HD 4100

Version 2.0
Revision Date 2010/12/22 Ref. 130000030606

This SDS adheres to the standards and regulatory requirements of Korea and may not meet the regulatory requirements in other countries.

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product name : HD 4100

Recommended use of the chemical and restrictions on use

Recommended use : Polyimide coating for semi-conductor industry

Information on the Manufacturer/Supplier/Distributor

Company	:	HD MicroSystems™
Street address		250 Cheesequake Road, Parlin, New Jersey 08859
Responsible Department	:	No information available.
Contact person	:	Dong Young EMS Co. LTD, 772 Yeoksam-Dong, Kangnam-Gu, Seoul, Korea
Telephone	:	82-2-562-3061-3
Telefax	:	82-2-557-9301
Emergency telephone number	:	+82-2-2222-5200 (Day time) +82-52-979-4193 (24hrs)

2. HAZARDS IDENTIFICATION

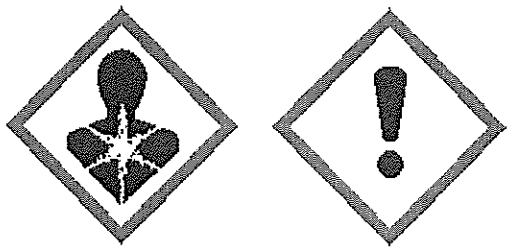
GHS-Classification

Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2A
Skin sensitization	Category 1
Reproductive toxicant	Category 1B
Target Organ Systemic Toxicant - Single exposure	Category 3

Endpoints which are not classified, cannot be classified or are not applicable are not shown.

GHS Label element

Pictogram :



Signal word : Danger

Hazard statements : Causes skin irritation.
May cause an allergic skin reaction.
Causes serious eye irritation.
May cause respiratory irritation.
May cause drowsiness or dizziness.
May damage fertility or the unborn child.

Precautionary statements : Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
Wash hands thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Contaminated work clothing should not be allowed out of the workplace.
Wear protective gloves/ protective clothing/ eye protection/ face protection.
Wear protective gloves.
IF ON SKIN: Wash with plenty of soap and water.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
IF exposed or concerned: Get medical advice/ attention.
Specific treatment (see First Aid instructions on this label).
If skin irritation or rash occurs: Get medical advice/ attention.
If eye irritation persists: Get medical advice/ attention.
Take off contaminated clothing and wash before reuse.
Store in a well-ventilated place. Keep container tightly closed.
Store locked up.
Dispose of contents/container in accordance with local regulation.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Pure substance/mixture : Mixture

Components

Chemical Name	CAS-No.	Concentration
N-Methyl-2-pyrrolidone	872-50-4	50 - 60%
3,6,9-Trioxaundecamethylene dimethacrylate	109-17-1	1 - 10%
Methanol	67-56-1	<1%
Non regulated ingredients		35 - 45%

4. FIRST AID MEASURES

Never give anything by mouth to an unconscious person.

Eye contact : Rinse thoroughly with plenty of water, also under the eyelids. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.

Skin contact : Take off all contaminated clothing immediately. Wash off with soap and water. Wash contaminated clothing before re-use.

Inhalation : Move to fresh air. Consult a physician.

Ingestion : Do NOT induce vomiting. Immediately give plenty of water (if possible charcoal slurry). Call a physician immediately.

Notes for physicians and etc. : No information available.

5. FIRE-FIGHTING MEASURES

Suitable (and inappropriate) extinguishing media	:	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Unsuitable extinguishing media: High volume water jet
Specific hazards arising from the chemical	:	Vapours may form explosive mixtures with air. Do not allow run-off from fire fighting to enter drains or water courses. Evacuate personnel to safe areas.
Special protective equipment for fire-fighters	:	In the event of fire, wear self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Evacuate personnel to safe areas. Remove all sources of ignition. Ensure adequate ventilation. Wear respiratory protection. Wear personal protective equipment. Avoid contact with skin, eyes and clothing. Dispose of in accordance with local regulations.
Environmental precautions	:	Do not flush into surface water or sanitary sewer system. Avoid subsoil penetration. Prevent further leakage or spillage if safe to do so.
Methods and materials for containment and cleaning up	:	Contain spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a container for disposal according to local / national regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling

Technical measures/Precautions	:	Avoid contact with skin, eyes and clothing. Avoid inhalation of vapour or mist. Provide sufficient air exchange and/or exhaust in work rooms. Take precautionary measures against static discharges. Smoking, eating and drinking should be prohibited in the application area.
Precautions for safe handling	:	Keep away from heat and sources of ignition.
Hygiene measures	:	Wash hands before breaks and at the end of workday. Wash contaminated clothing before re-use. Keep away from food and drink.

Conditions for safe storage

Suitable storage conditions	:	Keep container closed to prevent contamination. Storage temperature: > -20 - < -10 °C Stable under normal conditions.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits of the chemical substance, biological exposure limits and etc.

Chemical Name	Occupational Exposure Limits		Regulation
Methanol	TWA	200 ppm, 260 mg/m3	Industrial Safety and Health Act (06 2008)
	STEL	250 ppm, 310 mg/m3 (SKIN)	Industrial Safety and Health Act (06 2008)
	TWA	200 ppm	US. ACGIH Threshold Limit Values (01 2010)
	STEL	250 ppm (SKIN)	US. ACGIH Threshold Limit Values (01 2010)

Engineering measures : Ensure adequate ventilation.

Personal protective equipment

Respiratory protection : Provide adequate ventilation. When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.

Eye protection : Safety glasses with side-shields

Hand protection : Material: butyl-rubber
Break through time: 60 min
Permeation rate: 480 min
Glove thickness: 0.7 mm
As the product is a mixture of several substances, the durability of the glove materials cannot be calculated in advance and has to be tested before use.,
The data about break through time/strength of material are standard values!
The exact break through time/strength of material has to be obtained from the producer of the protective glove.

Skin and body protection : No information available.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state : liquid

Form : liquid

Colour : brown

Odour : aromatic

Odour Threshold : no data available

pH : no data available

Melting point/freezing point

no data available

Boiling point/boiling range

no data available

Flash point	: 93 °C
Evaporation rate	: no data available
Flammability (solid, gas)	: no data available

Upper and lower flammable or explosive limits

Upper explosion limit	: no data available
Lower explosion limit	: no data available
Vapour pressure	: no data available

Solubility(ies)

Water solubility	: partly soluble
Solubility in other solvents	: no data available
Vapour density	: no data available

Specific gravity

no data available

Partition coefficient: n-octanol/water	: no data available
Autoignition temperature	: no data available
Decomposition temperature	: no data available
Viscosity	: no data available
Molecular Weight	: no data available

10. STABILITY AND REACTIVITY

Chemical stability & Possibility of hazardous reactions	: Stable under normal conditions. Hazardous polymerisation does not occur. The material may slowly polymerize if heated or if inerted with nitrogen.
Conditions to avoid	: Exposure to sunlight.

Materials to avoid	:	No information available.
Hazardous decomposition products	:	Carbon dioxide (CO2), carbon monoxide (CO), oxides of nitrogen (NOx), dense black smoke.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Respiratory system: Refer to below subheading

Oral: Refer to below subheading

Eye/Skin contact: Refer to below subheading

Health hazard information

Acute toxicity : N-Methyl-2-pyrrolidone:

Oral: LD50/rat : 4,150 mg/kg

Inhalation: LC50/4 h/rat : > 5.1 mg/l
Respiratory tract irritation
Target Organs: Respiratory Tract

Dermal: LD50/rat : > 5,000 mg/kg

3,6,9-Trioxaundecamethylene dimethacrylate:

Oral: LD50/rat : > 5,000 mg/kg

Dermal: LD50/rabbit : > 3,000 mg/kg

Methanol:

Oral: Acute toxicity estimate/ : 100 mg/kg
LDL0/human : 143 mg/kg
multiple species :
narcosis Liver effects eye effects Central nervous system effects

Inhalation: Acute toxicity estimate/ : 3 mg/l

Dermal: LDL0/Monkey : 393 mg/kg

Skin corrosion/irritation : HD 4100:

Irritating to skin.

Serious eye damage/eye irritation : HD 4100:

Irritating to eyes.

Respiratory sensitization / Skin sensitization	:	HD 4100: May cause sensitization by skin contact.
Germ cell mutagenicity	:	N-Methyl-2-pyrrolidone: Did not show mutagenic effects in animal experiments. Tests on bacterial or mammalian cell cultures did not show mutagenic effects. 3,6,9-Trioxaundecamethylene dimethacrylate: Tests on mammalian cell cultures showed mutagenic effects. Did not cause genetic damage in cultured bacterial cells. Methanol: Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Carcinogenicity	:	N-Methyl-2-pyrrolidone: Overall weight of evidence indicates that the substance is not carcinogenic.
Reproductive toxicity	:	N-Methyl-2-pyrrolidone: Animal testing showed effects on reproduction at levels equal to or above those causing parental toxicity. Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity. Reduced embryo-foetal viability Foetal malformations 3,6,9-Trioxaundecamethylene dimethacrylate: Did not show teratogenic effects in animal experiments. Methanol: Animal testing showed effects on embryo-foetal development at levels below those causing maternal toxicity. Foetal malformations Delayed foetal development (variations) Reduced growth
Specific Target Organs Toxicity (Single/Repeated)	:	Refer to acute toxicity and/or repeated dose toxicity data for more information on target organs if applicable.
Aspiration toxicity	:	no data available
Other	:	N-Methyl-2-pyrrolidone: Repeated dose toxicity: Oral, rat Reduced body weight gain

3,6,9-Trioxaundecamethylene dimethacrylate:

Repeated dose toxicity: Dermal, multiple species
No toxicologically significant effects were found.

Methanol:

Repeated dose toxicity: Dermal, multiple species
mortality
Repeated dose toxicity: Oral, Monkey
Blindness

12. ECOLOGICAL INFORMATION

Toxicity on aquatic terrestrial organisms

Toxicity to fish : N-Methyl-2-pyrrolidone:

LC50/96 h/Oncorhynchus mykiss (rainbow trout): > 500 mg/l
Methanol:

LC50/96 h/Fathead minnow: 28,100 mg/l

Other : N-Methyl-2-pyrrolidone:

EC50/72 h/Algae: > 500 mg/l

Methanol:

EC50/48 h/Daphnia: > 10,000 mg/l

Persistence and degradability : N-Methyl-2-pyrrolidone:

Readily biodegradable, according to appropriate OECD test.

Bioaccumulation : N-Methyl-2-pyrrolidone:

Accumulation in aquatic organisms is unlikely.

Mobility in soil : no data available

Other adverse effects : HD 4100:

No data is available on the product itself.

13. DISPOSAL CONSIDERATIONS

Waste disposal methods : In accordance with local and national regulations.

Precautions for Disposal : no data available

14. TRANSPORT INFORMATION

Not classified as dangerous in the meaning of transport regulations.

15. REGULATORY INFORMATION

Industrial Safety and Health Act

Refer to section 2 of this MSDS for classification according to the GHS.

Toxic Chemicals Control Law

not regulated

Dangerous Substance Safety Management Act

FSL Class 4 Flammable liquids Type 3 petroleums, Water insoluble liquid, (Threshold quantity: 2,000 liters)

Waste Management Law

Dispose of in accordance with local regulations.

Regulations in other countries

No information available.

16. OTHER INFORMATION

Sources of key data used to compile the Safety Data Sheet	:	not applicable
Issuing date	:	2011/04/20
Number of revision times and the date of preparation of the latest revision	:	2010/12/22 Version 2.0
Other	:	No information available.

Significant change from previous version is denoted with a double bar.

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