

Material Safety Data Sheet



PI-2562

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CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Tradenames and Synonyms

Pyralin(R)polyimide precursor coatings, Polyamic acid

Company Identification

MANUFACTURER/DISTRIBUTOR

HD MicroSystems
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	%
*n-Methylpyrrolidone	872-50-4	10-30
Partial Ester of Benzophenone	31942-21-9	10-30
Tetracarboxylic Dianhydride/4,4-Oxydianiline/m-Phenylenediamine Polymer		
1-Methoxy-2-Propanol	107-98-2	10-30
*Xylene	1330-20-7	5-10
*Ethyl Benzene	100-41-4	1-5

* 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

This product is a physical mixture. The health effects information about this product is based on the individual ingredients:

OVERVIEW

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(HAZARDS IDENTIFICATION - Continued)

The most likely routes 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 (see section titled GLOVES) and washing affected areas immediately if contact occurs. Volatile solvents will start evaporating during room temperature use of the product, such as thinning, pouring from jar to dispensing machine, and spin coating. Mist and solvent vapors will evolve if spray application is used.

During wafer drying, 125 - 150 C, and final curing, 350 - 450 C, the remaining solvent(s) will evaporate. Potential overexposure to other chemicals used in the operation such as wafer etchants and cleaners should also be considered. Well designed area and personal air sampling and analysis can show if exposures are within established limits. Properly designed local ventilation and process enclosure are effective ways to limit employee exposure where needed. In addition to meeting exposure limits, it is always prudent to use all practical means to minimize employee exposure to chemicals. A significant difference in overall exposure can be made with practical measures such as:

- *Inhalation - minimizing by keeping jars of product covered
- *Eye - avoiding contact by wearing chemical splash goggles where there is splash potential
- *Ingestion - avoiding by washing hands before eating, drinking or smoking, and restricting these activities to outside the work area.

>>>n-Methylpyrrolidone

INHALATION may cause irritation of the nose and throat with sneezing, sore throat or runny nose; or non-specific effects such as headache, nausea and weakness. SKIN CONTACT may cause skin irritation with itching, burning, redness, swelling or rash. Human experience or case reports have identified the following POTENTIAL EFFECTS FROM OVEREXPOSURE: Prolonged contact may cause severe skin irritation with burning, redness, swelling, pain, blisters, cracking, or rash. There are inconclusive or unverified reports of human sensitization. Skin permeation may occur in amounts capable of producing the effects of systemic toxicity. EYE CONTACT may cause eye irritation with tearing, pain or blurred vision. Low vapor concentrations did cause eye irritation in some individuals.

>>>Partial Ester 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.

>>>1-Methoxy-2-Propanol

****Toxic effects described in animals include: BY SKIN OR

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(HAZARDS IDENTIFICATION - Continued)

EYE CONTACT: Slight skin irritation; Eye irritation; Central nervous system effects; BY INHALATION: Central nervous system effects; Liver effects; Lung effects. Toxic effects of repeated or prolonged animal exposures include: BY SKIN OR EYE CONTACT: Kidney effects; Death; BY INHALATION: Central nervous system effects; Lower weight gain; Liver effects; Kidney effects; BY INGESTION: Weight loss; Central nervous system effects; Kidney effects; Liver effects; ****Additional animal tests have shown: Developmental toxicity at dosage levels showing maternal toxicity; No reproductive toxicity. ****Human health effects of overexposure may include: BY SKIN OR EYE CONTACT: Skin irritation with discomfort or rash; Eye irritation with discomfort, tearing, or blurring of vision; BY INHALATION: Irritation of the upper respiratory passages with coughing and discomfort; BY INGESTION: Temporary nervous system depression with anaesthetic effects, e.g., dizziness, headache, confusion, incoordination, and loss of consciousness. ***In addition: BY SKIN OR EYE CONTACT: Skin permeation can occur in amounts capable of producing effects of systemic toxicity.

>>>Xylene

****Short-term overexposure by inhalation may cause irritation of the nose and throat with sneezing, sore throat or runny nose; non-specific effects such as headache, nausea and weakness; and central nervous system depression with dizziness, confusion, incoordination, drowsiness or unconsciousness. Gross over-exposure may cause cardiovascular effects; impaired functioning of the blood-forming system with alterations in blood cell counts and/or anemia; pathological changes in the liver and kidneys; and fatality. Skin contact may cause irritation with itching, burning, redness, swelling or rash. Repeated and/or prolonged exposure may cause defatting of the skin with itching, redness or rash. Skin permeation may occur in amounts capable of producing the effects of systemic toxicity. A report in the literature indicates that repeated exposures to Xylene vapors have been associated with skin sensitization in humans. Eye contact may cause eye irritation with tearing, pain or blurred vision. Ingestion may cause irritation of the digestive tract with stomach pain, heartburn, nausea, vomiting or diarrhea; however there may be no symptoms at all. Other effects include non-specific effects such as headache, nausea and weakness; and central nervous system depression with dizziness, confusion, incoordination, drowsiness or unconsciousness. The major ingestion hazard is aspiration (liquid entering the lungs during ingestion or vomiting) which may result in "chemical pneumonia". Symptoms include coughing, gasping, choking, shortness of breath, bluish discoloration of the skin, rapid breathing and heart rate, and fever. Pulmonary edema or bleeding, drowsiness, confusion, coma and seizures may occur in more serious cases. Symptoms may develop

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(HAZARDS IDENTIFICATION - Continued)

immediately or as late as 24 hours after exposure, depending on how much chemical entered the lungs. Increased susceptibility to the effects may be observed in persons with pre-existing disease of the central nervous system, kidneys, liver, cardiovascular system, lungs, or bone marrow.

>>>Ethyl Benzene

Skin contact: May cause defatting of the skin resulting in skin irritation with discomfort or rash.

Eye contact: May cause eye irritation with discomfort, tearing, or blurring of vision.

Inhalation: May cause irritation of the upper respiratory passages, with coughing and discomfort; or nonspecific discomfort, such as nausea, headache, or weakness. Aspiration of the liquid may lead to chemical pneumonitis. may cause temporary nervous system depression with anaesthetic effects such as dizziness, headache, confusion, incoordination, and loss of consciousness; or abnormal liver or kidney function as detected by laboratory tests.

Ingestion: may cause gastrointestinal tract irritation. May cause temporary nervous system depression with anaesthetic effects such as dizziness, headache, confusion, incoordination, and loss of consciousness; or abnormal liver or kidney function as detected by laboratory tests.

Individuals with preexisting diseases of the central nervous system, lungs, liver, or kidneys may have increased susceptibility to the toxicity of excessive exposures.

Carcinogenicity Information

The following components are listed by IARC, NTP, OSHA or ACGIH as carcinogens.

Material	IARC	NTP	OSHA	ACGIH
Ethyl Benzene	2B			A3

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

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(FIRST AID MEASURES - Continued)

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.

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 : 137 F (58 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

Water Spray, Dry Chemical, Carbon Dioxide.

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.).

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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.

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.).

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.).

Storage

Store product in a refrigerated location (0-4F), away from sunlight or ultraviolet light to ensure product viscosity stability.

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 preferred; Respiratory protection will be needed if exposures can not be kept below applicable limits by other means.

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(EXPOSURE CONTROLS/PERSONAL PROTECTION - Continued)

Personal Protective Equipment

Respiratory Protection:

A NIOSH/MSHA approved full-face mask equipped with chemical cartridges approved for methylamine may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air purifying respirators is limited. Use a positive pressure air supplied respirator if there is any potential for an uncontrolled release, when exposure levels are not known, or in any other circumstances where air purifying respirators may not provide adequate protection; For most conditions, no respiratory protection should be needed; however, if handling at elevated temperatures without sufficient ventilation, use an approved air-purifying respirator. In dusty atmospheres, use an approved dust respirator; Selection of a suitable respirator will depend on the properties of the contaminant(s) and their actual or expected air concentration(s) versus applicable limits. Consult ANSI Standard Z88.2 for decision logic to select appropriate NIOSH/MSHA approved respirators; A NIOSH/MSHA/OSHA approved air purifying respiratory with a dust/mist cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed limits. Protection provided by air purifying respirators is limited. Use a positive pressure air supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known or any other circumstances where air purifying respirators may not provide adequate protection; Use a positive pressure air-supplied respirator if concentrations may exceed exposure limits. Air-purifying respirators are inadequate for this material; If respirators are needed to meet applicable limits, a respiratory protection program 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; An OSHA/NIOSH respirator for protection against Nuisance Dust is recommended.

Respirators with organic vapor cartridges provide adequate protection, within use limitations, for the following components in this product: Xylene;

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.

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(EXPOSURE CONTROLS/PERSONAL PROTECTION - Continued)

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 * (DuPont) : 5 ppm, 8 & 12 Hr. TWA, Skin
 WEEL (AIHA) : 10 ppm, 8 Hr. TWA, Skin

1-Methoxy-2-Propanol

PEL (OSHA) : None Established
 TLV (ACGIH) : 100 ppm, 369 mg/m³, 8 Hr. TWA
 STEL 150 ppm, 553 mg/m³
 AEL * (DuPont) : None Established

Xylene

PEL (OSHA) : 100 ppm, 435 mg/m³, 8 Hr. TWA
 TLV (ACGIH) : 100 ppm, 8 Hr. TWA, A4
 STEL 150 ppm, A4
 AEL * (DuPont) : 100 ppm, 8 & 12 Hr. TWA
 150 ppm, 15 minute TWA

Ethyl Benzene

PEL (OSHA) : 100 ppm, 435 mg/m³, 8 Hr. TWA
 TLV (ACGIH) : 100 ppm, 8 Hr. TWA, A3
 STEL 125 ppm
 AEL * (DuPont) : 25 ppm, 8 & 12 Hr. TWA

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

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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

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

Decomposition

Decomposition products at high temperature may include: Carbon monoxide (CO); Nitrogen oxides; Carbon dioxide; water; Various hydrocarbons

Polymerization

Polymerization will not occur.

TOXICOLOGICAL INFORMATION

Animal Data

>>>1-Methoxy-2-Propanol

Inhalation 4 hour LC50: 15,000 ppm in rats
Skin absorption LD50: 14,000 mg/kg in rabbits
Oral LD50: 5,200 mg/kg in rats.

>>>n-Methylpyrrolidone

Inhalation 4 hour ALC: 1.7 mg/L in rats
Skin absorption LD50: > 8,000 mg/kg in rabbits
Oral LD50: 4,320 mg/kg

>>>Xylene

Oral LD50: 4,500 mg/kg in rats
Dermal ALD: 4,320 mg/kg (>5 mL/kg) in rabbits
Inhalation 4 hour LC50: 6,700 ppm in rats

>>>Ethyl Benzene

Oral LD50: 3,500 mg/kg in rats
Skin absorption LD50: ~ 15,000 mg/kg (17.8mL/kg) in rabbits

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(TOXICOLOGICAL INFORMATION - Continued)

Inhalation 4 hour LC50: 4,000 ppm in rats

DISPOSAL CONSIDERATIONS

Waste Disposal

Components of this product may be considered hazardous;
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.

TSCA 12(b) EXPORT NOTIFICATION: This product contains
chemicals subject to TSCA 12(b) Export Notification.

State Regulations (U.S.)

WARNING - SUBSTANCES KNOWN TO THE STATE OF CALIFORNIA TO CAUSE
CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM-
n-Methylpyrrolidone; toluene ; ethyl benzene;1,4-dioxane

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)
Address : Cheesequake Road
Parlin, NJ 08859
Telephone : 1-800-346-5656

Indicates updated section.

End of MSDS