CORNELL UNIVERSITY
MATERIAL SAFETY DATA SHEET

Section 1 - Product and Company Information

Product Name CU07-C-M-4-R
Company CORNELL UNIVERSITY
Street Address 256 Duffield Hall, Cornell
City, State, Zip, Country Ithaca, NY, 14853
Technical Phone: 607-255-8439
Emergency Phone: 607-339-1451
Fax: 607-255-2365

Section 2 - Composition/Information on Ingredient

Substance Name
1. 1,2-PROPANEDIOL MONOMETHYL ETHER ACETATE; Formula C6H12O3 (94 %)
2. Hydroxyphenyl compound (6 %)
3. Triphenylsulfonium photoacid generator (5 % wrt to hydroxyphenyl)

Section 3 - Hazards Identification

EMERGENCY OVERVIEW
Combustible (USA) Flammable (EU). Irritant. May form explosive peroxides. Irritating to eyes.
Target organ(s): Liver. Kidneys
HMIS RATING
HEALTH: 2*
FLAMMABILITY: 2
REACTIVITY: 0
NFPA RATING
HEALTH: 2
FLAMMABILITY: 2
REACTIVITY: 0
*additional chronic hazards present.
For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE
If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of contact, immediately wash skin with soap and copious amounts of water.

EYE EXPOSURE
In case of contact, immediately flush eyes with copious amounts of water for at least 15 minutes.

Section 5 - Fire Fighting Measures
FLAMMABLE HAZARDS
Flammable Hazards: Yes
Peroxide Former: Yes

EXPLOSION HAZARDS
Vapor may travel considerable distance to source of ignition and flash back. Container explosion may occur under fire conditions. May form peroxides of unknown stability.

FLASH POINT
109.4 °F 43 °C Method: closed cup

EXPLOSION LIMITS
Lower: 1.3 % Upper: 13.1 %

AUTOIGNITION TEMP
354 °C

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Flammable liquid. Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area. Shut off all sources of ignition.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear respirator, chemical safety goggles, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Avoid breathing vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep container closed. Keep away from heat, sparks, and open flame. Store in a cool dry place.
Unsuitable: Minimize exposure to air. If peroxide formation is suspected, do not open or move container.

SPECIAL REQUIREMENTS
Do not distill to dryness.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Use nonsparking tools. Mechanical exhaust required.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Government approved respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash thoroughly after handling. Wash contaminated clothing before reuse.

EXPOSURE LIMITS
Country Source Type Value
Poland NDS 260 mg/m³
Poland NDSch 520 mg/m³
Poland NDSP

Section 9 - Physical/Chemical Properties

Appearance Physical State: Clear liquid
Color: colorless

Property Value At Temperature or Pressure
Molecular Weight None
pH N/A
BP/MP Range 145 - 146 °C 760 mmHg
MP/MP Range N/A
Freezing Point N/A
Vapor Pressure 3.7 mmHg 20 °C
Vapor Density N/A
Saturated Vapor Conc. N/A
SG/Density 0.968 g/cm³
Bulk Density N/A
Odor Threshold N/A
Volatile% N/A
VOC Content N/A
Water Content N/A
Solvent Content N/A
Evaporation Rate N/A
Viscosity N/A
Surface Tension N/A
Partition Coefficient N/A
Decomposition Temp. N/A
Flash Point 109.4 °F 43 °C Method: closed cup
Explosion Limits Lower: 1.3 %
Upper: 13.1 %
Flammability N/A
Autoignition Temp 354 °C
Refractive Index 1.402
Optical Rotation N/A
Miscellaneous Data N/A
Solubility N/A
N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Conditions of Instability: Upon exposure to air, product may slowly degrade, forming peroxides, which can be unstable
Materials to Avoid: Strong oxidizing agents, Strong acids, Strong bases.
HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.
HAZARDOUS POLYMERIZATION
Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: May cause skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: Causes eye irritation.
Inhalation: May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.
Ingestion: May be harmful if swallowed.
TARGET ORGAN (S) OR SYSTEM (S)
Liver. Kidneys.

SIGNS AND SYMPTOMS OF EXPOSURE
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

TOXICITY DATA
Oral
Rat
8532 mg/kg
LD50
Intraperitoneal
Mouse
750 MG/KG
LD50
Skin
Rabbit
> 5000 mg/kg
LD50

Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Ethers, n.o.s.
UN#: 3271
Class: 3
Packing Group: Packing Group III
Hazard Label: Flammable liquid
PIH: Not PIH
IATA
Proper Shipping Name: Ethers, n.o.s.
IATA UN Number: 3271
Hazard Class: 3
Packing Group: III
Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: Xi
Indication of Danger: Irritant.
R: 10 36
Risk Statements: Flammable. Irritating to eyes.
S: 25
Safety Statements: Avoid contact with eyes.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Combustible (USA) Flammable (EU). Irritant.
Risk Statements: May form explosive peroxides. Irritating to eyes.
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: No
TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER
For R&D use only. Not for drug, household or other uses.
Subject: Re: Solvent Shipping
From: Jing Sha <js545@cornell.edu>
Date: Sun, 10 Feb 2008 20:34:38 -0500
To: Marlene Larson <ml2@cornell.edu>

Marlene,

I'll be available in my lab in Duffield between 10am and 1pm. Thank you very much!

-Jing

Marlene Larson wrote:

Jing,

I am sure I can fit this in on Tuesday- when can I meet with you? Give me a few times and I can see what fits best for my schedule.

Thanks

Marlene

Mike Lonon wrote:

Jing,

A summary of the small quantities exemption is now on our webpage:
http://www.ehs.cornell.edu/irs/dot/small_quantity_exception.cfm

for domestic shipping, the exterior of the package has be marked "this package conforms to 49cfr173.4"

My schedule is full, so I've CC:ed Marlene Larson just in case she has time available to help you.

Mike

Jing Sha wrote:

Mike,

Thank you very much for the help with shipping the solvents to Switzerland last time. Next Monday/Tuesday we need to ship more solvents to Lawrence Berkeley National Lab in CA. We remember you mentioned last time that we didn't need to fill out the special little form attached to the outside of the package if it's domestic shipping. We'd like to make sure whether just putting MSDS forms in the package is enough this time. Thanks a lot in advance!

-Jing

Mike Lonon wrote:

Jing,

I got your voice mail, but you didn't leave a phone number.

We can ship this as "dangerous goods in exception quantities" which will greatly reduce the paperwork. The vials will need to be sealed with a screw top lid that is taped shut to prevent accidental opening then the vials will need to go into a strong plastic bag (ziplock is OK) and the bag will need to go into a sturdy box with absorbent

I can get over there Friday afternoon to ship this, is there a best time for you?

Mike

Jing Sha wrote:

Dear Mr. Lonon,

Thank you very much for getting back to me. I need to ship 5 small vials (about 15ml each). The only hazardous materials is PGMEA (PROPYLENE GLYCOL METHYL ETHER ACETATE). The MSDS is attached.

The samples need to be shipped to Switzerland. the address and phone number is given below.

Ms. Anja Weber
Laboratory for Micro and Nanotechnology
Paul Scherrer Institute
5232 Villigen PSI
Switzerland

email:anja.weber@psi.ch
phone: 41 56 310 4546

My address: 258 Duffield Hall, Cornell University
My phone number is :607-342-5937

Please let me know what steps I need to take.
Thank you very much

-Jing

Mike Lonon wrote:

Jing,

I need to know:

address and phone number of the destination
your address and phone number

and confirmation from you that diethyl ether is the solvent and the only hazardous material
in the shipment

Mike

Jing Sha wrote:

Dear Mr. Lonon,

I was asked to contact you through the dept of chemistry as they're no longer handling
hazardous chemical shipments.

We need to ship 5 hazardous solvent samples. Each vial will contain about 15ml of the
ether solvent (it is a flammable liquid) We have the MSDS sheets required. The samples
need to be sent to Switzerland through priority international shipping.

Please let me know what procedure to follow.

Thanks,

Jing

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Marlene Larson
Radiological Safety Specialist
Cornell University
Environmental Health and Safety
Laboratory and Radiation Safety Section
395 Pine Tree Road Suite 210
Ithaca, NY 14850
Phone: (607) 255-5676
Fax: (607) 255-8267
E-mail address: mat2@cornell.edu
Exemptions

- Lab Safety
- Hazardous Material Shipping
- Training
- Exemptions
- Use of Vehicles
- Links
- Alerts

Small Quantity Exception

To qualify for the small quantity exception the shipper must ensure all conditions below detailing classes, quantities and containers are met.

If your chemical or chemical mixture falls into the following DOT Class or Hazard and your material quantities do not exceed maximum allowance per inner container, the Small Quantity Exception can be utilized (see packing requirements).

<table>
<thead>
<tr>
<th>Hazard</th>
<th>DOT Class</th>
<th>Maximum amount per inner container (gms solid/ml liquid)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammable and combustible liquid</td>
<td>Class 3</td>
<td>50</td>
</tr>
<tr>
<td>Flammable solid</td>
<td>Division 4.1</td>
<td>50</td>
</tr>
<tr>
<td>Spontaneous combustible material</td>
<td>Division 4.2 (PGII and PGIII)</td>
<td>50</td>
</tr>
<tr>
<td>Dangerous when wet material</td>
<td>Division 4.3 (PGII and PGIII)</td>
<td>50</td>
</tr>
<tr>
<td>Oxidizer</td>
<td>Division 5.1</td>
<td>50</td>
</tr>
<tr>
<td>Organic Peroxide</td>
<td>Division 5.2</td>
<td>50</td>
</tr>
<tr>
<td>Toxic Material</td>
<td>Division 6.1 (PGI)</td>
<td>50</td>
</tr>
<tr>
<td>Toxic Material</td>
<td>Division 6.1 (PGII and PGIII)</td>
<td>50</td>
</tr>
<tr>
<td>Corrosive Material</td>
<td>Class 8</td>
<td>50</td>
</tr>
</tbody>
</table>

If you are able to utilize the Small Quantity Exception continue below for packaging and marking requirements, otherwise return to flowchart for further shipping guidance.

PACKAGING REQUIREMENTS SMALL QUANTITY EXCEPTION

http://www.ehs.cornell.edu/irs/dot/small_quantity_exception.cfm

02/12/2008
- Each inner container must be closed (capped) and its cap is secured with tape.
- Chemically compatible absorbent/cushioning material must be added around the inner container capable of absorbing the entire liquid contents of the inner container(s).
- Outside packaging must be capable of sustaining drops on all sides and edges from a height of 1.8 m (5.9) ft onto a solid surface.
- **Shipper must mark outside of package with statement "This package conforms to 49 CFR 173.4"
- The gross weight of the shipping package must be less than or equal to 64 pounds.

If you are able to utilize the Small Quantity Exception, package and mark according to requirements, otherwise return to flowchart for further shipping guidance.