

# Material Safety Data Sheet



PI-2545

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Revised 1-OCT-2009

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## 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	%
	25038-81-7	
Polyamic Acid of Pyromellitic Dianhydride/4,4-Oxydianiline (Polymer)		10-20
*n-Methylpyrrolidone	872-50-4	>60
Aromatic Hydrocarbon	64742-95-6	10-20
Aromatic Hydrocarbon includes:		
*1,2,4-Trimethylbenzene	95-63-6	5-10

\* 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 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

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## (HAZARDS IDENTIFICATION - Continued)

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 drying, 25 C - 120 C, bake out at 350 C - 400 C, and firing of tape substrate at 850 C, the remaining organics will evaporate and/or decompose.

Potential overexposure to other chemicals used in the operation 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 containers 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.

## PRINCIPAL HEALTH EFFECTS:

>>>Polyamic Acid of Pyromellitic Dianhydride/4,4-Oxydianiline (Polymer)  
\*\*\*\*Toxic effects described in animals include: BY SKIN OR EYE CONTACT: Slight skin irritation; No skin sensitization; BY INHALATION: Respiratory effects. Toxic effects of repeated or prolonged animal exposures include: BY INGESTION: Lower weight gain; \*\*\*\*Human health effects of overexposure may include: BY SKIN OR EYE CONTACT: Skin irritation with discomfort or rash; BY INHALATION: Irritation of the upper respiratory passages with coughing and discomfort. \*\*\*In addition: Significant skin permeation appears unlikely.

>>>Aromatic Hydrocarbon  
\*\*\*\*Toxic effects described in animals include: BY SKIN OR EYE CONTACT: Skin photosensitization; Moderate skin irritation; Slight eye irritation; BY INHALATION: Respiration rate changes; Tremors; Incoordination; Salivation; Hyperactivity; Nonspecific effects, e.g., weight loss and irritation. \*\*\*\*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

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## (HAZARDS IDENTIFICATION - Continued)

and discomfort; BY INGESTION: Nonspecific discomfort, e.g., nausea, headache or weakness; Temporary nervous system depression with anaesthetic effects, e.g., dizziness, headache, confusion, incoordination, and loss of consciousness. \*\*\*In addition: Skin contact may cause photosensitization in susceptible individuals.

## &gt;&gt;&gt;N-Methyl-2-Pyrrolidone

\*\*\*\*Toxic effects described in animals include: BY SKIN OR EYE CONTACT: Mild skin irritation; No skin sensitization; BY INHALATION: Respiratory effects. Toxic effects of repeated or prolonged animal exposures include: BY INHALATION: Respiratory effects; Bone marrow effects; Lymph system effects; Testicular effects; \*\*\*\*Additional animal tests have shown: No carcinogenic activity; No developmental toxicity; No genetic damage in bacterial or mammalian cell cultures; No reproductive toxicity. \*\*\*\*Human health effects of overexposure may include: By contact with liquid or vapor: Eye irritation with discomfort, tearing, or blurring of vision; BY SKIN OR EYE CONTACT: Eye irritation with discomfort, tearing, or blurring of vision; Skin irritation with itching, burning, redness, swelling or rash; BY INHALATION: Runny nose; Sore throat; Sneezing; Irritation of the nose and throat; Nonspecific discomfort, e.g., nausea, headache or weakness. \*\*\*\*Human effects of higher level acute, repeated or chronic overexposure may include: BY SKIN OR EYE CONTACT: Skin reddening; Skin irritation with discomfort or rash; Dermatitis; Swelling; Burning. \*\*\*In addition: BY SKIN OR EYE CONTACT: There are inconclusive or unverified reports of human sensitization.

## &gt;&gt;&gt;1,2,4-Trimethylbenzene

Human health effects of overexposure may include: BY SKIN CONTACT: Skin irritation with discomfort or rash; BY EYE CONTACT: Eye irritation with discomfort, tearing, or blurring of vision; BY INHALATION: Temporary nervous system depression with anaesthetic effects, e.g., dizziness, headache, confusion, incoordination, and loss of consciousness; Temporary lung irritation effects with cough, discomfort, difficulty breathing or shortness of breath; Asthma-like reactions with shortness of breath, wheezing, or cough, and possibly occurring on subsequent re-exposure to concentrations below established exposure limits. In addition: BY SKIN CONTACT: There are no reports on human sensitization.

## 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.

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FIRST AID MEASURES  
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## 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.

## 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.

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FIRE FIGHTING MEASURES  
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## Flammable Properties

Flash Point : 138 F (59 C)  
Method : Setaflash Closed Cup - SCC.

## FIRE &amp; 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.

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(FIRE FIGHTING MEASURES - Continued)

## 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  
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## 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.).

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HANDLING AND STORAGE  
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## Handling (Personnel)

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

## Material Safety Data Sheet

(HANDLING AND STORAGE - Continued)

## Storage

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

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EXPOSURE CONTROLS/PERSONAL PROTECTION  
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## Engineering Controls

Use only with adequate ventilation.

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.

## 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

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(EXPOSURE CONTROLS/PERSONAL PROTECTION - Continued)

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.

## 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

Polyamic Acid of Pyromellitic Dianhydride/4,4-Oxydianiline  
(Polymer)

PEL (OSHA)	: None Established
TLV (ACGIH)	: None Established
AEL * (DuPont)	: 10 mg/m <sup>3</sup> , 8 & 12 Hr. TWA, total dust 5 mg/m <sup>3</sup> , 8 & 12 Hr. TWA, respirable dust

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

Aromatic Hydrocarbon

## Material Safety Data Sheet

(Applicable Exposure Limits - Continued)

PEL (OSHA) : None Established  
TLV (ACGIH) : None Established  
AEL \* (DuPont) : 50 ppm, 8 Hr. TWA

## 1,2,4-Trimethylbenzene

PEL (OSHA) : 25 ppm, 125 mg/m<sup>3</sup>, 8 Hr. TWA  
TLV (ACGIH) : 25 ppm, 123 mg/m<sup>3</sup>, 8 Hr. TWA  
AEL \* (DuPont) : None Established

\* 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  
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## Physical Data

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

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STABILITY AND REACTIVITY  
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## 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.

## Material Safety Data Sheet

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TOXICOLOGICAL INFORMATION  
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## Animal Data

>>>Polyamic Acid of Pyromellitic  
Dianhydride/4,4-Oxydianiline (Polymer)  
Inhalation 4 hour LC50: 15,600 mg/m3 in rats.

>>>N-Methyl-2-Pyrrolidone  
Inhalation 4 hour ALC: 1.7 mg/L in rats (Moderately toxic)  
Skin absorption LD50: > 8,000 mg/kg in rabbits (Slightly  
toxic)  
Oral LD50: 4,320 mg/kg (Slightly toxic).

>>>Aromatic 100 (Petroleum Distillate)  
Inhalation 6 hour LC50: > 14.4 mg/L in rats  
Oral LD50: ~ 5000 mg/kg in rats.

>>>1,2,4-Trimethylbenzene  
Inhalation 4 hour LC50: 18,000 mg/m3 in rats  
Skin absorption LD50: No information found.  
Oral LD50: 5,000 mg.kg in rats (Soviet Data)

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DISPOSAL CONSIDERATIONS  
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## 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.).

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REGULATORY INFORMATION  
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## U.S. Federal Regulations

All Ingredients in This Product are TSCA Listed/Reported.

The following ingredients are subject to the reporting  
requirements of section 313 of Title III of the Superfund  
Amendment and Reauthorization Act of 1986 and 40 CFR part  
372:

INGREDIENT(S)	Weight %
n-Methylpyrrolidone	>60%
1,2,4-Trimethylbenzene	5-10%

Material Safety Data Sheet

(REGULATORY INFORMATION - Continued)

State Regulations (U.S.)

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

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OTHER INFORMATION  
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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