KAPTON POLYIMIDE FILM, H TYPES, V TYPES AND VARIATIONS

Manufacturer MSDS Number: DU005413

SECTION 1 : CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MSDS Name: KAPTON POLYIMIDE FILM, H TYPES, V TYPES AND VARIATIONS
Manufacturer Name: E.I. DuPont de Nemours and Company
   Distributor Name: Uline
   Distributor Address:
      2200 S. Lakeside Drive
      Waukegan, IL 60085

   Distributor Telephone: 1-800-295-5510
For information in North America, call: 1-800-295-5510
Chemtrec: For emergencies in the US, call CHEMTREC: 800-424-9300

Manufacturer MSDS Revision Date: 6-JAN-1999
Trade Names:
   “KAPTON” H, HN, HA, HZT
   “KAPTON” V, VN
   “KAPTON” FPC, FPC-C, FPC-ZT
   “KAPTON” HPP, HPP-A, HPP-LT, HPP-ST
   “KAPTON” LT
   “KAPTON” MT, MTB
   “KAPTON” CB
   “KAPTON” PST, PST-C
   “KAPTON” XC, XC600
   “KAPTON” 5 x 4M
   “KAPTON” CR

Synonyms:
   “KAPTON” H, HN, HA, HZT
   “KAPTON” V, VN
   “KAPTON” FPC, FPC-C, FPC-ZT
   “KAPTON” HPP, HPP-A, HPP-LT, HPP-ST
   “KAPTON” LT
   “KAPTON” MT, MTB
   “KAPTON” CB
   “KAPTON” PST, PST-C
   “KAPTON” XC, XC600
   “KAPTON” 5 x 4M
   “KAPTON” CR

Kapton is a registered trademark of DuPont.
SECTION 2 : COMPOSITION, INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS#</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>INERT POLYMIDE FILM</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>LT, MT, Or CR contain : ALUMINA</td>
<td>1344-28-1</td>
<td>0 – 35%</td>
</tr>
<tr>
<td>CB, XC, XC600, FPC-C, MTB, FST-C contain : CARBON BLACK</td>
<td>1333-86-4</td>
<td>0 – 30%</td>
</tr>
<tr>
<td>DIMETHYL ACETAMIDE (residual in film)</td>
<td>127-19-5</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>POLYIMIDE POLYMER (as nuisance dust)</td>
<td>25038-81-7</td>
<td></td>
</tr>
</tbody>
</table>

Exposure limits for the above may apply.

All reportable ingredients are listed in the TSCA chemical Substance Inventory.

SECTION 3 : HAZARDS IDENTIFICATION

Applies to All Ingredients:

Potential Health Effects:
Before using "Kapton" Polyimide Films, read the bulletin on safe handling and use.

Eye Contact:
Not a probable route of exposure for film.

Skin Contact:
No irritation is expected from handling film. Less than 1 ppm dimethyl acetamide was extracted from film by distilled water at 40 deg C for 4 hours.

Inhalation:
Not a probable route of exposure for film. Exposure to alumina or carbon black encapsulated in the polymer is not likely.

For the polymer from which the film is made, DuPont recommends treating polymer dust as a nuisance particulate.

**Ingestion:**
Not a probable route of exposure for film.

**Carcinogenicity:**
The following components are listed by IARC, NTP, OSHA or ACGIH as carcinogens.

Material: CARBON BLACK
IARC: 2B

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**SECTION 4 : FIRST AID MEASURES**

**Eye Contact:**
Flush eyes with water. Consult a physician if irritation persists.

**Skin Contact:**
Wash with soap and water after handling. If skin irritation develops, consult a physician.

**Inhalation:**
Not a probable route of exposure for films.

**Ingestion:**
Not a probable route of exposure for films.

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**SECTION 5 : FIRE FIGHTING MEASURES**

**Fire:**
Not a fire or explosion hazard.

The flammability characteristic of polyimide film is reported as “self-extinguishing”.

"Kapton” chars but does not burn in air. “Kapton” will burn in an atmosphere of 100% oxygen. The major off-gases are carbon dioxide and carbon monoxide.

The processing of “Kapton” polyimide films can cause the generation of static charge. Precautions for static charges should also be taken when removing plastic films used as protective packaging for “Kapton”.

**Extinguishing Media:**
Water, Foam, Dry Chemical, CO2.

**Fire Fighting Instructions:**
None required.
SECTION 6 : ACCIDENTAL RELEASE MEASURES

Personal Precautions:
Safeguards (Personnel)
Review FIRE FIGHTING MEASURES AND HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Accidental Release Measures
Pick up to prevent slipping hazard.

SECTION 7 : HANDLING and STORAGE

Handling:
Wash thoroughly after handling.

Storage:
Store away from flammable materials.

SECTION 8 : EXPOSURE CONTROLS, PERSONAL PROTECTION

Engineering Controls:
Safe handling of "Kapton" polyimide films at high temperatures (above 200 deg C) requires adequate ventilation If small quantities of "Kapton" are involved, normal air circulation may be all that is needed in case of overheating. Whether or not existing ventilation is adequate at higher temperature will depend on the combined factors of film quantity, temperatures and exposure time.

Eye/Face Protection:
Safety glasses are recommended as good industrial practice.

Protective Clothing/Body Protection:
Special protective clothing is not needed for normal use. Gloves are recommended as good industrial practice.

Respiratory Protection:
Respirators are not needed for normal use.

Exposure Limits:
ALUMINA:
PEL (OSHA) : 15 mg/m³, total dust, 8 Hr. TWA
5 mg/m³, respirable dust, 8 Hr. TWA
TLV (ACGIH) : 10 mg/m³, total dust, 8 Hr, TWA, A4
AEL * (DuPont) : None Established.

CARBON BLACK
PEL (OSHA) : 3.5 mg/m³, 8 Hr. TWA.
TLV (ACGIH) : 3.5 mg/m³, 8 Hr. TWA, A4
AEL * (DuPont): 0.5 mg/m³, 8 & 12 Hr.TWA, (Polynuclear Aromatic Hydrocarbon
Content <0.1%)
Includes Channel, Lamp, and Thermal Black

DIMETHYL ACETAMIDE (residual in film):
PEL (OSHA) : 10 ppm, 35 mg/m³, 8 Hr. TWA, Skin
TLV (ACGIH) : 10 ppm, 36 mg/m³, 8 Hr. TWA, Skin
AEL * (DuPont) : 10 ppm, 8 & 12 Hr. TWA, Skin

POLYMIDE POLYMER (as nuisance dust):
PEL (OSHA) : None Established.
TLV (ACGIH) : None Established.
AEL * (DuPont) : 10 mg/m³, 8 Hr. TWA, total dust.
5 mg/m³, 8 Hr. TWA, respirable dust.

*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.

SECTION 9 : PHYSICAL AND CHEMICAL PROPERTIES

Color:
Light amber.

Odor:
No odor.

Physical State:
Transparent film.

Melting Point:
None.

Solubility:
In Water : Insoluble.

Specific Gravity:
>1.4

Percent Volatile:
1% max.
SECTION 10 : STABILITY AND REACTIVITY

Chemical Stability:
   Stable at normal temperatures and storage conditions.

Incompatibilities with Other Materials:
   None reasonably foreseeable.

Hazardous Decomposition Products:
   At temperatures above 400 deg C, the major off-gases are carbon monoxide and carbon dioxide.

SECTION 11 : TOXICOLOGICAL INFORMATION

SECTION 12 : ECOLOGICAL INFORMATION

Effect of Material On Aquatic Life:
   Aquatic Toxicity : Insoluble.

SECTION 13 : DISPOSAL CONSIDERATIONS

Waste Disposal:
   Landfill or incinerate in compliance with federal, state, and local regulations.

SECTION 14 : TRANSPORT INFORMATION

DOT Shipping Name:
   NOT APPLICABLE.

DOT Hazard Class: NOT REGULATED.

SECTION 15 : REGULATORY INFORMATION

Applies to all ingredients:
State:
No substances on the state hazardous substances list, for the states indicated below, are used in the manufacture of products on this Material Safety Data Sheet, with the exceptions indicated.

SUBSTANCES OF THE PENNSYLVANIA HAZARDOUS SUBSTANCES LIST PRESENT AT A CONCENTRATION OF 1% OF MORE (0.1% FOR SPECIAL HAZARDOUS SUBSTANCES)–Dimethyl acetamide (1% maximum); Some types contain carbon black (2 - 30%); some types contain alumina (35% maximum)

WARNING : SUBSTANCES KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM – None known.

SUBSTANCES ON THE NEW JERSEY WORKPLACE HAZARDOUS SUBSTANCE LIST PRESENT AT A CONCENTRATION OF 1% OR MORE (0.1% FOR SUBSTANCES IDENTIFIED AS CARCINOGENS, MUTAGENS OR TERATOGENS) – Dimethyl acetamide (1% maximum) ; Some types contain carbon black (2-30%) ; Some types contain alumina (35% maximum)

SECTION 16 : ADDITIONAL INFORMATION

Label Hazard Warning:
MEDICAL USE :
CAUTION : Do not use in medical applications involving permanent implantation in the human body. For other medical applications see DuPont : CAUTION Bulletin No. H-50102.

MSDS Revision Date: 6-JAN-1999

MSDS Author:

Disclaimer:
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.

Copyright:
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This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience are gained.