HD MicroSystems™
An Enterprise of Hitachi Chemical and DuPont Electronics

MATERIAL SAFETY DATA SHEET

***** IDENTIFICATION *****

NAME: RI9180 SYNONYMS: POLYIMIDED DEVELOPER.
CHEM.FAMILY: Pyralin® Polyimide Coating. FORMULA: Proprietary.

MANUFACTURER:
HD MicroSystems™
Cheesequake Road
Parlin, NJ 08859

INFORMATION & EMERGENCY TELEPHONE NOS:
INFORMATION: Product: (800) 441-7515
EMERGENCIES: Medical: (800) 441-3637
Transport (CHEMTREC): (800) 424-9300

All Ingredients in This Product Are TSCA Listed/Reported.

***** PHYSICAL DATA *****

FORM: Liquid. ODOR: Sweet Aromatic.

APPEARANCE: Colorless. SOLUBILITY IN WATER: Moderate.

***** COMPONENTS *****

Material(s):	CAS#	V.P. mm Hg @ 20C	Weight %
Cyclohexanone.	108-94-1	2.	10 - 30%
Butyl Acetate.	123-86-4	1.	> 60%

***** HAZARDOUS REACTIVITY *****

INSTABILITY:

The product is normally stable.

INCOMPATIBILITY:

Avoid contact with:

Nitric acid; Strong bases; Strong oxidizers; Chromium trioxide; Strong reducing agents; Sodium hydroxide; Perchloric acid.

DECOMPOSITION:

Decomposition products:

Carbon monoxide, carbon dioxide, water.

POLYMERIZATION:

The product does not normally polymerize significantly.

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

FLASHPOINT: 77F Calculated

FIRE & EXPLOSION HAZARDS:

KEEP AWAY FROM SPARKS AND OPEN FLAMES. Do not smoke in area with open product;
The solvent vapors are heavier than air and may travel along the floor to a source of ignition and flashback;
Use the product in areas and equipment with appropriate National Electric Code (NEC) classification. Consider the need for spark proof tools;
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;
Containers may need bonding to a common ground to prevent static sparks during dispensing.

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.).

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

PRINCIPAL HEALTH EFFECTS:

>>>Cyclohexanone
****Additional animal tests have shown: No genetic damage in animals; No heritable genetic damage in animals; Genetic damage in bacterial or mammalian cell cultures; Tests in some animal demonstrate weak carcinogenic response; Reduced fertility has been observed in animal tests; Developmental effects only at levels producing other toxic effects in adult animal. ****Human health effects of overexposure may include: By contact with liquid or vapor: Eye irritation with discomfort, tearing, or blurring of vision; Defatting (drying) of the skin; BY SKIN CONTACT: Defatting (drying) of the skin; Skin irritation with itching, burning, redness, swelling or rash; Infrequently associated with skin sensitization in humans; BY EYE CONTACT: Eye irritation with discomfort, tearing, or blurring of vision; BY INHALATION: Irritation of the upper respiratory passages with coughing and discomfort. ****Human effects of higher level acute, repeated or chronic overexposure may include: By contact with liquid or vapor: Skin irritation with discomfort or rash; BY CONTACT, INHALATION, OR INGESTION: Temporary central nervous system depression with anaesthetic effects: dizziness, headache, confusion, incoordination, and loss of consciousness.

>>>Butyl Acetate
Toxic effects of repeated or prolonged animal exposures include: BY INHALATION: Degenerative changes in liver; Altered liver enzymes; ****Additional animal tests have shown: No genetic damage in animals, bacterial or mammalian cell cultures; No animal data available to define carcinogenicity; Developmental effects only at levels producing other toxic effects in adult animal; No animal data available to define reproductive toxicity. ****Human health effects of overexposure may include: BY SKIN CONTACT: Skin irritation with discomfort or rash; Allergic skin rashes; Infrequently associated with skin sensitization in humans; Significant skin permeation appears unlikely; BY EYE CONTACT: Eye irritation with discomfort, tearing, or blurring of vision; BY INHALATION: Coughing; Nonspecific discomfort, e.g., nausea, headache or weakness; Irritation of the upper respiratory passages. ****Human effects of higher level acute, repeated or chronic overexposure may include: Temporary central nervous system depression with anaesthetic effects: dizziness, headache, confusion, incoordination, and

loss of consciousness; Abnormal liver function as detected by laboratory tests.

Individuals may have increased susceptibility to the hazards of overexposure to ingredient(s) of this product if they have pre-existing diseases of the:
Central nervous system; Lungs.

ANIMAL DATA:

>>>Cyclohexanone
Inhalation 4 hour ALC: 2,000 ppm in rats
Skin absorption LD50: 948 mg/kg in rabbits
Oral LD50: 1,535 mg/kg in rats.

>>>Butyl Acetate
Inhalation 4 hour LC50: 9,200 ppm in rats
Skin absorption ALD: 17,652 mg/kg in rabbits
Oral LD50: 14,130 mg/kg in rats.

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
BUTYL ACETATE							
Units: ppm			150	200		150	
CYCLOHEXANONE							
Units: ppm			25		(S)	50	

Also, DuPont has established and observes the following limits:

Name/Units	12 hr	8hr	15min	Ceiling
CYCLOHEXANONE				
Units: ppm	25	25	50	

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.

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

Skin Contact: For skin 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: 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.

NOTES TO PHYSICIAN: Activated charcoal slurry may be administered. To prepare activated charcoal slurry, suspend 50 grams activated charcoal in 400ml water and mix thoroughly. Administer 5ml/kg, or 350ml for an average adult.

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

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:
Butyl acetate;
Cyclohexanone;

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.

***** 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.).

Storage:
Store product in a refrigerated location (0-4F), away from sunlight or ultraviolet light to ensure product viscosity stability;
Do not store the product in areas where vapors may contact sources of heat, sparks or open flame.

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

No ingredients of this product 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.

DENSITY = g/L VOC = g/L wt %

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: 05/29/98

Person Responsible for MSDS:

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