the occupational exposure limit could cause respiratory sensitisation. Symptoms may include irritation to the 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 sensitised persons. LC50 (rat) : ca. 490 mg/m^3 (4 hours) : using experimentally produced respirable aerosol having aerodynamic diameter <5microns.

Skin contact: Causes skin irritation. May cause sensitization by skin contact. Animal studies have shown that respiratory sensitisation can be induced by skin contact with known respiratory sensitisers including diisocyanates. These results emphasize the need for protective clothing including gloves to be worn at all times when handling these chemicals or in maintenance work.

Ingestion: Low oral toxicity, but ingestion may cause irritation of the gastrointestinal tract.

Over-exposure signs/symptoms

Eye contact: Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation: Adverse symptoms may include the following:
respiratory tract irritation
coughing
wheezing and breathing difficulties
asthma

Skin contact: Adverse symptoms may include the following:
irritation
redness

Ingestion: No specific data

Indication of immediate medical attention and special treatment needed, if necessary

Notes to Physician

Symptomatic treatment and supportive therapy as indicated. Following severe exposure the patient should be kept under medical review for at least 48 hours.

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. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

Section 5 – Fire Fighting Measures

Flash Point: Closed cup: >110°C (>230°F)

Extinguishing media

Suitable extinguishing media: Foam, CO_2 or dry powder

Unsuitable extinguishing media: Water may be used if no other available and then in copious quantities. Reaction between water and hot isocyanate may be vigorous. Prevent washings from entering water courses, keep fire exposed containers cool by spraying with water.

Specific hazards arising from the chemical: In a fire or if heated, a pressure increase will occur and the container may burst.

Hazardous thermal decomposition products: Combustion products may include: carbon monoxide, carbon dioxide, nitrogen oxides, hydrocarbons and HCN.

Special protective actions for fire-fighters: Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. PVC boots, gloves, safety helmet and protective clothing should be worn.

Remark: Due to reaction with water producing CO_2-gas, a hazardous build-up of pressure could result if contaminated containers are re-sealed. Containers may burst if overheated.

Section 6 – Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate personal protective equipment (see Section 8).

For emergency responders	If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
Environmental precautions	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drain and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
Methods and materials for containment and cleaning up	If the product is in its solid form: Spilled MDI flakes should be picked up carefully. The area should be vacuum cleaned to remove remaining dust particles completely. If the product is in its liquid form: Absorb spillages onto sand, earth or any suitable adsorbent material. Leave to react for at least 30 minutes. Shovel into open-top drums for further decontamination. Wash the spillage area with water. Test atmosphere for MDI vapour. Neutralize small spillages with decontaminant. Remove and dispose of residues. The compositions of liquid decontaminants are given in Section 16. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7 – Storage and Handling

Precautions for safe handling

Protective measures	Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems or asthma, allergies or chronic or recurrent respiratory disease should not be employed in any process in which this product is used. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous.
Advice on general occupational hygiene	Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
Conditions for safe storage, including any incompatibilities	Store in accordance with local regulations. Keep container tightly closed in a cool, well-ventilated place. Keep away from moisture. Due to reaction with water producing CO2-gas, a hazardous build-up of pressure could result if contaminated containers are re-sealed. Do not reseal contaminated containers. Uncontaminated containers, free of moisture, may be resealed only after placing under a nitrogen blanket. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. Unsuitable containers: Do not store in containers made of copper, copper alloys or galvanized surfaces.

Section 8 – Exposure Controls/Personal Protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Diphenylmethane 4,4'-diisocyanate	**ACGIH TLV (United States, 3/2012).** TWA: 0.005 ppm 8 hours. **OSHA PEL (United States, 6/2010).** CEIL: 0.02 ppm CEIL: 0.2 mg/m³

Appropriate Engineering controls

Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. Diisocyanates can only be smelled if the occupational exposure limit has been exceeded considerably.

Medical supervision of all employees who handle or come in contact with respiratory sensitisers is recommended. Personnel with a history of asthma-type conditions, bronchitis or skin sensitisation conditions should not work with MDI based products. The Occupational Exposure Limits listed do not apply to previously sensitized individuals. Sensitised individuals should be removed from any further exposure.

Environmental exposure controls

Emissions from ventilation or work process equipment should be checked to ensure they comply 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.

Individual protection measures

Hygiene measures

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. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection

Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Hand protection

Use chemical resistant gloves classified under Standard EN374: protective gloves against chemicals and microorganisms.Examples of glove materials that might provide suitable protection include :Butyl rubber, Chlorinated polyethylene, Polyethylene, Ethyl vinyl alcohol copolymers laminated ("EVAL"), Polychloroprene (Neoprene*), Nitrile/butadiene rubber ("nitrile" or "NBR"), Polyvinyl chloride ("PVC" or "vinyl"), Fluoroelastomer (Viton*).

When prolonged or frequently repeated contact may occur, a glove with protection class of 5 or higher (breakthrough time greater then 240 minutes according to EN374) is recommended.

Contaminated gloves should be decontaminated and disposed of.

	Notice: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all requisite workplace factors such as, but not limited to : other chemicals that may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), as well as instructions/specifications provided by the glove supplier. Protective gloves should be worn when handling freshly made polyurethane products to avoid contact with trace residual materials which may be hazardous in contact with skin.
Body protection	Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Recommended: Overall (preferably heavy cotton) or Tyvek-Pro Tech 'C' , Tyvek-Pro 'F' disposable coverall.
Other skin protection	Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Respiratory protection	Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
Thermal hazards	Not available.

Section 9 – Physical Properties

Physical state:	Liquid
Color:	Not available
Odor:	Not available
Odor threshold:	Not available
pH:	Not available
Melting Point/Freezing Point	Not available
Boiling/condensation point:	>300°C decomposes
Flash point:	Closed cup: >110°C (>230°F)
Evaporation rate:	Not available
Flammability (solid, gas):	Not available
Lower and upper explosive (flammable) limits:	Not available
Vapor pressure:	Not available
Vapor density:	Not available
Relative density:	Not available
Solubility in water:	Not available
Partition coefficient: n-ctanol/water:	Not available
Auto-ignition temperature:	>600°C
Decomposition temperature:	Not available
Viscosity:	Not available

Section 10 – Stability and Reactivity

Reactivity	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	Stable at room temperature.
Possibility of hazardous	Reaction with water (moisture) produces CO2-gas. Exothermic reaction with materials containing active hydrogen groups. The reaction becomes progressively more vigorous and can be violent at higher temperatures if the

miscibility of the 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 carbon dioxide gas.

Conditions to avoid Avoid high temperatures.

Incompatible materials Water, alcohols, amines, bases, and acids.

Hazardous Decomposition products Combustion products may include: carbon oxides (CO, CO_2) nitrogen oxides (NO, NO_2 etc.) hydrocarbons and HCN

Section 11 – Toxicological Information

Acute toxicity

Product/ingredient name	Test	Endpoint	Species	Result
Isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	-	LC50 Inhalation Dusts and mists	Rat	0.49 mg/l
	OECD 402 Acute Dermal Toxicity	LD50 Dermal	Rabbit – Male, Female	>9400 mg/kg
	No official guidelines	LD50 Intraperitoneal	Rabbit – Male	100mg/kg
	OECD 401 Acute Oral Toxicity	LD50 Oral	Rat - Male	>10000 mg/kg
Diphenylmethane 4,4'-diisocyanate	OECD 403 Acute Inhalation Toxicity	LC50 Inhalation Dusts And mists	Rat – Male Female	0.49 mg/l
	OECD 402 Acute Dermal Toxicity	LD50 Dermal	Rabbit – Male, Female	>9400 mg/kg
	OECD 401 Acute Oral Toxicity	LD50 Oral	Rat - Male	>10000 mg/kg
Propylene carbonate	OECD 402 Acute Dermal Toxicity	LD50 Dermal	Rabbit – Male, Female	>2000 mg/kg
	No official guidelines	LD50 Oral	Rat – Male, Female	33520 mg/kg
Isocyanic acid, polymethylenepolyphenylene ester	OECD 403 Acute Inhalation Toxicity	LC50 Inhalation Dusts And mists	Rat – Male, Female	0.49 mg/l
	OECD 402 Acute Dermal Toxicity	LD50 Dermal	Rabbit – Male, Female	>9400 mg/kg
	OECD 401 Acute Oral Toxicity	LD50 Oral	Rat - Male	>10000 mg/kg
Diphenylmethane-2,4'-diisocyanate		LC50 Inhalation Dusts and mists	Rat	0.49 mg/l
	OECD 402 Acute Dermal Toxicity	LD50 Dermal	Rabbit – Male, Female	>9400 mg/kg
Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl),.alpha.-methyl-omega.hydroxy-	OECD 403 Acute Inhalation Toxicity	LC50 Inhalation Dusts and mists	Rat – Male, Female	0.49 mg/l
	OECD 402 Acute Dermal Toxicity	LD50 Dermal	Rabbit – Male, Female	>9400 mg/kg
	OECD 401 Acute Oral Toxicity	LD50 Oral	Rat - Male	>10000 mg/kg

Conclusion/Summary

Diphenylmethane 4,4'-diisocyanate diisocyanate — Irritating to respiratory system.

Irritation/Corrosion

Product/ingredient name	Test	Species	Result

Isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	OECD 404 Acute Dermal Irritation/Corrosion OECD 405 Acute Eye Irritation/Corrosion	Rabbit Rabbit	Skin-Irritant Eyes – non-irritant.
Propylene carbonate	EPA OPPTS OECD 404 Acute Dermal Irritation/Corrosion	Rabbit Rabbit	Eyes – Moderate irritant Skin-irritant
Diphenylmethane 4,4'-diisocyanate	OECD 404 Acute Dermal Irritation/Corrosion OECD 405 Acute Eye Irritation/Corrosion	Rabbit Rabbit	Skin – Irritant Eyes – Non-irritant
Isocyanic acid, polymethylenepolyphenylene ester	OECD 404 Acute Dermal Irritation/Corrosion OECD 405 Acute Eye Irritation/Corrosion	Rabbit Rabbit	Skin – Mild irritant Eyes – Non-irritant
Diphenylmethane-2,4'-dissocyanate	OECD 404 Acute Dermal Irritation/Corrosion OECD 405 Acute Eye Irritation/Corrosion	Rabbit Rabbit	Skin – Irritant Eyes – Non-irritant
Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl),.alpha.-methyl-omega.hydroxy-	OECD 404 Acute Dermal Irritation/Corrosion OECD 405 Acute Eye Irritation/Corrosion	 Rabbit	 Eyes – Non-irritant

Conclusion/Summary

Skin :	Isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	Irritating to skin.
	Diphenylmethane 4,4'-diisocyanate	Irritating to skin.
	Isocoyanic acid, Polymethylenepolyheneylene ester	Irritating to skin.
	Propylene carbonate	Non-irritating to the skin.
	Diphenylmethane-2,4'-dissocyanate	Irritating to skin.
	Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl), .alpha.-methyl-omega.hydroxy-	Irritating to skin.
Eyes :	Isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	Based on the human occupational exposure data, this substance is considered as irritating to eyes.
	Diphenylmethane 4,4'-diisocyanate	Based on the human occupational exposure data, this substance is considered as irritating to eyes.

	Propylene carbonate	Irritating to eyes.
	Diphenylmethane-2,4'-diisocyanate	Based on the human occupational exposure data, this substance is considered as irritating to eyes.
	Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl), .alpha.-methyl-omega.hydroxy-	Based on the human occupational exposure data, this substance is considered as irritating to eyes.
Respiratory :	Isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	No additional information.
	Diphenylmethane 4,4'-diisocyanate	No additional information.
	Isocoyanic acid, Polymethylenepolyheneylene ester	No additional information.
	Propylene carbonate	No additional information.
	Diphenylmethane-2,4'-dissocyanate	No additional information.
	Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl), .alpha.-methyl-omega.hydroxy-	No additional information.

Sensitization

Product/ingredient name	Test	Route of exposure	Species	Result
Isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	-	Skin	Mouse	Sensitizing
	No official Guidelines	Respiratory	Guinea pig	Sensitizing
Diphenylmethane 4,4'-diisocyanate	OECD 429 Skin Sensitization: Local Lymph Node Assay	Skin	Mouse	Sensitizing
	OECD 406 Skin Sensitization	Skin	Guinea pig	Not Sensitizing
	No official Guidelines	Respiratory	Guinea pig	Sensitizing
Propylene carbonate	No official guidelines	Skin	Human	Not sensitizing
Isocyanic acid, polymethylenepolyphenylene ester	OECD 406 Skin Sensitization	Skin	Guinea Pig	Not sensitizing
	No official guidelines	Respiratory	Rat	Sensitizing
	-	skin	Guinea Pig	Sensitizing
Diphenylmethane-2,4'-dissocyanate	-	Skin	Mouse	Sensitizing
	No Official	Respiratory	Guinea pig	Sensitizing
Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl),.alpha.-methyl-omega.hydroxy-	OECD 406 Skin Sensitization	Skin	Guinea Pig	Not sensitizing
	No official guidelines	Respiratory	Rat	Sensitizing

Mutagenicity

Product/ingredient name	Test	Result

Isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	Experiment: In vitro Subject: Bacteria Metabolic activation: +/- Experiment: In vivo Subject: Mammalian-Animal	Negative Negative
Diphenylmethane 4,4'-diisocyanate	Experiment: In vitro Subject: Bacteria Metabolic activation: +/- Experiment: In vivo Subject: Mammalian-Animal	Negative Negative
Propylene carbonate	Experiment: In vitro Subject: Mammalian-Animal Experiment: In vitro Subject: bacteria/yeast Metabolic activation: +/- Experiment: In vivo Subject: Mammalian-Animal	Negative Negative Negative
Isocyanic acid, polymethylenepolyphenylene ester	Experiment: In vitro Subject: Bacteria Metabolic activation: +/- Experiment: In vitro Subject: Mammalian-Animal Experiment: In vivo Subject: Mammalian-Human	Negative Negative Equivocal
Diphenylmethane-2,4'-dissocyanate	Experiment: In vitro Subject: Bacteria Metabolic activation: +/- Experiment: In vitro Subject: Mammalian-Animal	Negative Negative
Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl),.alpha.-methyl-omega.hydroxy-	Experiment: In vitro Subject: Bacteria Metabolic activation: +/- Experiment: In vitro Subject: Mammalian-Animal Experiment: In vitro Subject: Mammalian-Human	Negative Negative Negative

Conclusion/Summary

Diphenylmethane 4,4'-diisocyanate	No mutagenic effect.
Isocoyanic acid, Polymethylenepolyheneylene ester	No mutagenic effect.
Propylene carbonate	Not mutagenic in a standard battery of genetic toxicological tests.
Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl), .alpha.-methyl-omega.hydroxy-	No mutagenic effect.

Carcinogenicity

Product/ingredient name	Test	Species	Dose	Exposure	Result/Result type
Isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	OECD 453 Combined Chronic Toxicity/ Carcinogenicity Studies	Rat – Male, Female	1 mg/m³	2 years; 5 days per week	Positive – Inhalation - NOAEL
Diphenylmethane 4,4'-diisocyanate Diisocyanate	OECD 453 Combined Chronic Toxicity/ Carcinogenicity Studies	Rat – Male, Female	1 mg/m³	2 years; 5 days per week	Positive – Inhalation - NOAEL
Propylene carbonate	OECD 451 Carcinogenicity Studies	Mouse – Male	1500 to 2000 Mg/kg	104 weeks; 2 days per week	Negative – Dermal - NOAEL
Isocyanic acid, polymethylenepolyphenylene ester	OECD 453 Combined Chronic Toxicity/ Carcinogenicity Studies	Rat – Male, Female	1 mg/m³	2 years; 5 days per week	Negative – Inhalation - NOAEL
Diphenylmethane-2,4'-dissocyanate	OECD 453 Combined Chronic Toxicity/ Carcinogenicity Studies	Rat – Male, Female	1 mg/m³	2 years; 5 days per week	Positive – Inhalation - NOAEL
Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl),.alpha.-methyl-omega.hydroxy-	OECD 453 Combined Chronic Toxicity/ Carcinogenicity Studies	Rat – Male, Female	1 mg/m³	2 years; 5 days per week	Negative – Inhalation - NOAEL

Carcinogenic class

Product/ingredient name	IARC	OSHA
Diphenylmethane 4,4'-diisocyanate	3	-
Isocyanic acid, polymethylenepolyphenylene ester	3	-

Reproductive toxicity

Product/ingredient name	Test	Species	Maternal toxicity	Fertility	Developmental Effects
Propylene carbonate	OECD 414 Prenatal Developmental Toxicity Study	Rat	Negative	Negative	Negative
Isocyanic acid, polymethylenepolyphenylene ester	OECD 414 Prenatal Developmental Toxicity Study	Rat – Male, Female	Negative	Negative	Negative
Diphenylmethane-2,4'-dissocyanate	OECD 414 Prenatal Developmental Toxicity Study	Rat – Female	Negative	-	-
	OECD 414 Prenatal Developmental Toxicity Study	Rat – Male, Female	Negative	-	-
	OECD 414 Prenatal Developmental Toxicity Study	Rat – Male, Female	Negative	Negative	Negative

Conclusion/Summary

Diphenylmethane 4,4'-diisocyanate	No known significant effects or critical hazards.
Isocoyanic acid, Polymethylenepolyheneylene ester	No known significant effects or critical hazards.
Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl), .alpha.-methyl-omega.hydroxy-	No known significant effects or critical hazards.

Teratogenicity

Product/ingredient name	Test	Species	Result/Result type
Isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	OECD 414 Prenatal Developmental Toxicity Study	Rat – Male, Female	Negative - Inhalation
Diphenylmethane 4,4'-diisocyanate	OECD 414 Prenatal Developmental Toxicity Study	Rat – Female	Negative - Inhalation
Isocyanic acid, polymethylenepolyphenylene ester	OECD 414 Prenatal Developmental Toxicity Study	Rat – Male, Female	Negative - Inhalation
Propylene carbonate	OECD 414 Prenatal Developmental Toxicity Study	Rat – Male, Female	Negative - Oral
Diphenylmethane-2,4'-dissocyanate	OECD 414 Prenatal Developmental Toxicity Study	Rat – Male, Female	Negative-Inhalation
Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl),.alpha.-methyl-omega.hydroxy-	OECD 414 Prenatal Developmental Toxicity Study	Rat – Male, Female	Negative - Inhalation

Conclusion/Summary

Diphenylmethane 4,4'-diisocyanate	No known significant effects or critical hazards.
Isocoyanic acid, Polymethylenepolyheneylene ester	No known significant effects or critical hazards.
Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl), .alpha.-methyl-omega.hydroxy-	No known significant effects or critical hazards.

Specific target organ toxicity (single exposure)

Product/ingredient name	Category	Route of exposure	Target organs
Isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	Category 3	Not applicable.	Respiratory tract irritation
Diphenylmethane 4,4'-diisocyanate	Category 3	Not applicable.	Respiratory tract irritation
Isocyanic acid, polymethylenepolyphenylene ester	Category 3	Not applicable.	Respiratory tract irritation
Diphenylmethane-2,4'-dissocyanate	Category 3	Not applicable.	Respiratory tract irritation

Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl),.alpha.-methyl-omega.hydroxy-	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)
Not available.

Aspiration hazard
Not available.

Information on the likely routes of exposure:
Not available

Potential acute Health effects

Eye contact: Causes eye irritation.

Inhalation: Harmful if inhaled. May cause respiratory irritation. This product is a respiratory irritant and potential respiratory sensitiser: repeated inhalation of vapour or aerosol at levels above the occupational exposure limit could cause respiratory sensitisation. Symptoms may include irritation to the 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 sensitised persons. LC50 (rat) : ca. 490 mg/m^3 (4 hours) : using experimentally produced respirable aerosol having aerodynamic diameter <5microns.

Skin contact: Causes skin irritation. May cause sensitization by skin contact. Animal studies have shown that respiratory sensitisation can be induced by skin contact with known respiratory sensitisers including diisocyanates. These results emphasize the need for protective clothing including gloves to be worn at all times when handling these chemicals or in maintenance work.

Ingestion: Low oral toxicity, but ingestion may cause irritation of the gastrointestinal tract.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact: Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation: Adverse symptoms may include the following:
respiratory tract irritation
coughing
wheezing and breathing difficulties
asthma

Skin contact: Adverse symptoms may include the following:
irritation
redness

Ingestion: No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential Immediate effects: Not available.

Potential delayed effects: Not available.

Long term exposure

Potential immediate effects: Not available.

Potential delayed effects: Not available.

Potential chronic health effects

Product/ingredient name	Test	Endpoint	Species	Result
Isocyanic acid, polymethylenepolyphenylene ester	OECD 453 Combined Chronic Toxicity/Carcinogenicity Studies	Chronic NOEC Inhalation Dusts and Mists	Rat – Male, Female	0.2 mg/m³
Propylene carbonate	OECD 408 Repeated Dose 90-Day Oral Toxicity Study in Rodents	Sub-chronic NOEL Oral	Rat – Male, Female	>5000 mg/kg
	OECD 413 Subchronic Inhalation Toxicity: 90-day Study	Sub-chronic NOEC Inhalation Dusts and mists	Rat – Male, Female	100 mg/m³
Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl),.alpha.-methyl-omega.hydroxy-	OECD 453 Combined Chronic Toxicity/Carcinogenicity Studies	Chronic NOEC Inhalation Dusts and Mists	Rat – Male, Female	0.2 mg/m³
	OECD 412 Repeated Dose Inhalation Toxicity: 90-day Study or 14-day Study	Sub-acute LOEC Inhalation Dusts and mists	Rat – Male, Female	1.1 mg/m³

General: May cause damage to organs through prolonged or repeated exposure if inhaled. Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

Carcinogenicity: Rats have been exposed for two years to a respirable aerosol of polymeric MDI which resulted in chronic pulmonary irritation at high concentrations. Only at the top level (6 mg/m3), there was a significant incidence of a benign tumour of the lung (adenoma) and one malignant tumour (adenocarcinoma). There were no lung tumours at 1 mg/ m3 and no effects at 0.2 mg/m3. Overall, the tumour incidence, both benign and malignant, and the number of animals with the tumours were not different from controls. The increased incidence of lung tumours is associated with prolonged respiratory irritation and the concurrent accumulation of yellow material in the lung, which occurred throughout the study. In the absence of prolonged exposure to high concentrations leading to chronic irritation and lung damage, it is highly unlikely that tumour formation will occur.

Mutagenicity: No known significant effects or critical hazards.

Teratogenicity: No known significant effects or critical hazards.

Developmental Effects: No birth defects were seen in two independant 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, which are well in excess of defined occupational exposure limits.

Fertility No known significant effects or critical hazards.

Numerical measures of toxicity

Acute Toxicity estimates

Route	ATE value
Inhalation (dusts and mists)	1.706 mg/l

Other information: Not available.

Toxicity

Product/ingredient name	Test	Endpoint	Exposure	Species	Result
Isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	OECD 209 Activated Sludge, Respiration Inhibition Test	Acute EC50	3 hours static	Bacteria	>100 mg/l
	OECD 202 Daphnia sp. Acute Immobilisation test	Acute EC50	24 hours static	Daphnia	>1000 mg/l
	OECD 203 Fish, Acute Toxicity Test	Acute LC50	96 hours static	Fish	>1000 mg/l
	OECD 211 Daphnia Magna Reproduction Test	Chronic NOEC	21 days Semi-static	Daphnia	>10 mg/l
Diphenylmethane 4,4'-diisocyanate	OECD 202 Daphnia Sp. Acute Immobilisation Test	Acute EC50	72 hours static	Algae	>1000 mg/l
	OECD 203 Fish, Acute Toxicity Test	Acute LC50	96 hours static	Fish	>1000 mg/l
	OECD 211 Daphnia Magna Reproduction Test	Chronic NOEC	21 days semi-static	Daphnia	>=10 mg/l
	OECD 201 Alga, Growth Inhibition Test	Chronic NOECr	72 hours Static	Algae	1640 mg/l
Propylene carbonate	DIN DIN 38412 Part 8	Acute EC50	16 Hours	Bacteria	25619 mg/l
	OECD 202 Daphnia sp. Acute Immobilisation Test	Acute EC50	48 hours static	Daphnia	>1000 mg/l
	OECD 201 Alga, Growth Inhibition Test	Acute ErC50 (growth rate)	72 hours static	Algae	>900 mg/l
	EU EC C.1 Acute Toxicity for Fish	Acute LC50	96 hours semi-static	Fish	>1000 mg/l
	OECD 201 Alga, Growth Inhibition Test	Chronic NOEC	72 hours static	Algae	900 mg/l
	OECD 201 Alga, Growth Inhibition Test	Chronic NOEC	72 hours static	Algae	929 mg/l
Isocyanic acid, polymethylenepolyphenylene ester	OECD 201 Alga, Growth Inhibition Test	Acute EC50	72 hours static	Algae	>1640 mg/l
	OECD 209 Activated Sludge, Respiration Inhibition Test	Acute EC50	3 hours static	Bacteria	>100 mg/l
	OECD 202 Daphnia Sp. Acute	Acute EC50	24 hours static	Daphnia	>1000 mg/l

	Immobilisation Test - OECD 203 Fish, Acute Toxicity Test OECD 211 Daphnia Magna Reproduction Test OECD 201 Alga, Growth Inhibition Test	Acute LC0 Acute LC50 Chronic NOEC Chronic NOECr	96 hours 96 hours static 21 days Semi-static 72 hours static	Fish Fish Daphnia Algae	>1000 mg/l >1000 mg/l >=10 mg/l 1640 mg/l
Diphenylmethane-2,4'-dissocyanate	OECD 203 Fish, Accute Toxicity Test	Acute LC50	96 hours static	Fish	>1000 mg/l
Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl),.alpha.-methyl-omega.hydroxy-	OECD 201 Alga, Growth Inhibition Test OECD 209 Activated Sludge, Respiration Inhibition Test OECD 202 Daphnia Sp. Acute Immobilisation Test OECD 203 Fish, Acute Toxicity Test No official guidelines OECD 211 Daphnia Magna Reproduction Test No official guidelines OECD 201 Alga, Growth Inhibition Test	Acute EC50 Acute EC50 Acute LC50 Chronic NOEC Chronic NOEC Chronic NOEC Chronic NOECr	72 hours static 3 hours static 24 hours static 96 hours static 112 days static 21 days Semi-static 112 days static 72 hours static	Algae Bacteria Daphnia Fish Daphnia Daphnia 112 days static 72 hours static	>1640 mg/l >100 mg/l >1000 mg/l >1000 mg/l >10000 mg/l >=10 mg/l >10000 mg/l 1640 mg/l

Persistence and degradability

Product/ingredient name	Test	Period	Result
Isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	OECD 302C Inherent Biodegradability: Modified MITI Test (II)	28 days	0%
Diphenylmethane 4,4'-diisocyanate	OECD 302C Inherent Biodegradability: Modified MITI Test (II)	28 days	0%
Propylene carbonate	OECD 301B Ready Biodegradability - CO^2 Evolution Test	29 days	83.5 to 87.7%
Isocyanic acid, polymethylenepolyphenylene ester	OECD 302C Inherent Biodegradability: Modified MITI Test (II)	28 days	0%
Diphenylmethane-2,4'-dissocyanate	OECD 302C Inherent Biodegradability: Modified MITI Test (II)	28 days	0%

Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl),.alpha.-methyl-omega.hydroxy-	OECD 302C Inherent Biodegradability: Modified MITI Test (II)	28 days	0%

Conclusion/Summary

Isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	Not biodegradable.
Diphenylmethane 4,4'-diisocyanate	Not biodegradable.
Isocoyanic acid, Polymethylenepolyheneylene ester	Not biodegradable.
Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl), .alpha.-methyl-omega.hydroxy-	Not biodegradable.

Product/ingredient name	Aquatic half-like	Photolysis	Biodegradability
Isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	-	-	Not readily
Diphenylmethane 4,4'-diisocyanate	Fresh water 0.83 days	-	Not readily
Propylene carbonate	-	-	Readily
Isocyanic acid, polymethylenepolyphenylene ester	Fresh water 0.8 days	-	Not readily
Diphenylmethane-2,4'-dissocyanate	-	-	Not readily
Reaction product of isocyanic acid, polymethylenepolyphenylene ester and poly(oxy-1, 2-ethanediyl),.alpha.-methyl-omega.hydroxy-	-	-	Not readily

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	4.51	200	Low
Propylene carbonate	-0.5	-	Low
Diphenylmethane 4,4'-diisocyanate	4.51	200	low
Isocyanic acid, polymethylenepolyphenylene ester	-	200	Low
Diphenylmethane-2,4'-dissocyanate	4.51	200	low

Mobility is soil

Mobility: By considering the production and use of the substance, it is unlikely that significant environmental exposure in the air or water will arise. Immiscible with water, but will react with water to 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 a relatively rapid OH radical attack, by calculation and by analogy with related diisocyanates.

Other adverse Effects: Not known significant effects or critical hazards.

Other ecological information

BOD5: Not determined.
COD: Not determined.
TOC: Not determined.

Section 13 – Disposal Consideration

Disposal methods

The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. **Disposal should be in accordance with applicable regional, national and local laws and regulations.**

Section 14 – Transportation Information

Proper shipping name

DOT: Other regulated substance, Liquid, NOS (Methylene Diphenyl Diisocyanate)
TDG: Not regulated.
IMDG: Not regulated.
IATA: Not regulated.

Regulatory	UN number	Classes	Packing Group	Label	Additional information
DOT Classification	NA3082	9	III		**Reportable quantity 5000 lbs (2270 kg)** Single containers less than 5,000 lbs are not regulated.
TDG Classification	Not regulated.	-	-		-
IMDG Classification	Not regulated.	-	-		-
IATA Classification	Not regulated.	-	-		-

Section 15 – Regulatory Information

Safety, health and environmental regulations specific for the product

United States Regulations

TSCA 8(b) inventory: All components are listed or exempted.
TSCA 5(a)2 final Significant new use Rule (SNUR): 2-Methoxyethanol.
TSCA 5(e) substance consent order: No ingredients listed.
TSCA 12(b) export

notification: No ingredients listed.
SARA 311/312: Immediate (acute) health hazard

	Product name	Concentration %
Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)	Diphenylmethane 4,4'-diisocyanate	11.633 – 15.681
Clean Air Act – Ozone Depleting Substances (ODS)	This product does not contain nor is it manufactured with ozone depleting substances.	
Sara 313 Form R – Reporting requirements	Diphenylmethane 4,4'-diisocyanate Isocyanic acid, polymethylenepolyphenylene ester Diphenylmethane-2,4'-dissocyanate	11.633 – 15.681 8.9095 – 12.586 5.751 – 8.4745

	Ingredient name	%	Section 304 CERCLA Hazardous Substances	CERCLA Reportable Quantity (LBS)	Product Reportable Quantity (LBS)
CERCLA Hazardous Substances	Diphenylmethane 4,4'-dissocyanate	31.2619431442998	Listed	5000	31886
	Chlorobenzene	0.001255	Listed	100	7968127
	2-Methoxyethanol	0.00002	Listed	NO RQ assigned	
	Ethylene Oxide	0.00002	Listed	10	50000000
	Formaldehyde	0.00001	Listed	100	1000000000
	1,4-Dioxane	0.00001	Listed	100	1000000000
	Acetaldehyde	0.00001	Listed	1000	10000000000

State regulations

Pennsylvania – RTK: Diphenylmethane 4,4'-dissocyanate
California Prop 65: **Warning:** This product contains less than 0.1% of a chemical known to the State Of California to cause cancer.
Warning: This product contains less than 1% of a chemical know to the State of California to cause birth defects or other reproductive harm.

Ingredient names	Cancer	Reproductive
2-Methoxyethanol	No	Yes
Ethylene Oxide	Yes	Yes
Formaldehyde	Yes	No
1,4-Dioxane	Yes	No
Acetaldehyde	Yes	No

Canadian regulations
CEPA DSL: At least one component is not listed
WHMIS Classes: WHMIS Class D-2A: Material causing other toxic effects (Very toxic).
WHMIS Class D-2B: Material causing other toxic effects (Toxic).
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

Brazil Regulations
Classification system

Used: **Norma ABNT-NBR 14725-2:2012**

International lists:
Australia inventory (AICS): Not determined.
China inventory (IECSC): Not determined.
Japan inventory: Not determined.
Korea inventory: Not determined.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): Not determined.
Philippines inventory (PICCS): Not determined.
Taiwan inventory (CSNN): Not determined.

Section 16 – Other Information

Hazardous Material Information System (USA)
Health = 2
Flammability = 1
Physical hazards = 1
Personal protection = H

The customer is responsible for determining the PPE code for this material.
Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

National Fire Protection Association (USA)
Health = 2
Flammability = 1
Instability = 1
Special = 0

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Liquid decontaminants (percentages by weight or volume) :
Decontaminant 1 : *- sodium carbonate : 5 - 10 % *- liquid detergent : 0.2 - 2 % *- water : to make up to 100 %
Decontaminant 2 : *- concentrated ammonia solution : 3 - 8 % *- liquid detergent : 0.2 - 2 % *- water : to make up to
100 %
Decontaminant 1 reacts slower with diisocyanates but is more environmentally friendly than decontaminant 2.
Decontaminant 2 contains ammonia. Ammonia presents health hazards. (See supplier safety information.)
Literature reference: PU 193-1 : 'MDI-Based Compositions : Hazards and Safe Handling Procedures.'
PU 181-15 : Recommended melting procedures for MDI-based isocyanates.

ISOPA Guidelines for safe Loading/Unloading, Transportation, Storage of TDI and MDI , Ref.03-96 PSC-0005-GUIDL.
SPI PMDI User Guidelines for the Chemical Protective Clothing Selection.
References of methods used in the Physico-Chemical Properties section are reported in Annex V part A to Commission Directive 92/69/EEC of 31 July 1992 adapting to technical progress for the Seventeenth time Council Directive 67/548/EEC.

Notice to reader

While the information and recommendations in this publication are to the best of our knowledge, information and belief accurate at the date of publication, NOTHING HEREIN IS TO BE CONSTRUED AS A WARRANTY, EXPRESS OR OTHERWISE.

IN ALL CASES, IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE APPLICABILITY OF SUCH INFORMATION AND RECOMMENDATIONS AND THE SUITABILITY OF ANY PRODUCT FOR ITS OWN PARTICULAR PURPOSE.

THE 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 the 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.