1. PRODUCT AND COMPANY IDENTIFICATION

MICROPOSIT™ S1811™ POSITIVE PHOTORESIST

Supplier
ROHM AND HAAS ELECTRONIC MATERIALS LLC
A Subsidiary of The Dow Chemical Company
455 FOREST STREET
MARLBOROUGH, MA  01752  United States

For non-emergency information contact:  215-592-3000
For non-emergency information contact:  508-481-7950

Emergency telephone number  1 800 424 9300
Local emergency telephone number  989-636-4400

2. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic grade propylene glycol monomethyl</td>
<td>108-65-6</td>
<td>70.0 - 80.0 %</td>
</tr>
<tr>
<td>ether acetate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed cresol novolak resin</td>
<td></td>
<td>10.0 - 20.0 %</td>
</tr>
<tr>
<td>Diazo Photoactive Compound</td>
<td></td>
<td>1.0 - 10.0 %</td>
</tr>
<tr>
<td>Cresol</td>
<td>1319-77-3</td>
<td>&lt; 1.0 %</td>
</tr>
<tr>
<td>Fluoroaliphatic Polymer Esters</td>
<td>11114-17-3</td>
<td>&lt; 1.0 %</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

Emergency Overview

Appearance
Form  liquid
Colour  Red Amber
Odour: ester-like

**Hazard Summary**

**CAUTION!**

Combustible liquid and vapor. Causes irritation to eyes, nose, and respiratory tract. Prolonged, repeated contact, inhalation, ingestion, or absorption through the skin, may cause adverse effects to internal organ systems.

**Potential Health Effects**

**Primary Routes of Entry:** Inhalation, ingestion, eye and skin contact, absorption.

**Eyes:** May cause pain, transient irritation and superficial corneal effects.

**Skin:** Material may cause irritation. Prolonged or repeated exposure may have the following effects: drowsiness, defatting and drying of the skin which can lead to irritation and dermatitis, central nervous system depression, kidney damage, liver damage.

**Ingestion:** Swallowing may have the following effects: irritation of mouth, throat and digestive tract, headache, nausea, Vomiting. Repeated doses may have the following effects: central nervous system depression, liver damage, kidney damage.

**Inhalation:** Inhalation may have the following effects: irritation of nose, throat and respiratory tract. Higher concentrations may have the following effects: systemic effects similar to those resulting from ingestion.

**Target Organs:** Eye, Respiratory System, nervous system, Liver, Kidney, Skin.

**Carcinogenicity**

Not considered carcinogenic by NTP, IARC, and OSHA.

---

**4. FIRST AID MEASURES**

**Inhalation:** Remove from exposure. If there is difficulty in breathing, give oxygen. Seek medical attention if symptoms persist.
**Skin contact:** Wash skin with water. Continue washing for at least 15 minutes. Obtain medical attention if blistering occurs or redness persists.

**Eye contact:** Immediately flush the eye with plenty of water for at least 15 minutes, holding the eye open. Obtain medical attention if soreness or redness persists.

**Ingestion:** Wash out mouth with water. Have victim drink 1-3 glasses of water to dilute stomach contents. Induce vomiting if person is conscious. Immediate medical attention is required. Never administer anything by mouth if a victim is losing consciousness, is unconscious or is convulsing.

**Notes to physician:** Treat symptomatically.

---

## 5. FIRE-FIGHTING MEASURES

**Flash point**

40 - 46 °C (104 - 115 °F)

**Suitable extinguishing media:** Use water spray, foam, dry chemical or carbon dioxide. Keep containers and surroundings cool with water spray.

**Specific hazards during fire fighting:** This product may give rise to hazardous vapors in a fire. Vapors can travel a considerable distance to a source of ignition and result in flashback.

**Special protective equipment for fire-fighters:** Wear full protective clothing and self-contained breathing apparatus.

**Further information:** Pressure may build up in closed containers with possible liberation of combustible vapors.

---

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**

Wear suitable protective clothing.

Wear respiratory protection.

Eliminate all ignition sources.

**Environmental precautions**

Prevent the material from entering drains or water courses.

Do not discharge directly to a water source.

Advise Authorities if spillage has entered watercourse or sewer or has contaminated soil or vegetation.

**Methods for cleaning up**

Contain spills immediately with inert materials (e.g., sand, earth).

Transfer into suitable containers for recovery or disposal.

Finally flush area with plenty of water.

---

## 7. HANDLING AND STORAGE

**Handling**

Use local exhaust ventilation. Avoid contact with eyes, skin and clothing. Keep container tightly closed.

**Storage**

**Storage conditions:** Store in original container. Keep away from heat and sources of ignition. Storage area should be: cool, dry, well ventilated, out of direct sunlight.
Further information on storage conditions: Proprietary photoresist film contains approximately 2-4% of 2,3,4-trihydroxybenzophenone (THBP), which may sublime during soft-bake or hard-bake processing. THBP has low acute toxicity (LD50 > 5g/kg). Contact with eyes, skin or mucous membranes cause irritation. To prevent accumulation of THBP on equipment surfaces and ventilation ducts, preventative maintenance program including regular cleaning should be implemented. Wipe surfaces using an appropriate cleaning solvent when possible. Provide adequate general or local exhaust ventilation during the cleaning process. In situations where this is not possible or where solvent or dust concentrations become excessive, use an air purifying respirator with an organic vapor/toxic particulate cartridge. When cleaning residual THBP, wear protective gloves and adequate protective clothing to prevent skin contact. Practice good personal hygiene to prevent accidental exposure. Clean all protective clothing and equipment thoroughly after each use.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### Exposure limit(s)

Exposure limits are listed below, if they exist.

<table>
<thead>
<tr>
<th>Component</th>
<th>Regulation</th>
<th>Type of listing</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic grade propylene glycol monomethyl ether acetate</td>
<td>Rohm and Haas</td>
<td>TWA</td>
<td>30 ppm</td>
</tr>
<tr>
<td></td>
<td>Rohm and Haas</td>
<td>STEL</td>
<td>90 ppm</td>
</tr>
<tr>
<td></td>
<td>Rohm and Haas</td>
<td>WEEL</td>
<td>Absorbed via skin</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50 ppm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Regulation</th>
<th>Type of listing</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cresol</td>
<td>ACGIH</td>
<td>TWA</td>
<td>5 ppm</td>
</tr>
<tr>
<td></td>
<td>ACGIH</td>
<td>SKIN_DES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OSHA_TRAN</td>
<td>PEL</td>
<td>22 mg/m3 5 ppm</td>
</tr>
<tr>
<td></td>
<td>OSHA_TRAN</td>
<td>SKIN_DES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Z1A</td>
<td>TWA</td>
<td>22 mg/m3 5 ppm</td>
</tr>
<tr>
<td></td>
<td>Z1A</td>
<td>SKIN_FINAL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ACGIHLIS_P</td>
<td>TWA Inhalable fraction and vapor.</td>
<td>20 mg/m3</td>
</tr>
<tr>
<td></td>
<td>ACGIHLIS_P</td>
<td>SKIN_DES Inhalable fraction and vapor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ACGIH</td>
<td>TWA Inhalable fraction and vapor.</td>
<td>20 mg/m3</td>
</tr>
<tr>
<td></td>
<td>ACGIH</td>
<td>SKIN_DES Inhalable fraction and vapor.</td>
<td></td>
</tr>
</tbody>
</table>

### Exposure controls

**Engineering measures:** Engineering methods to prevent or control exposure are preferred. Methods include process or personnel enclosure, mechanical ventilation (local exhaust), and control of process conditions.

**Individual protection measures**

**Eye/face protection:** Goggles

**Skin protection**
Hand protection: Butyl rubber gloves. Other chemical resistant gloves may be recommended by your safety professional.

Other protection: Normal work wear.

Respiratory protection: Respiratory protection if there is a risk of exposure to high vapor concentrations. The specific respirator selected must be based on the airborne concentration found in the workplace and must not exceed the working limits of the respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form liquid
Colour Red Amber
Odour ester-like
pH neutral

Boiling point/boiling range ca.146 °C (295 °F)
Flash point 40 - 46 °C (104 - 115 °F)
Evaporation rate Slower than ether

Component: Electronic grade propylene glycol monomethyl ether acetate

Vapour pressure 3.7 mmHg at 20 °C (68 °F)

Relative vapour density Heavier than air.
Relative density 0.80 - 1.00
Water solubility insoluble
VOC's 727 - 950 g/l

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10. STABILITY AND REACTIVITY

Hazardous reactions Stable under normal conditions.

Conditions to avoid High temperatures Static discharge

Materials to avoid Oxidizing agents

Hazardous decomposition products Combustion will generate: Carbon monoxide, carbon dioxide, phenols, nitrogen oxides (NOx), Aldehydes, acrid smoke and irritating fumes.

Polymerisation Will not occur.
11. TOXICOLOGICAL INFORMATION

Toxicological information on this product or its components appear in this section when such data is available.

Component: **Electronic grade propylene glycol monomethyl ether acetate**
- **Acute oral toxicity**
  - LD50 rat > 5,000 mg/kg

Component: **Cresol**
- **Acute oral toxicity**
  - LD50 rat 1,454 mg/kg

Component: **Electronic grade propylene glycol monomethyl ether acetate**
- **Acute inhalation toxicity**
  - LC50 rat 6 h > 24 mg/l

Component: **Cresol**
- **Acute inhalation toxicity**
  - LC50 rat 8 h 35.38 mg/l

Component: **Electronic grade propylene glycol monomethyl ether acetate**
- **Acute dermal toxicity**
  - LD50 rat > 5,000 mg/kg

Component: **Electronic grade propylene glycol monomethyl ether acetate**
- **Acute dermal toxicity**
  - LD50 rabbit > 5,000 mg/kg

Component: **Cresol**
- **Acute dermal toxicity**
  - LD50 rabbit 2,000 mg/kg

Component: **Fluorocyclic Polymer Esters**
- **Acute dermal toxicity**
  - > 5,000 mg/kg

Component: **Cresol**
- **Skin irritation**
  - rabbit Corrosive

Component: **Cresol**
- **Eye irritation**
  - rabbit Corrosive

Component: **Electronic grade propylene glycol monomethyl ether acetate**

**Reproductive toxicity**
- Dermal teratology testing of this solvent (with less than 3% beta isomer) revealed no maternally toxic, teratogenic or fetotoxic responses in rats or rabbits exposed to concentrations of 1,000 and 2,000 mg/kg per day.

Component: **Electronic grade propylene glycol monomethyl ether acetate**

**Mutagenicity**
- No significant mutagenic response was observed and the carcinogenic potential of the material is therefore considered to be low.

Component: **Cresol**

**Teratogenicity**
- Developmental effects were seen in laboratory animals only at dose levels that were maternally toxic.

Component: **Cresol**

**Mutagenicity**
- Not mutagenic in Ames Test. In vitro tests showed mutagenic effects
12. ECOLOGICAL INFORMATION

Ecotoxicological information on this product or its components appear in this section when such data is available.

**Electronic grade propylene glycol monomethyl ether acetate**

Elimination information (persistence and degradability)
- Biodegradability: OECD Test Guideline 302B or Equivalent 100 %
  10-day Window: Pass

Bioaccumulation
- No applicable data.

Ecotoxicity effects
- Toxicity to fish: LC50 Fathead minnow (Pimephales promelas) 96 h Method Not Specified 161 mg/l
- Toxicity to algae: Growth inhibition EC50 Algae (Selenstrum capricornutum) 72 h Method Not Specified >1,000 mg/l
- Toxicity to aquatic invertebrates: EC50 Daphnia magna (Water flea) 48 h Method Not Specified >500 mg/l

**Cresol**

Ecotoxicity effects
- Toxicity to fish: LC50 Zebra fish (Danio/Brachydanio rerio) 96 h Method Not Specified 9 mg/l
- Toxicity to fish: LC50 Bluegill sunfish (Lepomis macrochirus) 96 h Method Not Specified 10 mg/l
- Toxicity to fish: LC50 Pimephales promelas (fathead minnow) 96 h Method Not Specified 12.8 mg/l
- Toxicity to bacteria: EC0 Pseudomonas putida 0.5 h 250 mg/l
- Toxicity to aquatic invertebrates: LC50 Daphnia 48 h Method Not Specified 33 - 100 mg/l

13. DISPOSAL CONSIDERATIONS

Environmental precautions: Prevent the material from entering drains or water courses. Do not discharge directly to a water source. Advise Authorities if spillage has entered watercourse or sewer or has contaminated soil or vegetation.

Disposal
- Dispose in accordance with all local, state (provincial), and federal regulations. Incineration is the recommended method of disposal for containers. Under RCRA, it is the responsibility of the product's user to determine at the time of disposal, whether the product meets RCRA criteria for hazardous waste.
This is because the product uses, transformations, mixtures, processes, etc. may render the resulting materials hazardous. Do not remove label until container is thoroughly cleaned. Empty containers may contain hazardous residues. This material and its container must be disposed of in a safe way.

14. TRANSPORT INFORMATION

DOT

Not regulated per 49CFR 173.150(f)(2)

IMO/IMDG

<table>
<thead>
<tr>
<th>Proper shipping name</th>
<th>RESIN SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN number</td>
<td>UN 1866</td>
</tr>
<tr>
<td>Class</td>
<td>3</td>
</tr>
<tr>
<td>Packing group</td>
<td>III</td>
</tr>
</tbody>
</table>

Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations.

15. REGULATORY INFORMATION

Workplace Classification
OSHA: Combustible
      Irritant

WHMIS: This product is a 'controlled product' under the Canadian Workplace Hazardous Materials Information System (WHMIS).

SARA TITLE III: Section 311/312 Categorizations (40CFR370): Immediate, delayed, flammability hazard

SARA TITLE III: Section 313 Information (40CFR372)
This product does not contain a chemical which is listed in Section 313 at or above de minimis concentrations.

US. Toxic Substances Control Act (TSCA): All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

California (Proposition 65)
This product does not contain materials which the State of California has found to cause cancer, birth defects or other reproductive harm.

16. OTHER INFORMATION

NFPA Hazard Rating

<table>
<thead>
<tr>
<th>Health</th>
<th>Fire</th>
<th>Reactivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

Page 8 of 9
Revision date 04/08/2011
**Legend**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH</td>
<td>American Conference of Governmental Industrial Hygienists</td>
</tr>
<tr>
<td>BAc</td>
<td>Butyl acetate</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Administration</td>
</tr>
<tr>
<td>PEL</td>
<td>Permissible Exposure Limit</td>
</tr>
<tr>
<td>STEL</td>
<td>Short Term Exposure Limit (STEL):</td>
</tr>
<tr>
<td>TLV</td>
<td>Threshold Limit Value</td>
</tr>
<tr>
<td>TWA</td>
<td>Time Weighted Average (TWA):</td>
</tr>
<tr>
<td></td>
<td>Bar denotes a revision from prior MSDS.</td>
</tr>
</tbody>
</table>

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Version: 3.2
Print Date: 04/24/2014