Material Safety Data Sheet

HD MicroSystems

PI-2525

PI2525 Revised 1-OCT-2009 Printed 1-OCT-2009

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Tradenames and Synonyms

Pyralin(R) polyimide precursor coatings, Polyamic acid

Company Identification

MANUFACTURER/DISTRIBUTOR

HD MicroSystems(TM)
Cheesequake Road
Parlin
New Jersey
USA
08859

PHONE NUMBERS

Product Information : (800) 346-5656
Transport Emergency : (800) 424-9300 (Outside the US (703) 527-3887)
Medical Emergency : (800) 441-7515 (Outside the US (302) 774-1000)

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
Polyamic acid of Benzophenone Tetracarboxylic Dianhydride/4,4- Oxydianiline/m-Phenylenediamine Polymer	31942-21-9	10-30
*n-Methylpyrrolidone	872-50-4	>60

* Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

HAZARDS IDENTIFICATION

Potential Health Effects

OVERVIEW: The most likely routes of worker overexposure to this product are skin contact and inhalation. Skin irritation and / or other effects of skin contact are easily avoided by: using proper gloves, reading "Protection Information" section below; not touching exposed skin (like your neck or face) or clothing with contaminated gloves; using proper glove removal techniques; washing affected

(HAZARDS IDENTIFICATION - Continued)

areas immediately if skin contact occurs; washing hands before leaving the work area. Inhalation exposure would occur by breathing the product's volatile components, which begin to evaporate at room temperature when product container is opened. Volatile solvents continue to evaporate during room temperature use of the product, such as pouring from the jar to the dispensing machine and spin coating. Mist and solvent vapors will evolve if a spray application is used. During the wafer or substrate drying (125 - 150 deg C) and the final curing (300 - 450 deg C) any remaining solvent shall volatilize. Consideration should be given to avoiding overexposure to chemicals used in related processes. For example, avoid over exposure to chemicals used as "product thinners", solvents used to clean process equipment, and other chemicals used in the operation such as wafer etchants and parts cleaners. Personnel performing maintenance and repairs on dispensing equipment (e.g. spin coaters) may need personnel protective equipment such as respirators, gloves, goggles, and protective clothing to prevent exposure to accumulated materials. Well-designed area and personal air sampling /analysis can show whether exposures are within the required / recommended limits. Properly designed engineering controls such as local ventilation and process enclosures are effective ways to reduce the environmental concentrations to permissible limits. Respirators should be used when engineering and work practice controls are not technically feasible, or when such controls are in the process of being installed, or when the engineering controls fail and need to be supplemented. (See the "Exposure Limits" table below for more information). Process controls and procedures must comply with all applicable Federal, State (or Provincial) and Local safety, health and environmental laws, regulations and ordinances. In addition, it is always prudent to use all the practical means to limit worker exposure to chemicals. Significant differences in overall exposure can be made by using practical measures such as:

* Inhalation - Minimize exposure by keeping containers of product, solvents, solvent-dampened clean wipes, etc, covered;

*Skin - Avoid contact by selecting proper gloves, and know how to them properly;

*Eye - Wear chemical safety glasses when handling the product, solvents and waste materials, and where there is potential for splashing wear chemical goggles and face shield;

*Ingestion - Avoid inadvertent ingestion by washing the hands before eating, drinking, or smoking, and restrict these activities to locations outside of the work area.

(HAZARDS IDENTIFICATION - Continued)

>>>Polyamic acid of Benzophenone Tetracarboxylic Dianhydride/4,4-Oxydianiline/m-Phenylenediamine (Polymer) ****Toxic effects described in animals include: BY SKIN OR EYE CONTACT: Skin irritation; Skin sensitization; Eye irritation.

>>> n-Methylpyrollidone
Toxic effects described in animals include: BY SKIN CONTACT: No skin sensitization; BY INHALATION: Altered respiratory rate; Nonspecific effects, e.g., weight loss and irritation. Toxic effects of repeated or prolonged animal exposures include: BY INHALATION: Lethargy/inactivity; Weight loss; Bone marrow effects; Increased mortality; Testicular effects; BY INGESTION: Decreased body weight; Blood effects; Kidney tissue degeneration; Altered enzyme activity; Thyroid effects; Additional animal tests have shown: NMP is not carcinogenic when tested by the inhalation, skin, and "under skin" routes of administration on laboratory animals. In oral studies, NMP was not carcinogenic in rats, but produced liver tumors in mice. There was no clear dose-response relationship in the mouse study and the significance of the data is unknown. == NMP was not teratogenic (i.e. did not cause fetal developmental malformations) by skin exposure to laboratory test animals. For inhalation animal testing, NMP showed developmental delays rather than teratogenic effects. The delayed effects involved a reduction in fetal body weight, delay in physical development and limited evidence of deficits in behavioral test. The effects were found to be neither permanent nor life-threatening. == Tests have shown NMP does not cause genetic damage in bacterial or mammalian cell cultures. It has not been tested in animals for genetic toxicity. ****Human health effects of overexposure may include: BY SKIN CONTACT: Dermatitis; Skin irritation with itching, burning, redness, swelling or rash; BY EYE CONTACT: Eye irritation with discomfort, tearing, or blurring of vision; BY INHALATION: Vapors may cause respiratory tract irritation; May cause nose and throat irritation with sneezing, sore throat or runny nose; Nonspecific discomfort, e.g., nausea, headache or weakness; BY INGESTION: Chills; May cause gastrointestinal tract irritation; Vomiting; Abdominal cramps; BY INHALATION OR INGESTION: Drowsiness; Nausea; Dizziness. Human effects of higher level acute, repeated or chronic overexposure may include: BY SKIN CONTACT: There are inconclusive or unverified reports of human sensitization; Rash; Blisters; Cracking; Redness; Pain; Severe irritation; Skin permeation may occur in amounts capable of producing the effects of systemic toxicity. ***In addition: No information was found to determine carcinogenic potential of NMP in humans. == One documented human case has attempted to link human stillbirth and occupational NMP exposure. This study neither proved nor disproved a causal link between the NMP exposure and the stillbirth. == There are reports that low NMP exposures

(HAZARDS IDENTIFICATION - Continued)

caused some individuals to experience eye irritation or chronic headache.

>>>Polyamic acid of Benzophenone Tetracarboxylic Dianhydride/4,4-Oxydianiline/m-Phenylenediamine Polymer

Inhalation: May cause nose and throat irritation. May cause nervous system depression characterized by the following progressive steps: headache, dizziness, nausea, staggering gait, confusion, unconsciousness.

Reports have associated repeated and prolonged overexposure to solvents with permanent brain and nervous system damage.

Skin or eye contact: May cause irritation or burning of the eyes. Repeated or prolonged liquid contact may cause skin irritation with discomfort and dermatitis.

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

FIRST AID MEASURES

First Aid

INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash contaminated clothing before reuse.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

If swallowed, do not induce vomiting. Immediately give 2 glasses of water. Never give anything by mouth to an unconscious person. Call a physician.

(FIRST AID MEASURES - Continued)

Notes to Physicians

Activated charcoal mixture may be beneficial. Suspend 50 g activated charcoal in 400 mL water and mix well. Administer 5 mL/kg, or 350 mL for an average adult.

FIRE FIGHTING MEASURES

Flammable Properties

Flash Point	: 194 F (90 C)
Method	: Setaflash Closed Cup - SCC.

FIRE & EXPLOSION HAZARDS:
KEEP AWAY FROM SPARKS AND OPEN FLAMES. Do not smoke in area with open product; If the product may be heated above its flashpoint during processing, remove sources of ignition such as open sparks, flames or static discharge to prevent vapor ignition.

Extinguishing Media

Dry Chemical, Carbon Dioxide, Sand.

Fire Fighting Instructions

Wear full protective equipment. Thoroughly decontaminate all equipment used in firefighting efforts before returning to service.

Toxic decomposition products may form under fire conditions. (See Decomposition Section.); Wear a full facepiece, positive pressure, self-contained breathing apparatus (SCBA); Dispose of residues per federal, state, and local regulation. (See Waste Disposal Section.).

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Evacuate personnel, thoroughly ventilate area, use self-contained breathing apparatus.

(ACCIDENTAL RELEASE MEASURES - Continued)

Spill Clean Up

Spill, Leak or Release:
FOR SMALL SPILLS, absorb on rags, sand or other absorbent material;

FOR LARGE SPILLS, get workers out of affected area. If flammable liquids or vapors may be present, turn off electrical devices or other sources of sparks or flames.

WEAR PROTECTIVE EQUIPMENT. Use supplied-air respiratory protection if vapor concentrations are not known; Contain spill at source by diking or absorbing with sand. Do not allow spill to spread to or intentionally flush to sewer or ground. Wash area thoroughly. Adequately ventilate area; Spill residue, cleaning rags and absorbent may be considered hazardous. (See Waste Disposal Section.).

Components of this product may be considered hazardous; Consult applicable Federal, State, and local regulations for allowable disposal methods.

HANDLING AND STORAGE

Handling (Personnel)

Contaminated clothing and cleaning materials, etc. should be considered hazardous until decontaminated or properly disposed of. (See Waste Disposal Section.).

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Adequate local ventilation should be used to keep exposures below applicable limits; Other engineering controls such as totally enclosed handling systems are also perferred; Respiratory protection will be needed if exposures can not be kept below applicable limits by other means.

Personal Protective Equipment

Respiratory Protection:
If respirators are needed to meet applicable limits, a respiratory protection group up to the level of OSHA Standard 29 CFR 1910.134 is mandatory. This includes air monitoring selection, medical approval training, fit testing, inspection, maintenance, cleaning. storage, etc. Selection of a suitable respirator will depend on the properties of the contaminant(s) and their actual or expecte air concentration(s) versus applicable limits. Consult ANSI Standard Z88.2 for decision logic to select appropriate

(EXPOSURE CONTROLS/PERSONAL PROTECTION - Continued)

NIOSH/MESA approved respirators;

Gloves: Gloves should be used when the possibility of skin contact exists; The suitability of a particular glove and glove material should be determined as part of an overall glove program. Considerations may include chemical breakthrough time; permeation rate; abrasion, cut and puncture resistance; flexibility; duration of contact; etc.

Other Protection Practices:
Appropriate eye protection such as chemical splash goggles should be used if the possibility of eye contact exists; Protective outer clothing should be used where the possibility of body contact exists. Contaminated work clothing should not be allowed out of the workplace; Do not smoke, consume or store food or drinks in areas where the product is handled or stored. After handling the product, wash hands thoroughly before leaving the work area;
Additional engineering controls, work practices and training may be required depending on exposure levels.These are discussed in the OSHA Respiratory Protection Standard (29 CFR 1910.134) and OSHA Hazard Communication Standard (29 CFR 1910.1200);
Do not breath dust. Avoid contact with eyes, skin, or clothing. Wash thoroughly after handling.

Exposure Guidelines

Applicable Exposure Limits
n-Methylpyrrolidone

PEL	(OSHA)	: None Established
TLV	(ACGIH)	: None Established
AEL *	()	: 5 ppm, 8 & 12 Hr. TWA, Skin
WEEL	(AIHA)	: 10 ppm, 8 Hr. TWA, Skin

* AEL is 's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Form	: Viscous Liquid.
Color	: Colorless to Amber.
Solubility in Water	: Slight
Odor	: Aromatic.

STABILITY AND REACTIVITY

Chemical Stability

Stable at normal temperatures and recommended storage conditions.

Conditions to Avoid

Avoid contact with:
Reducing agents; Oxidizing agents; Bases; Acids; Strong Acids; Strong Oxidizers.

Incompatibility with Other Materials

Reducing agents; Oxidizing agents; Bases; Acids; Strong Acids; Strong Oxidizers.

Decomposition

Carbon monoxide (CO); Nitrogen oxides; Carbon dioxide; water; Various hydrocarbons

Polymerization

Polymerization will not occur.

TOXICOLOGICAL INFORMATION

Animal Data

>>>n-Methylpyrollidone
Inhalation 4 hour ALC [Rats]: 1.7 mg/L
Skin LD50 [Rabbits]: 8000 mg/kg
Oral LD50 [Rats]: 4320 mg/kg

DISPOSAL CONSIDERATIONS

Waste Disposal

Consult applicable Federal, State, and local regulations for allowable disposal methods.

Container Disposal

Empty product containers should be considered hazardous until decontaminated or properly disposed of. (See Waste Disposal Section.).

REGULATORY INFORMATION

U.S. Federal Regulations

All Ingredients in This Product are TSCA Listed/Reported.

State Regulations (U.S.)

WARNING - SUBSTANCES KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM-
n-Methylpyrrolidone

OTHER INFORMATION

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsibility for MSDS : HD MicroSystems(TM)
Telephone : 1-800-346-5656

# Indicates updated section.

End of MSDS