Conforms to HazCom 2012/ United States

SAFETY DATA SHEET

Section 1. Identification

GHS product Identifier : **Hydrotech® VM 60 Liquid Membrane Part B (activator)**
Formerly known as VM 60 Liquid Membrane Part B (activator)

Other means of identification : Not available

Relevant identified used of the substance or mixtures and uses advised against

Component of a Polyurethane System

Supplier's details

Sika Corporation
201 Polito Avenue,
Lyndhurst, NJ 07071 USA

Emergency telephone number) with hours of operation)

Tel: (201) 933-8800
PERS #11540: 800-633-8253 (24/7)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazardous Communications Standard (49CFR1910.1200) .

Classification of the substance or mixture : Acute toxicity: Inhalation- Category 4
Skin Corrosion/Irritation- Category 2
Serious Eye Damage/Eye Irritation- Category 2B.
Respiratory Sensitization- Category 1
Skin Sensitization- Category 1
Specific target organ toxicity (single exposure) (Respiratory Tract irritation – Category 3

GHS label elements

Hazard pictogram

Signal word : Danger

Hazard statement : 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

Prevention : Wear protective gloves. Wear eye or face protection. In case of inadequate ventilation wear respiratory protection. Use only outdoors or in well ventilated area. Avoid breathing vapor. Wash hands thoroughly after handling. Contaminated work clothing should not be allowed out of the work place.

Section 2. Hazards identification

Response : 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.

Storage : Store locked up. Store in a well-ventilated place. Keep cool.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : None known

Section 3. Composition/information on ingredients

Substance/Mixture : Mixture

Other means of identification : Not available

Ingredient name	%	CAS Number
4,4'-Methylenediphenyl diisocyanate	30-60	101-68-8
Isocyanic acid, polymethylenepolyphenylene ester	30-60	9016-87-9
Diphenylmethane-2,4'- diisocyanate	13-30	5873-54-1

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 necessary 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 labored, 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 cleaner (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 mouth out with water. Get medical attention if symptoms appear.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes eye irritation.

Section 4. First aid measures

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

Skin contact : Causes skin irritation. May cause sensitization by skin contact. Animal studies have shown that respiratory sensitization can be induced by skin contact with known respiratory sensitizers 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: : Symptomatically 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 the aid to give mouth to mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use CO_2, foam or dry powder.

Unsuitable extinguishing media : Water may be used if no other option is available and then do so in copious amounts. Reactions 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 : Decomposition products may include the following materials: Carbon Monoxide, Carbon Dioxide, nitrogen oxides, hydrocarbons and HCN.

Section 5. Fire-fighting measures

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 a 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 personal : 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 thru spilled material. Avoid breathing vapor or mist.Wear appropriate respirator when ventilation is inadequate. Put on 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 unstuiatble materials. See also the information in “For non-emergency personnel.

Enviromental precautions : Avoid disposal of spilled material and runoff and contact with soil, waterways, drains 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 adsorbant material. Leave to react for the at least 30 minutes. Shovel into open- top drums for further decontamination. Wash spillage area with water. Test atmosphere for MDI vapors. Neuralize small spillages with decontaminant. Remove and dispose of residues. The compositions of liquid decontaminates are given in section 16. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

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 the skin or clothing. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in original container or an approved alternative made from 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 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 section 8 for additional information on hygiene measures.

Section 7. Handling and storage

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 CO_2 gas, a hazardous build-up of pressure could result if contaminated containers are resealed. 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
4,4'-Methylenediphenyl diisocyanate	**ACGIH TLV (United States, 3/2012)** TWA: 0.005 ppm 8 hours **OSHA PEL (United States, 6/2010)** CEIL: 0.02 ppm CEIL: 30.2 mg/m^3

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airbornes contaminants below any recommended or statutory limits. Diisocyanates can only be smelled if occupational exposure limits have been exceeded considerably. Medical supervision of all employees who handle or come in contact with respiratory sensitizers is recommended. Personnel with a history of asthma-type conditions, bronchitis or skin sensitization conditions should not work with MDI based products.The Occupational ExposureLimits listed do not apply to previously sensitized individuals. Sensitized individulas 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.

Hygiene measure: : 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 work station.

Eye/face protection : Safety eyewear complying with an approved standard should be used when risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases and dusts.

Section 8. Exposure controls/personal protection

Skin Protection

Hand protection : Use chemical resistant gloves classified under standard EN374: protective gloves against chemicals and microorganisms. Exampales of glovesmaterial that might prove suitable protection iunclude: 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 frequent repeated contact may occur, a glove with protection class 5 or higher (breakthrough time is greater than 240 minutes according to EN 374) is recommended.

Contaminated gloves should be decontaminated and diposed of.

Notice: The selection of a specific glove for a particular application and duration of use in the workplace should also take into account all requisite workplace factors such asa , 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 manufacturer.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 preformed and the risks involved and should be approved by a specialist before handling this product.Recommended: Overall (preferably heavy cotton) ot 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 preformed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air purifying or supplied air 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 th eproduct and the safe working limits of the selected respirator.

Thermal hazards : Not available

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid

Color : Not available

Odor : Not available

Odor threshold : Not available

pH : Not applicable

Melting point : Not applicable

Boiling point : > 300°C (572°F)

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

Evaporation rate: : Not available

Flammability(solid, gas) : Not applicable

Lower & upper explosive (flammable) limits : Not available

Vapor density : Not available

Vapor pressure : Not available

Relative density : Not available

Solubility : Not available

Partition coefficient: n-octanol/water : Not available

Auto- ignition temperature : >600°C (>1112°F)

Decomposition temperature : Not available

VOC : 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 reactions : Reaction with water (moisture) produces CO_2 – gas. Exothermic reaction with materials containing active hydrogen groups. The reaction becomes progressively more vigorous and can be violent at higher temperatures if miscibility of the reaction partners is good or is supported 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 polyuria 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

Information on toxicological effects

Acute toxicity

Product/ingredient name	Test	Endpoint	Species	Result
4,4'-Methylenediphenyl 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
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
	No official guidelines	LD50 Intraperitoneal	Rabbit- Male	100 mg/kg

Conclusion/Summary 4, 4'-Methylenediphenyl diisocyanate Irritating to the respiratory system.

Irritation/Corrosion

Product/ingredient name	Test	Species	Result
4,4'-Methylenediphenyl diisocyanate	OECD 404 Acute Dermal Irritation/Corrosion	Rabbit	Skin- Irritant
	OECD 405 Acute Eye Irritation/Corrosion	Rabbit	Eyes- Non-irritant
Isocyanic acid, polymethylenepolyphenylene ester	OECD 404 Acute Dermal Irritation/Corrosion	Rabbit	Skin- Mild irritant
	OECD 405 Acute Eye Irritation/Corrosion	Rabbit	Eyes- Non-irritant
Diphenylmethane-2,4'-diisocyanate	OECD 404 Acute Dermal Irritation/Corrosion	Rabbit	Skin- Mild irritant
	OECD 405 Acute Eye Irritation/Corrosion	Rabbit	Eyes- Non-irritant

Section 11. Toxicological information

Conclusions/Summary

Skin	:	4,4'-Methylenediphenyl diisocyanate	Irritating to the skin
		Isocyanic acid, polymethylenepolyphenylene ester	Irritating to the skin
		Diphenylmethane-2,4'- diisocyanate	Irritating to the skin
		Isocyanic acid, polymethylenepolyphenylene ester	Irritating to the skin
Eyes	:	4,4'-Methylenediphenyl diisocyanate	Based on the human occupational exposure data, this substance is considered as irritating to eyes.
		Isocyanic acid, polymethylenepolyphenylene ester	Based on the human occupational exposure data, this substance is considered as irritating to eyes.
		Diphenylmethane-2,4'- diisocyanate	Based on the human occupational exposure data, this substance is considered as irritating to eyes.
Respiratory	:	4,4'-Methylenediphenyl diisocyanate	No additional information
		Isocyanic acid, polymethylenepolyphenylene ester	No additional information
		Diphenylmethane-2,4'- diisocyanate	No additional information

Sensitization

Product/ingredient name	Test	Route of exposure	Species	Result
4,4'-Methylenediphenyl 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
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'- diisocyanate	-	Skin	Mouse	Sensitizing
	No official guidelines	Respiratory	Guinea pig	Sensitizing

Mutagenicity

Product/ingredient name	Test	Result
4,4'-Methylenediphenyl diisocyanate	Experiment: In vitro Subject: Bacteria Metabolic activation:+/-	Negative
	Experiment: In vitro Subject: Mammalian- Animal	Negative
Isocyanic acid, polymethylenepolyphenylene ester	Experiment: In vitro Subject: Bacteria Metabolic activation:+/-	Negative
	Experiment: In vitro Subject: Mammalian- Animal	Negative
	Experiment: In vitro Subject: Mammalian- Human	Equivocal
Diphenylmethane-2,4'- diisocyanate	Experiment: In vitro Subject: Bacteria Metabolic activation:+/-	Negative
	Experiment: In vitro Subject: Mammalian- Animal	Negative

Section 11. Toxicological information

Conclusions/Summary

:	4,4'-Methylenediphenyl diisocyanate	No Mutagenic effect
	Isocyanic acid, polymethylenepolyphenylene ester	No Mutagenic effect

Carcinogenicity

Product/ingredient name	Test	Species	Dose	Exposure	Result/Result type
4,4'-Methylenediphenyl diisocyanate	OECD 453 Combined Chronic Toxicity/ Carcinogenicity Studies	Rat-Male, Female	1 mg/m^3	2 years; 5 days per week	Positive- Inhalation-NOAEL
Isocyanic acid, polymethylenepolyphenylene ester	OECD 453 Combined Chronic Toxicity/ Carcinogenicity Studies	Rat-Male, Female	1 mg/m^3	2 years; 5 days per week	Negative- Inhalation-NOAEL
Diphenylmethane-2,4'-diisocyanate	OECD 453 Combined Chronic Toxicity/ Carcinogenicity Studies	Rat-Male, Female	1 mg/m^3	2 years; 5 days per week	Positive- Inhalation-NOAEL

Carcinogenic class

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

Reproductive Toxicity

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

Conclusions/Summary

:	4,4'-Methylenediphenyl diisocyanate	No known significant effects or critical hazards
:	Isocyanic acid, polymethylenepolyphenylene ester	No known significant effects or critical hazards

Section 11. Toxicological information

Teratogenicity

Product/ingredient name	Test	Species	Result/Result type
4,4'-Methylenediphenyl 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
Diphenylmethane-2,4'-diisocyanate	OECD 414 Prenatal Developmental Toxicity Study	Rat- Male, Female	Negative- Inhalation

Conclusions/Summary

: 4,4'-Methylenediphenyl diisocyanate — No known significant effects or critical hazards

: Isocyanic acid, polymethylenepolyphenylene ester — No known significant effects or critical hazards

Specific target organ toxicity(single exposure)

Product/ingredient name	Test	Route of exposure	Result/Result type
4,4'-Methylenediphenyl diisocyanate	Category 3	Not applicable	Respiratory tract irritation
Isocyanic acid, polymethylenepolyphenylene ester	Category 3	Not applicable	Respiratory tract irritation
Diphenylmethane-2,4'-diisocyanate	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 sensitizer: repeated inhalation of vapors or aerosol at levels above the occupational exposure limit could cause respiratory sensitization. Symptoms may include 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. LC50 (rat): ca 490 mg/m^3 (4 hours): using experimentally produced respirable aerosol having aerodynamic diameter < 5 microns.

Skin contact : Causes skin irritation. May cause sensitization by skin contact. Animal studies have shown that respiratory sensitization can be induced by skin contact with known respiratory sensitizers 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.

Section 11. Toxicological information

Symptoms related to the physical , chemical and toxicological characterisitics

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/m^3

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.

Carcinogencity : 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/m^3), there was a significant incidence of a benign tumor of the lung (adenoma) and one malignant tumor (adenocarcinoma). There were no lung tumors at 1 mg/m^3 and no effects at 0.2 mg/m^3. Overall, the tumor incidences, both benign and malignant, and the number of animals with the tumors were not different from the controls. The increased incidence of lung tumors 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 tumor formation will occur.

: No known significant effects or critical hazards

Mutagenicity

Teragenicity : No known significant effects or critical hazards

Developmental effects : 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, which are well in excess of defined occupational exposure limits.

Fertility effects : No known significant effects or critical hazards

Numerical measures of toxicity

Route	ATE Value
Inhalation (dusts and mists)	1.5 mg/l

Other information : Not available

Section 12. Ecological information

Toxicity

Product/ingredient name	Test	Endpoint	Exposure	Species	Result
4,4'-Methylenediphenyl diisocyanate	OECD 202 Daphnia sp. Acute Immobilization Test	Acute EC 50	24 hours static	Daphnia	>1000 mg/l
	OECD 203 Fish, Acute Toxicity Test	Acute LC 50	96 hour 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
Isocyanic acid, polymethylenepolyphenylene ester	OECD 201 Alga, Growth Inhibition test	Acute EC 50	72 hours static	Algae	> 1640 mg/l
	OECD 209 Activated sludge, Respiration Inhibition test	Acute EC 50	3 hours static	Bacteria	> 100 mg/l
	OECD 202 Daphnia sp. Acute Immobilization Test	Acute EC 50	24 hours static	Daphnia	>1000 mg/l
	-	Acute LC 0	96 hour static	Fish	> 1000 mg/l
	OECD 203 Fish, Acute Toxicity Test	Acute LC 50	96 hour 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
Diphenylmethane-2,4'-diisocyanate	OECD 209 Activated sludge, Respiration Inhibition test	Acute EC 50	3 hours static	Bacteria	> 100 mg/l
	OECD 202 Daphnia sp. Acute Immobilization Test	Acute EC 50	24 hours static	Daphnia	>1000 mg/l
	OECD 203 Fish, Acute Toxicity Test	Acute LC 50	96 hour static	Fish	> 1000 mg/l
	OECD 211 Daphnia Magna Reproduction Test	Chronic NOEC	21 days Semi-static	Daphnia	>=10 mg/l

Section 12. Ecological information

Persistence and degradabilty

Product/ingredient name	Test	Period	Result
4,4'-Methylenediphenyl diisocyanate	OECD 302 C Inherent Biodegradability: Modified MITI Test (II)	28 days	0 %
Isocyanic acid, polymethylenepolyphenylene ester	OECD 302 C Inherent Biodegradability: Modified MITI Test (II)	28 days	0 %
Diphenylmethane-2,4'-diisocyanate	OECD 302 C Inherent Biodegradability: Modified MITI Test (II)	28 days	0 %

Conclusion/summary

4,4'-Methylenediphenyl diisocyanate	Not biodegradable
Isocyanic acid, polymethylenepolyphenylene ester	Not biodegradable

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
4,4'-Methylenediphenyl diisocyanate	Fresh Water 0.83 days	-	Not readily
Isocyanic acid, polymethylenepolyphenylene ester	Fresh Water 0.83 days	-	Not readily
Diphenylmethane-2,4'-diisocyanate		-	Not readily

Bioaccumulation potential

Product/ingredient name	Log P_{ow}	BCF	Potential
4,4'-Methylenediphenyl diisocyanate	4.51	200	low
Isocyanic acid, polymethylenepolyphenylene ester	-	200	low
Diphenylmethane-2,4'-diisocyanate	4.51	200	low

Mobility in 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 the 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 : No known significant effects or critical hazards.

Other ecological information

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

Section 13. Disposal considerations

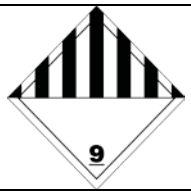
Disposal methods : The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non- recyclable product via a licensed waste disposal contractor.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

Disposal should be in accordance with applicable regional, local, national and local laws and regulations.

Section 14. Transport information

Proper shipping name

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

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

PG*: Packing group

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) : No ingredients listed.
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	Concentrations %
Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)	4,4'-Methylenediphenyl diisocyanate	48.5-54

Clean Air Act- Ozone Depleting Substances (ODS) : This product does not contain nor is it manufactured with ozone depleting substances.

Section 15. Regulatory information

	Product name	Concentrations %
SARA 313 Form R- Reporting requirements	4,4'-Methylenediphenyl diisocyanate	48.8-54
	Isocyanic acid, polymethylenepolyphenylene ester	30.899-37.199
	Diphenylmethane-2,4'-diisocyanate	12.4-16.7

	Ingredient name	%	Section 304 CERCLA Hazardous Substance	CERCLA Reportable Quantity (Lbs)	Product Reportable Quantity (Lbs)
CERCLA Hazardous Substance	Diphenylmethane -2,4'-diisocyanate	54	Listed	5000	9259

State Regulations

Pennsylvania- RTK : 4,4'-Methylenediphenyl diisocyanate

California Prop 65 : This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statue.

Section 16. Other information

Hazardous Material Information System (USA)

Health -2* **Flammability-1** **Physical hazards-1**

Caution: HMIS® rating 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 CFR1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with fully implemented HMIS® program. HMIS® is a registered trademark of the National Paint & Coating Association (NPCA). HMIS® materials may be purchased exclusively from J.J. Keller.

National Fire Protection Association (USA) NFPA 704

Health -2 **Flammability-1** **Instability-1** **Special- N/A**

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

Date of revision : **5/8/15**
Date of previous issue : **2/24/12**
Revisions: : **Revision to entire document for compliance of new HazCom rules.**
Version : **4**
Prepared by : **C. Rogalski**

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