SHOWA DENKO K.K.

13-9, Shiba Daimon 1-Chome
Minato-Ku, Tokyo 105-8518 Japan

Date of preparation : November 25, 2004
Date of revision :

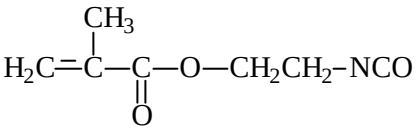
MATERIAL SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Karenz MOI (Methacryloyloxyethyl isocyanate)
Company name : SHOWA DENKO K.K.
Address : 5-1, Ogimachi, Kawasaki-ku, Kawasaki-shi, Kanagawa 210-0867, Japan
Section : Specialty Chemicals Division, Chemicals Sector
Telephone number : +81-44-329-0726
Facsimile number : +81-44-329-0791
Emergency telephone number : +81-242-75-2121 (Weekday in the daytime)
+81-242-75-2884 (Holiday or nighttime)
MSDS number : SCA-1013

2. COMPOSITION／INFORMATION ON INGREDIENTS

Single substance or mixture : Single substance
Common chemical name (generic name) : 2-isocyanatoethyl methacrylate
Synonym (s) : 2-methacryloyloxyethyl isocyanate
Content : 97 % or over
Chemical formula :



Publication number in Japanese official gazette : The Law concerning the Examination and Regulation of Manufacture etc. of Chemical Substances
(2)-3378
The Industrial Safety and Health Law
2-(6)-1145
CAS number : 30674-80-7
Ingredients contributing to the hazard : 2-isocyanatoethyl methacrylate

3. HAZARDS IDENTIFICATION

Most important hazards
Adverse human health effects : Inhalation: Extreme inhalation may cause breathing difficulty.
: Skin: The product is corrosive to the skin and the mucous membrane.
Eyes: The product is corrosive to the eyes.
Environmental effects : The product may be harmful to the aquatic organism.
Physical and chemical hazards : Flammability is promoted by heating.
Specific hazards : Flammable and corrosive.
Classification of chemical product : Acutely toxic substance. (Isocyanate n. o .s. and its solution)

4. FIRST-AID MEASURES

Inhalation	: When breathing stops, artificial respiration is done. Aerobic respiration is given when breathing is difficult. Then, obtain medical aid.
Skin contact	: Wash the affected area with water, soap and water, again. Obtain medical aid, as the product may cause dermatitis or inflammation.
Eye contact	: Immediately wash the eye(s) with plenty of clean running water for more than 15 minutes, and obtain medical aid as soon as possible.
Ingestion	: Do not induce vomiting. Promptly seek medical attention.

5. FIRE-FIGHTING MEASURES

Extinguishing media	: Dry chemicals, foam and carbon dioxide are effective.
Specific methods of fire-fighting and special equipment	: When it is small-scale, dry chemicals, carbon dioxide and foam are used. In case of fire in the surrounding area, promptly remove the container to a safe place.
Protection of firefighters	: Wear the protective cloth, goggles for chemicals and gas mask, to prevent from contact and inhalation of the vapor.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions	: Careless wipe of released product may cause affection of the eyes, the mucous membrane and the hand, by the vapor. Wears suitable protective equipment. Evacuate leeward personnel.
Environmental precautions	: Prevent from draining into the river and sea, and environmental impacts by the leaked product. Because a bad smell or irritation is strong, take proper measures, for example, report of leakage to the circumference inhabitant.
Methods for cleaning up	: Absorb the spilt MOI with the vermiculite, sawdust, sand, etc., and deal with it with thin ammonia solution (for example, mixture of 50 % ethylene glycol aquatic solution and 1/10 amount of concentrated ammonia solution).
Prevention of secondary hazards	: Promptly remove ignition sources from the surrounding area. Prepared fire extinguisher.

7. HANDLING AND STORAGE

Handling

Technical measures	: Install eyewash fountain and a safety shower the handling area. Handle MOI in the environment, which is kept its concentration lower than 0.025 ppm by the adequate ventilation. [1)]
Precautions	: In handling of MOI, equip the handling area with the facilities of the local or the whole ventilation.
Safe handling advice	: Handle MOI with attention to the following, because it causes the corrosion of eyes, mucous membrane, skin, and so on, and is hazardous. ・Educate handling personnel about the toxicity, the reactivity, and so on, of MOI, regularly. ・Prevents from the direct contact of MOI to skin, eyes, clothes, and inhalation of vapor and so on. Take off the clothes contaminated by MOI at once, and dump them. Wash the contaminated area of skin with water adequate, with soap, and with water, again.

Storage

Appropriate storage conditions : Prevent from the contact with water, heat, strong base and the compound with active hydrogen (alcohol and amine).
It reacts with the damp, and formate the insoluble urea and carbon dioxide. Notice the formation of urea, because it causes choke of pipes and valves.
It is stored up in the cool and dark space.
Strage in according with the statute such as the Poisonous and Deleterious Substances Control Law and Fire Service Law.

Safe packaging materials : Use the container made of glass, the polyethylene and so on.
Use the water-proof container, because it reacts with the damp, and formate the insoluble urea and carbon dioxide.

8. EXPOSURE CONTROLS／PERSONAL PROTECTION

Engineering measures to reduce exposure : Install eyewash fountain and a safety shower the handling area.
Treat MOI in the environment, which is kept its concentration lower than 0.025 ppm by the adequate ventilation. [1)]

Exposure guidelines : not established

Japan Society for Occupational Health (2004) : not established

ACGIH (2004) : not established

Personal protective equipment

Respiratory protection : Gas mask for organic gas. Air respirator

Hand protection : Gloves to avoid contact with the skin..
Use the protective equipment made of the neoprene, the nitrile rubber and the vinyl chloride, because it permeates in the simple rubber equipment.

Eye protection : Air-proof goggles to avoid irritation to eyes.

Skin and body protection : Apron and boots to avoid contact to the skin.
Use the protective equipment made of the neoprene, the nitrile rubber and the vinyl chloride, because it permeates in the simple rubber equipment.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state

Appearance : Liquid

Color : Colorless or light yellow transparence.

Odor : Irritating odor

Specific temperatures/temperature ranges at which changes in physical state occur

Boiling point : 211 ℃

Melting point : -45 ℃

Flash point : 99 ℃

Auto-ignition temperature : No data applicable

Explosion properties : No data applicable

Vapor pressure : 27 Pa (25 ℃)

Specific gravity : 1.096 (25 ℃)

Solubility

Water : Solubility can't be measured because it reacts with water and organic solvent containing the active hydrogen.

Other solvents : In other organic solvent, easily soluble.

10. STABILITY AND REACTIVITY

Stability : Stable under normal handling conditions.
Reactivity : React with water, alcohol, some kind of amine.
When it is heated, auto-polymerization and heat is promoted.
Conditions to avoid : High temperature, contact with water.
Hazardous decomposition products : No data applicable

11. TOXICOLOGICAL INFORMATION

Acute toxicity [1] : Oral Rat LD_{50} 670～2000 mg/kg [1]
Dermal Rabbit LD_{50} 1000～2000 mg/kg [1]
Inhalation Rat LC_{50} 25 ppm/ l hr, [1] 4 ppm/ 6 hr [3]
Local effects (skin, eye etc.) : It has strong irritancy, and sometimes causes inflammation and loss of eyesight. [1]
It has strong causticity in the skin. [1]
Sensitization : The extreme sensitization to the guinea pig was seen. [2]
Chronic Toxicity or long term toxicity : Hypermorphoisis on mucous membrane of nose, in the above 0.025 ppm, (91 days inhalation sub-acute) [3]
Carcinogenicity : No data available
Mutagenicity : Chromosomal aberration test CHO cell ; negative [4]
Ames test salmonella S9 mix(+) TA98, TA100 ; positive [5]
salmonella S9 mix(+) TA1535, TA1537 ; negative
salmonella S9 mix(-) TA98, TA100, TA1535, TA1537 ; negative

12. ECOLOGICAL INFORMATION

Persistence/Degradability : No data available
Eco-toxicity
Fish toxicity : Fat head minnow : LC_{50} 162 mg/l /96 hr [6]
Water flea : LC_{50} 5 mg/l /48 hr

13. DISPOSAL CONSIDERATIONS

Dispose the product, after counteract it by ammonia-alcohol aquatic solution (for example, mixture of 50 % ethylene glycol aquatic solution and 1/10 amount of concentrated ammonia solution).
It is convenient to prepare an absorbent and counteract agent in advance.
Example : sawdust 23 %, ethanol 19 % and conc. ammonia solution 4 %, White soil 39 %, Triethanolamine 4 %, water 11 %.

Note: When disposing of the product outside Japan, conform to applied laws and regulations in that country or territory.

14. TRANSPORT INFORMATION

International regulations for transport
IMDG code : Class 6.1 (toxic)
ICAO-TI／IATA-DGR : Class 6 GIII
UN hazard class : Class 6.1 (toxic)
UN number : 2206
Additional regulations :
The Fire Services Law;
Article 2, Notification annex table 4, Flammable liquid (Class 3 Petroleum, Water-insoluble Liquid)
The Ship Safety Law;
Rules for Dangerous Goods Articles 3, Notification Annex Table 1 (Toxic Substances)
The Aviation Law ;
Enforcement Regulations Article 194, Dangerous Substance Notification, Annex Table 1 (Toxic Substances)

Specific precautionary transport measures and conditions :

Container: 20 kg: Chemical drum, 200 kg: Chemical drum

(Note) Avoid impact in load and unload, and prevent from leakage due to damage of container.
Avoid leakage of water from the container.
Keep fire source away.

Container labeling: 'Inflammables ', 'Don't throw down', 'Don't lay the container on its side '

Note: When transporting the product outside Japan, conform to applied laws and regulations in that country or territory.

15. REGULATORY INFORMATION

Laws and regulations applied in Japan:

The Fire Services Law;
Article 2, Notification annex table 4, Flammable liquid (Class 3 Petroleum, Water-insoluble Liquid)
The Ship Safety Law;
Rules for Dangerous Goods Articles 3, Notification Annex Table 1 (Toxic Substances)
The Aviation Law ;
Enforcement Regulations Article 194, Dangerous Substance Notification, Annex Table 1 (Toxic Substances)

The product is not specified as a reportable dangerous and toxic substance under the Chemical Substance Control and Promotion Law, the Industrial Safety and Health Law, or the Poisonous and Deleterious Substances Control Law.

Note: When using the product outside Japan, it must be handled in accordance with applied laws and regulations in that country or territory.

16. OTHER INFORMATION

References 1) Isocyanatoethyl Methacrylate:
A Hetero Functional Monomer for Polyurethane And Vinyl Polymer Systems.
M.R.Thomas. Journal of Coatings Technology 55 (703), 55, (1983

2) EPA/OTS Doc#86-910000443S
LABORATORY REPORT ON METHACRYLIC ACID, 2-ISOCYANATOETHYL ESTER WITH COVER LETTER (SANITIZED)

3) -Isocyanatoethyl methacrylate - an inhalation dominant lethal study in the male Sprague- Dawley rat.
J.S.Murray et al., Drug and Chemical Toxycology 3(4), 381-392 (1980)

4) EPA/OTS Doc#86-910000447S
LABORATORY REPORT ON METHACRYLIC ACID, 2-METHYL-, 2-ISOCYANATOETHYL ESTER WITH COVER LETTER (SANITIZED)

5) EPA/OTS Doc#86-910000438S
LABORATORY REPORT ON METHACRYLIC ACID, 2-METHYL-, 2-ISOCYANATOETHYL ESTER WITH COVER LETTER (SANITIZED)

6) EPA/OTS Doc#86-910000321S
EVALUATION OF IEM, 2-PROPENOIC ACID: 2-METHYL-, 2-ISOCYANATOETHYL ESTER, IN THE AQUATIC ENVIRONMENT WITH COVER LETTER AND ATTACHMENTS (SANITIZED)

TSCA Inventory Included
EINECS number 250-284-7

For further information, please contact

Specialty Chemicals Division, Chemicals Sector
Telephone number : +81-44-329-0726
Facsimile number : +81-44-329-0791

The information in this MSDS was obtained from sources which we believe are reliable, but no warranty or representation as to its accuracy or completeness is hereby given. Users should consider the information herein only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use and disposal, the safety and health of employees and customers and the protection of the environment.

This is a translation of original Material Safety Data Sheet prepared in Japanese.