



Arch
Chemicals,
Inc.

MATERIAL SAFETY DATA SHEET - RESEARCH SAMPLE

EMERGENCY PHONE NUMBER: (423) 336-4970

This Material Safety Data Sheet (MSDS) is sent to you for research and development purposes only. The information provided on this MSDS is the best estimate of technically qualified individuals but may not be based on direct toxicology testing or experience in emergency situations. It must be used by or under the direct supervision of technically qualified individuals

SECTION I - PRODUCT IDENTIFICATION

REVISION NO: 02
REVISION DATE: January 13, 2000
FILE NUMBER: HRI 1303.03
PRODUCT CODE: Research sample
PRODUCT NAME: DURIMIDE™ 7320ES
SYNONYMS: PROBIMIDE(R) RD 99-41
CHEMICAL FAMILY: Photosensitive polyimide precursor solution
FORMULA: Not Applicable/Mixture
USE DESCRIPTION: Microelectronic device manufacture

SECTION II - COMPOSITION

CAS or CHEMICAL NAME: N-Methyl-2-pyrrolidone
CAS NUMBER: 872-50-4
PERCENTAGE RANGE: 52-72%
EXPOSURE STANDARDS: 10 ppm (8 hr. TWA) - Manufacturer recommended internal exposure standard

DESCRIPTIVE NAME: Polyamic acid ester
CAS NUMBER: None Established
PERCENTAGE RANGE: 25-45%

DESCRIPTIVE NAME: Acrylate monomer
CAS NUMBER: Proprietary
PERCENTAGE RANGE: 3-6%

CAS or CHEMICAL NAME: Organosilane
CAS NUMBER: Proprietary
PERCENTAGE Range 0.3-3%

DESCRIPTIVE NAME: Organo-titanium complex
CAS NUMBER: Proprietary
PERCENTAGE RANGE: 1-2%

SECTION III - HAZARD IDENTIFICATION

R AND S PHRASES AND SYMBOLS

R Phrases: R22-36/38 – Harmful if swallowed; Irritating to the eyes and skin

S Phrases: S41 – In case of fire and/or explosion do not breath fumes

Symbols: Xn (Harmful) Xi (Irritant)

OTHER: May be a mild respiratory irritant; central nervous system depressant

SECTION IV – FIRST AID

EYES: Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Call a physician at once.

SKIN: Immediately flush with water for at least 15 minutes. Call a physician. If clothing comes in contact with the product, the clothing should be removed immediately and should be laundered before re-use.

INHALATION: If person experiences nausea, headache or dizziness, person should stop work immediately and move to fresh air until these symptoms disappear. If breathing is difficult, administer oxygen, keep the person warm and at rest. Call a physician. In the event that an individual inhales enough vapor to lose consciousness, person should be moved to fresh air at once and a physician should be called immediately. If breathing has stopped, artificial respiration should be given immediately. In all cases, ensure adequate ventilation and provide respiratory protection before the person returns to work.

INGESTION: Immediately drink large quantities of water. DO NOT induce vomiting. Call a physician at once. DO NOT give anything by mouth if the person is unconscious or if having convulsions.

SECTION V – FIRE FIGHTING MEASURES

FLAMMABILITY DATA:

FLASH POINT: 81 Deg.C (178 Deg.F)

FLAMMABLE LIMITS AT NORMAL ATMOSPHERIC TEMPERATURE AND PRESSURE
(PERCENT VOLUME IN AIR): UEL - No Data LEL - No Data

EXTINGUISHING MEDIA:

Carbon dioxide
Dry chemical
Water spray

FIRE FIGHTING TECHNIQUES AND COMMENTS:

Use water to cool containers exposed to fire.

USE NIOSH/MSHA APPROVED POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS WHEN THIS MATERIAL IS INVOLVED IN A FIRE.

SECTION VI – ACCIDENTAL RELEASE MEASURES

SPILL MITIGATION PROCEDURES:

Evacuate all non-essential personnel. Hazardous concentrations in air may be found in local spill area. Remove all sources of ignition. Stop source of spill as soon as possible and notify appropriate personnel.

AIR RELEASE: Vapors may be suppressed by the use of water fog. Contain all liquid for treatment and/or disposal as a (potential) hazardous waste.

WATER RELEASE: This material is slightly soluble in water. Notify all downstream users of possible contamination. Divert water flow around spill if possible and safe to do so.

LAND SPILL: Create a dike or trench to contain materials. Spill materials may be absorbed using any non-flammable absorbent such as clay, sand, etc. Do not place spill materials back in their original containers. Containerize and label all spill materials properly. Decontaminate all clothing and the spill area using detergent and flush with large amounts of water.

SECTION VII – HANDLING AND STORAGE

DO NOT TAKE INTERNALLY. AVOID CONTACT WITH SKIN, EYES AND CLOTHING. UPON CONTACT WITH SKIN OR EYES, WASH OFF WITH WATER. AVOID BREATHING VAPOR OR MIST.

STORE AT -20 TO -15 DEG.C IN A DRY SPACE, AWAY FROM ALL SOURCES OF IGNITION.

OTHER: Store under yellow or safelight conditions.

Keep away from foodstuffs.

SECTION VIII – EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTION FOR ROUTINE USE OF PRODUCT:

RESPIRATORY PROTECTION:

Wear a NIOSH approved air purifying respirator with organic vapor cartridges and a dust/mist prefilter if any exposures above the recommended exposure limits are possible. Air purifying respirators should not be used in oxygen deficient or IDLH atmospheres.

VENTILATION:

Use local exhaust ventilation to maintain levels to below the recommended exposure limits.

SKIN AND EYE PROTECTIVE EQUIPMENT:

Use chemical goggles and impermeable gloves.

SECTION IX – PHYSICAL DATA

APPEARANCE: Viscous liquid

FREEZING POINT: No Data

BOILING POINT: 203 Deg.C

DECOMPOSITION TEMPERATURE: No Data

SPECIFIC GRAVITY: 1.16 @ 25/4 Deg.C

pH @ 25 DEG.C: Not Applicable (non-aqueous)

VAPOR PRESSURE @ 25 DEG.C: No Data

SOLUBILITY IN WATER: 50%

VOLATILES, PERCENT BY VOLUME: Approximately 45%

EVAPORATION RATE: No Data

VAPOR DENSITY: No Data

MOLECULAR WEIGHT: Not Applicable/Mixture

ODOR: Characteristic

SECTION X – STABILITY AND REACTIVITY

CONDITIONS UNDER WHICH THIS PRODUCT MAY BE UNSTABLE:

TEMPERATURES ABOVE: No Data

MECHANICAL SHOCK OR IMPACT: Not Expected

ELECTRICAL (STATIC) DISCHARGE: No Data

HAZARDOUS POLYMERIZATION: Not Expected

INCOMPATIBLE MATERIALS: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon dioxide, carbon monoxide, oxides of nitrogen

OTHER CONDITIONS TO AVOID: Ignition sources of any kind

SECTION XI – TOXICOLOGICAL INFORMATION

ROUTES OF ABSORPTION

Eye contact, oral ingestion, inhalation, dermal contact

WARNING STATEMENTS AND WARNING PROPERTIES

MAY BE HARMFUL IF SWALLOWED. CAN CAUSE EYE AND SKIN IRRITATION. MAY CAUSE RESPIRATORY IRRITATION. PROLONGED OR REPEATED CONTACT MAY DRY THE SKIN AND CAUSE DERMATITIS. INHALATION OF HIGH CONCENTRATIONS MAY CAUSE DIZZINESS OR DROWSINESS. DO NOT TAKE INTERNALLY.

HUMAN THRESHOLD RESPONSE DATA

ODOR THRESHOLD: No Data

IRRITATION THRESHOLD: No Data

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH: The IDLH concentration has not been established for this product.

SIGNS, SYMPTOMS, AND EFFECTS OF EXPOSURE:

INHALATION

ACUTE:

If inhaled, may cause irritation to the upper respiratory tract. Any irritation would be transient with no permanent damage expected. Inhalation of high concentrations may produce CNS depression, characterized by: headache, giddiness, mental confusion and nausea.

CHRONIC:

There are no known or reported effects from chronic exposure except for effects similar to those experienced from single exposure.

SKIN

ACUTE:

Skin contact would be expected to produce irritation consisting of transient redness. This irritant effect would not result in permanent damage.

CHRONIC:

Prolonged or repeated skin contact causes severe dermatitis and defatting of the skin.

EYE

Contact with the eyes would be expected to cause moderate to severe irritation consisting of reversible redness, swelling, and mucous discharge to the conjunctiva. Contact with the eyes may cause corneal clouding which will clear and not be expected to result in permanent eye damage.

INGESTION

ACUTE:

Ingestion may cause irritation and gastrointestinal discomfort with any or all of the following symptoms: nausea, vomiting, lethargy, or diarrhea. Other effects may include headache, dizziness, unconsciousness, and CNS depression.

CHRONIC:

There are no known or reported effects from chronic exposure except for effects similar to those experienced from single exposure.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

Skin diseases, asthma and other respiratory diseases.

INTERACTIONS WITH OTHER CHEMICALS WHICH ENHANCE TOXICITY:

None known or reported

ANIMAL TOXICOLOGY

ACUTE TOXICITY:

Inhalation LC 50: No Data

Dermal LD 50: Believed to be > 2 g/kg. (rabbit), based on constituents

Oral LD 50: Believed to be 1-2 g/kg.(rat), based on constituents

Irritation: Skin irritant; eye and mucous membrane irritant; may be a respiratory irritant

ACUTE TARGET ORGAN TOXICITY:

Causes skin, eye, mucous membrane and respiratory tract irritation.

Inhalation of high concentrations of vapors may cause CNS depression.

CHRONIC TARGET ORGAN TOXICITY:

This product would be expected to cause severe dermatitis upon prolonged or repeated skin contact.

REPRODUCTIVE AND DEVELOPMENTAL TOXICITY:

There are no known or reported effects on reproductive function or fetal development from exposure to this product.

Teratogenicity studies were performed in rats given N-methylpyrrolidone by dermal application. There was no evidence of teratogenic effects nor effects on the dams at 75 and 237 mg/kg. of body weight. At higher dose levels (close to the LD50), dermal exposure produced embryolethality. This can be attributed to maternal toxicity seen at this dose level.

Pregnant rats were exposed via inhalation to N-methylpyrrolidone at atmospheric concentrations of 0.1 and 0.36 mg/l for 6 hrs./day on days 6 through 15 of gestation. Exposure did not effect the outcome or pregnancy, fetal development or embryonic growth rate.

Teratogenicity studies were performed in rats and mice given N-methylpyrrolidone by oral and intraperitoneal routes of exposure. In these studies, evidence of embryotoxicity was observed at very high dose levels close to the LD50. The no-observable effect level (NOEL) for embryolethality was

determined as 1054 mg/kg. in the mouse (oral) and 332 mg/kg. in the rat (oral). No maternal toxicity was noted in the oral studies. Oral and intraperitoneal administration are two unlikely routes of exposure during the industrial use of N-methylpyrrolidone.

CARCINOGENICITY:

This product is not known or reported to be carcinogenic by any reference source including IARC, OSHA, NTP, or EPA.

Rats were exposed to vapor of N-methylpyrrolidone at concentrations of 0, 0.04, or 0.4 mg/liter for 6 hrs./day, 5 days/week for 2 years. No carcinogenic effects were observed in rats exposed for 2 years to 0.04 or 0.4 mg/liter of N-methylpyrrolidone.

MUTAGENICITY:

This product is not known or reported to be mutagenic.

N-methylpyrrolidone was determined to be non-mutagenic in the salmonella/microsome mutagenesis assay (Ames assay). It was also determined to be non-mutagenic in the mouse lymphoma assay and in the dominant lethal and chromosomal aberration studies.

This product contains 5-6% of an acrylate monomer which has been shown to cause a positive mutagenic response in the L5178Y mouse lymphoma assay. It has also been shown to increase chromosomal aberrations and micronuclei. As a class, the acrylate/methacrylate esters are genotoxic agents in in vitro assays without metabolic activation only. The significance of this genotoxic activity to the in vivo situation and human exposure is unknown.

SECTION XII – ECOLOGICAL INFORMATION

AQUATIC TOXICITY:

No known or reported for this product. Individual constituents are as follows:

N-methylpyrrolidone -

Bluegills (*Lepomis macrochirus*) LC 50: 832 mg/l, 22 Degrees Celsius

Fathead Minnow (*Pimephales promelas*) LC 50: 1072 mg/l, 22 Degrees Celsius

Trout (*Salmo Gairdnerii*) LD 50: 3048 mg/l, 12 Degrees Celsius

SECTION XIII – DISPOSAL CONSIDERATIONS

CARE MUST BE TAKEN TO PREVENT ENVIRONMENTAL CONTAMINATION FROM THE USE OF THIS MATERIAL. THE USER OF THIS MATERIAL HAS THE RESPONSIBILITY TO DISPOSE OF UNUSED MATERIAL, RESIDUES AND CONTAINERS IN COMPLIANCE WITH ALL RELEVANT LOCAL, STATE AND FEDERAL LAWS AND REGULATIONS REGARDING TREATMENT, STORAGE AND DISPOSAL FOR HAZARDOUS AND NONHAZARDOUS WASTES.

SECTION XIV – TRANSPORTATION INFORMATION

U.S. DOT: NOT REGULATED

IMDG: NOT REGULATED

IATA/ICAO: NOT REGULATED

RID/ADR: NOT REGULATED

SECTION XV – REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT

This product may contain substances not listed on the US EPA Toxic Substances Control Act Inventory of Chemical Substances.

R AND S PHRASES AND SYMBOLS

R Phrases: R22-36/38 S Phrases: S41
Symbols: Xn (Harmful) Xi (Irritant)

SECTION XVI – ADDITIONAL INFORMATION

Reference are available upon request.

THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET SHOULD BE PROVIDED TO ALL WHO WILL USE, HANDLE, STORE, TRANSPORT, OR OTHERWISE BE EXPOSED TO THIS PRODUCT. THIS INFORMATION HAS BEEN PREPARED FOR THE GUIDANCE OF PLANT ENGINEERING, OPERATIONS AND MANAGEMENT AND FOR PERSONS WORKING WITH OR HANDLING THIS PRODUCT. ARCH CHEMICALS BELIEVES THIS INFORMATION TO BE RELIABLE AND UP TO DATE AS OF THE DATE OF PUBLICATION, BUT MAKES NO WARRANTY THAT IT IS. ADDITIONALLY, IF THIS MATERIAL SAFETY DATA SHEET IS MORE THAN THREE YEARS OLD, YOU SHOULD CONTACT ARCH CHEMICALS AT THE PHONE NUMBER LISTED BELOW TO MAKE CERTAIN THAT THIS SHEET IS CURRENT.

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