

MATERIAL SAFETY DATA

**** IDENTIFICATION ****

NAME: PI2613 SYNONYMS: POLYIMIDE COATING.

CHEM.FAMILY: Mixture. FORMULA: Proprietary.

MANUFACTURER: INFORMATION & EMERGENCY TELEPHONE NOS:

HD MicroSystems" INFORMATION: Product: (800) 441-7515

Cheesequake Road EMERGENCIES: Medical: (800) 441-3637

Parlin, NJ 08859 Transport (CHEMTREC): (800) 424-9300

All Ingredients in This Product are TSCA Listed/Reported.

**** PHYSICAL DATA ****

FORM: Viscous Liquid. ODOR: Aromatic.

APPEARANCE: Amber. SOLUBILITY IN WATER: Slight.

**** COMPONENTS ****

Material(s): CAS# V.P. mm Hg @ 20C Weight %

N-Methyl-2-Pyrrolidone. 872-50-4 < 1. > 60%

S-Biphenyldianhydride/p- 29319-22-0 5 - 10%

Phenylenediamine (Polymer).

PI2613/AH1

08/16/00

**** HAZARDOUS REACTIVITY ****

INSTABILITY:

The product is normally stable.

INCOMPATIBILITY:

Avoid contact with:

Reducing agents; Oxidizing agents; Bases; Acids; Oxygen; Strong

acids; Peroxides; Strong reducing agents; Strong oxidizing agents;

Strong alkalis.

DECOMPOSITION:

Decomposition products:

Carbon Dioxide (CO₂); Various hydrocarbons; Carbon Monoxide (CO);

Water; Nitrogen oxides.

POLYMERIZATION:

The product may polymerize endothermically if exposed to

temperatures over 90 F, ultraviolet light or free radical

initiators. This may increase viscosity.

**** FIRE & EXPLOSION DATA ****

FLASHPOINT: 194 F Calculated

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 or carbon dioxide.

SPECIAL FIREFIGHTING INFORMATION:

Toxic decomposition products may form under fire conditions.

(See Decomposition Section.);

Wear full protective clothing and a full facepiece, positive pressure, self-contained breathing apparatus (SCBA);

Decontaminate contaminated clothing and equipment with soap and water. Dispose of residues per federal, state, and local regulation. (See Waste Disposal Section.).

PI2613/AH1 Page 2

***** HEALTH HAZARD INFORMATION *****

OVERVIEW: The most likely routes of 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 al-

ways 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.

PRINCIPAL HEALTH EFFECTS:

>>>N-Methyl-2-Pyrrolidone

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

CONTACT: No skin sensitization; BY INHALATION: Respiration

rate changes; 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

PI2613/AH1 Page 3

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

that 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;

Burning; 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 caused some individuals to experience eye

irritation or chronic headache.

>>>s-Biphenyldianhydride/p-Phenylenediamine (Polymer)

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

EYE CONTACT: Skin irritation; Skin sensitization; Eye

irritation.

Individuals may have increased susceptibility to the hazards of

overexposure to ingredient(s) of this product if they have pre-

existing diseases of the:

Skin; Eyes.

ANIMAL DATA:

>>>N-Methyl-2-Pyrrolidone

Inhalation 4 hour ALC [Rats]: 1.7 mg/L

Oral LD50 [Rats]: 4,320 mg/kg

Skin absorption LD50 [Rabbits]: 8,000 mg/kg.

>>>s-Biphenyldianhydride/p-Phenylenediamine (Polymer)

No information found.

CARCINOGENICITY LISTING:

No ingredients of this product are designated by IARC, NTP, OSHA, ACGIH or Dupont as potential carcinogens.

EXPOSURE LIMITS:

Workplace exposures should be kept below the following limits:

. AIHA ACGIH OSHA

Name/Units 8hr 15min 8hr 15min 8hr 15min

PARTICULATES (N.O.S.), respirable

Units: mg/m³ 5

PARTICULATES (N.O.S.), total

Units: mg/m³ 10 15

N-METHYL-2-PYRROLIDONE

Units: ppm 10 (S)

Also, DuPont has established and observes the following limits:

Name/Units 12 hr 8hr 15min Ceiling

N-METHYL-2-PYRROLIDONE

Units: ppm 5 5 (S)

NOTES ON EXPOSURE LIMITS:

PELs - OSHA Permissible Exposure Limits - 29 CFR 1910.1000,

Subpart Z, or specific substance standards;

TLVs - ACGIH Threshold Limit Values - published by American

Conference of Governmental Industrial Hygienists, 6500 Glenway

Avenue, Cincinnati, OH 45211;

WEELs- AIHA Workplace Environmental Exposure Limits - published by

the American Industrial Hygiene Association, 2700 Prosperity

Avenue, Suite 250, Fairfax, VA 22031;

AELs - Dupont Acceptable Exposure Limit. Where governmentally

imposed occupational exposure limits are lower than AEL in effect,

government limits shall take precedence;

(C) = "ceiling", limit not to be exceeded for any time period;

(S) = "skin", skin absorption may contribute significantly to the

ingredient's internal toxicity.

PI2613/AH1 Page 5

***** FIRST AID INSTRUCTIONS *****

Skin Contact: For skin contact, immediately wash skin with soap

and water. Wash contaminated clothing before reuse.

Eye Contact: For eye contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

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

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

***** PROTECTION INFORMATION *****

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.

Respiratory Protection:

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..

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;

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

PI2613/AH1 Page 6

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 breathe dust. Avoid contact with eyes, skin, or clothing. Wash thoroughly after handling.

***** DISPOSAL INFORMATION *****

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.).

Waste Disposal:

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

***** PRODUCT INFORMATION *****

Contaminated Items:

Empty product containers, contaminated clothing and

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

PI2613/AH1 Page 7

***** ADDITIONAL INFORMATION *****

SPECIAL NOTES:

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-Methyl-2-Pyrrolidone > 60%

CALIFORNIA PROPOSITION 65: WARNING: This product does not contain chemical known to the state of California to cause cancer, birth defects, or other reproductive harm.

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

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

Canadian WHMIS Classification:

Class B, Div 3; D2B.

Date of latest MSDS revision: 08/16/00

Person Responsible for MSDS:

Safety Coordinator - MSDS

DuPont P&EM / MCM

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PI2613/AH1 End of Material Safety Data Sheet Page 8