

1. Product and Company Identification

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| Material name | HTR-D2 |
| Issue date | 07-11-2011 |
| Revision date | - |
| Supersedes date | - |
| CAS # | 120-92-3 |
| Product use | Polyimide ancillary. |
| Synonym(s) | None. |
| Spec ID | 10000002178 |
| Manufacturer | FUJIFILM Electronic Materials U.S.A., Inc. 80 Circuit Road North Kingstown RI 02852 Transportation Emergency: FOR ALL TRANSPORTATION ACCIDENTS, CALL CHEMTREC: 1-800-424-9300 Medical Emergency (24HR): FOR ANY HEALTH & MEDICAL EMERGENCY, 24 HOURS /7 DAYS CALL: 1-800-365-8951 Non-emergency Telephone: FOR ALL MSDS REQUESTS & QUESTIONS, CALL CUSTOMER SERVICE: 1-800-553-6546 |
| MSDS file | 11469_NA_EN_V2.0 |
| Replaces file | 11469_NA_EN_V1.0 |

2. Hazards Identification

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| Physical state | Liquid. |
| Emergency overview | WARNING! Causes skin and eye irritation. May be harmful if swallowed. Flammable liquid. |
| Potential health effects | |
| Routes of exposure | Eye contact. Skin contact. Inhalation. Ingestion. |
| Eyes | Causes eye irritation. |
| Skin | Causes skin irritation. |
| Inhalation | High concentrations: May cause respiratory tract irritation. |
| Ingestion | Swallowing or vomiting of the liquid may result in aspiration into the lungs. Droplets of the product aspirated into the lungs through ingestion or vomiting may cause a serious chemical pneumonia. |
| Target organs | Eyes. Skin. Central nervous system. |
| Chronic effects | Organic solvents may be absorbed into the body by inhalation and cause permanent damage to the nervous system, including the brain. |
| Signs and symptoms | Eye contact: May cause redness and pain. Skin contact: Defats the skin. Ingestion: Be aware that symptoms of chemical pneumonia (shortness of breath) may occur several hours after exposure. |
| Potential environmental effects | The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment. |

3. Composition / Information on Ingredients

| Components | CAS # | Percent |
|----------------|----------|----------|
| Cyclopentanone | 120-92-3 | 99.5-100 |

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First Aid Measures

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| First aid procedures | |
| Eye contact | Immediately flush with plenty of water for up to 15 minutes. Remove any contact lenses and open eyes wide apart. Get medical attention promptly if symptoms occur after washing. |

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| Skin contact | Remove contaminated clothes and rinse skin thoroughly with water for at least 15 minutes. Get medical attention promptly if symptoms persist or occur after washing. |
| Inhalation | Move injured person into fresh air and keep person calm under observation. Get medical attention if any discomfort continues. |
| Ingestion | Rinse mouth thoroughly with water and give large amounts of milk or water, if person is conscious. Only induce vomiting at the instruction of medical personnel. Get medical attention immediately. |
| Notes to physician | Treat symptomatically. Be aware that symptoms of chemical pneumonia (shortness of breath) may occur several hours after exposure. |
| General advice | Thermal burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. |

5. Fire Fighting Measures

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| Flammable properties | The product is flammable, and heating may generate vapors which may form explosive vapor/air mixtures. |
| Extinguishing media | |
| Suitable extinguishing media | Extinguish with foam, carbon dioxide, dry powder or water fog. |
| Unsuitable extinguishing media | None. |
| Protection of firefighters | |
| Specific hazards arising from the chemical | During fire, gases hazardous to health may be formed. |
| Fire fighting equipment/instructions | Selection of respiratory protection for fire fighting: follow the general fire precautions indicated in the workplace. Self-contained breathing apparatus and full protective clothing must be worn in case of fire. |
| Specific methods | Use standard firefighting procedures and consider the hazards of other involved materials. Cool containers exposed to heat with water spray and remove container, if no risk is involved. |
| Hazardous combustion products | Carbon monoxide and carbon dioxide. |

6. Accidental Release Measures

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| Personal precautions | Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Ventilate the area. Avoid inhalation of vapors/spray and contact with skin and eyes. Wear suitable protective clothing. See Section 8 of the MSDS for Personal Protective Equipment. |
| Environmental precautions | Avoid discharge into drains, water courses or onto the ground unless authorized by permit. |
| Methods for cleaning up | Remove sources of ignition. Absorb spillage with non-combustible, absorbent material. For waste disposal, see section 13 of the MSDS. |

7. Handling and Storage

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| Handling | Local exhaust is recommended. Avoid inhalation of vapors and spray mist and contact with skin and eyes. Wear approved safety goggles. Wear protective gloves and appropriate clothing to prevent skin contact. The product is flammable, and heating may generate vapors which may form explosive vapor/air mixtures. Do not smoke and do not spray near an open flame or other sources of ignition. Vapors are heavier than air and may travel along the floor and in the bottom of containers. Vapors may be ignited by a spark, a hot surface or an ember. Ground container and transfer equipment to eliminate static electric sparks. Observe good industrial hygiene practices. |
| Storage | Follow rules for flammable liquids. Do not store near heat sources or expose to high temperatures. Store in closed original container in a dry place. Store away from incompatible materials. |

8. Exposure Controls / Personal Protection

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| Occupational exposure limits | No exposure limits noted for ingredient(s). |
| Engineering controls | Use explosion-proof equipment. Provide adequate ventilation. Provide easy access to water supply and eye wash facilities. |
| Personal protective equipment | |
| Eye / face protection | Wear approved safety goggles. |
| Skin protection | Wear protective gloves. Be aware that the liquid may penetrate the gloves. Frequent change is advisable. Suitable gloves can be recommended by the glove supplier. Wear appropriate chemical resistant clothing to prevent any possibility of skin contact. |

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| Respiratory protection | If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA 29 CFR 1910.134. Use a NIOSH/MSHA approved air purifying respirator as needed to control exposure. Consult with respirator manufacturer to determine respirator selection, use, and limitations. Use positive pressure, air-supplied respirator for uncontrolled releases or when air purifying respirator limitations may be exceeded. Follow respirator protection program requirements (OSHA 1910.134 and ANSI Z88.2) for all respirator use. |
| General hygiene considerations | Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. |

9. Physical & Chemical Properties

Information on basic physical and chemical properties

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| Physical state | Liquid. |
| Form | Colorless liquid. |
| Color | Colorless. |
| Odor | Characteristic, ketone. |
| Odor threshold | Not available. |
| pH | Not applicable. |
| Melting point/freezing point | -59.8 °F (-51 °C) |
| Boiling point, initial boiling point, and boiling range | 267.8 °F (131 °C) |
| Flash point | 95 °F (35 °C) Closed Cup |
| Auto-ignition temperature | 849.2 °F (454 °C) |
| Flammability (solid, gas) | Not available. |
| Flammability limit - lower (%) | 1.4 |
| Flammability limit - upper (%) | 8.4 |
| Oxidizing properties | Not applicable. |
| Explosive properties | Not applicable. |
| Explosive limit | Not applicable. |
| Vapor pressure | 11.4 mmHg |
| Vapor density | 2.3 (Air=1) |
| Evaporation rate | No data available. |
| Relative density (= specific gravity) | 0.95 |
| Density | 0.95 g/cm ³ |
| Solubility (water) | Slightly soluble in water. |
| Decomposition temperature | No data available. |
| Viscosity | Not available. |
| Volatiles, % by vol | 100 |
| Other data | |
| Molecular formula | C5-H8-O |
| Molecular weight | 84.12 g/mol |
| Other information | No relevant additional information available. |

10. Chemical Stability & Reactivity Information

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| Chemical stability | Stable under normal temperature conditions. |
| Conditions to avoid | Heat, sparks, flames. |
| Incompatible materials | Strong oxidizing agents. Strong acids. |
| Hazardous decomposition products | At elevated temperatures: Carbon dioxide (CO ₂). Carbon monoxide. |
| Possibility of hazardous reactions | Will not occur. |

11. Toxicological Information

Toxicological data

Components

Test Results

Cyclopentanone (120-92-3)

Acute Dermal LD50 Rabbit: > 5000 mg/kg

Acute Inhalation LC50 Rat: 19500 mg/m³

Acute Oral LD50 Rat: 1180 mg/kg

Acute effects

May be harmful if swallowed.

Local effects

Causes skin and eye irritation. High concentrations: May cause respiratory tract irritation.

Sensitization

Not a skin sensitizer.

Chronic effects

Organic solvents may be absorbed into the body by inhalation and cause permanent damage to the nervous system, including the brain.

Carcinogenicity

No data available.

Mutagenicity

No data available.

Reproductive effects

No data available.

Symptoms and target organs

Eye contact: May cause redness and pain. Skin contact: Defats the skin. Ingestion: Be aware that symptoms of chemical pneumonia (shortness of breath) may occur several hours after exposure.

Further information

Vapors may irritate throat and respiratory system and cause coughing. In high concentrations, vapors are narcotic and may cause headache, fatigue, dizziness and nausea. Droplets of the product aspirated into the lungs through ingestion or vomiting may cause a serious chemical pneumonia.

12. Ecological Information

Ecotoxicity

The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Environmental effects

Not classified as an environmental hazard.

Persistence and degradability

No data available.

Bioaccumulation / Accumulation

Not bioaccumulative.

Mobility in environmental media

This organic solvent will evaporate easily from all surfaces. The product is slightly soluble in water.

13. Disposal Considerations

Waste codes

D001: Waste Flammable material with a flash point <140 °F

Disposal instructions

Disposal recommendations are based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

Waste from residues / unused products

Dispose of in accordance with local regulations.

Contaminated packaging

Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport Information

DOT

Basic shipping requirements:

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|-------------------------|------------------|
| UN number | UN2245 |
| Proper shipping name | Cyclopentanone |
| Hazard class | 3 |
| Packing group | III |
| Environmental hazards | |
| Marine pollutant | No |
| Labels required | 3 |
| Additional information: | |
| Special provisions | B1, IB3, T2, TP1 |
| Packaging exceptions | 150 |
| Packaging non bulk | 203 |
| Packaging bulk | 242 |
| ERG number | 127 |

IATA

Basic shipping requirements:

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|-------------------------|----------------|
| UN number | 2245 |
| Proper shipping name | Cyclopentanone |
| Hazard class | 3 |
| Packing group | III |
| Environmental hazards | |
| Marine pollutant | No |
| Additional information: | |
| ERG code | 3L |

IMDG

Basic shipping requirements:

| | |
|-----------------------|----------------|
| UN number | 2245 |
| Proper shipping name | Cyclopentanone |
| Hazard class | 3 |
| Packing group | III |
| Environmental hazards | |
| Marine pollutant | No |
| EmS No. | F-E, S-D |

TDG

Basic shipping requirements:

| | |
|----------------------|----------------|
| Proper shipping name | Cyclopentanone |
| Hazard class | 3 |
| UN number | UN2245 |
| Packing group | III |
| Marine pollutant | No |

General Read safety instructions, SDS and emergency procedures before handling.

15. Regulatory Information

US federal regulations This product is hazardous according to OSHA 29 CFR 1910.1200.
TSCA Section 4(a) Final Test Rules & Testing Consent Orders: Not regulated.
TSCA Section 5(e) PMN-Substance Consent Orders: Not regulated.

Drug Enforcement Administration (DEA). List 1(i), Precursor Chemicals (21 CFR 1310.02(a) and 1310.04(f)(1))

Not listed.

Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number

Not listed.

TSCA Section 5(a)(2) Final Significant New Use Rules (SNURs)(40CFR 721, Subpt. E)

Not regulated.

TSCA Section 12(b) Export Notification(40 CFR 707, Subpt. D)

Not regulated.

CERCLA (Superfund) reportable quantity (lbs) (40 CFR 302.4)

Cyclopentanone: 100

Superfund Amendments and Reauthorization Act of 1986 (SARA)

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| Hazard categories | Immediate Hazard - Yes Delayed Hazard - Yes Fire Hazard - Yes Pressure Hazard - No Reactivity Hazard - No |
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| Section 302 extremely hazardous substance (40 CRF 355, Appendix A) | No |
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| Section 311/312 (40 CFR 370) | Yes |
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| Drug Enforcement Administration (DEA) (21 CFR 1308.11-15) | Not controlled |
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Canadian regulations This product has been classified according to the hazard criteria of the Canadian Controlled Products Regulations, Section 33, and the MSDS contains all required information.

WHMIS status Controlled

WHMIS classification B2 - Flammable/Combustible
D2B - Other Toxic Effects-TOXIC

WHMIS labeling



Inventory status

| Country(s) or region | Inventory name | On inventory (yes/no)* |
|-----------------------------|---|------------------------|
| Australia | Australian Inventory of Chemical Substances (AICS) | Yes |
| Canada | Domestic Substances List (DSL) | Yes |
| Canada | Non-Domestic Substances List (NDSL) | No |
| New Zealand | New Zealand Inventory | Yes |
| Philippines | Philippine Inventory of Chemicals and Chemical Substances (PICCS) | Yes |
| United States & Puerto Rico | Toxic Substances Control Act (TSCA) Inventory | Yes |

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
All ingredients are TSCA compliant.

State regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - Massachusetts RTK - Substance: Listed substance

Cyclopentanone (CAS 120-92-3) Listed.

US - New Jersey RTK - Substances: Listed substance

Cyclopentanone (CAS 120-92-3) Listed.

US - Pennsylvania RTK - Hazardous Substances: Listed substance

Cyclopentanone (CAS 120-92-3) Listed.

Mexico regulations This product is dangerous according to Mexican regulations.

16. Other Information

Further information HMIS® is a registered trade and service mark of the NPCA.
G - Safety Glasses, Gloves, Vapor Respirator

HMIS® ratings Health: 2*
Flammability: 3
Physical hazard: 0
Personal protection: G

NFPA ratings Health: 2
Flammability: 3
Instability: 0

Disclaimer THIS MATERIAL SAFETY DATA SHEET (MSDS) HAS BEEN PREPARED IN COMPLIANCE WITH THE FEDERAL OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200 AND THE CANADIAN CONTROLLED PRODUCT REGULATION (SOR/88-66). THE INFORMATION IN THIS MSDS 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. FUJIFILM ELECTRONIC MATERIALS 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 MSDS IS MORE THAN THREE YEARS OLD, YOU SHOULD CONTACT FUJIFILM ELECTRONIC MATERIALS AT THE PHONE NUMBER 1-800-553-6546 (CUSTOMER SERVICE) TO MAKE CERTAIN THAT THIS DOCUMENT IS CURRENT.

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