Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

MICROPOSIT™ S1818™ G2 POSITIVE PHOTORESIST

Revision Date: 07/02/2013

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
Electronic grade propylene glycol monomethyl ether acetate	108-65-6	65.0 - 75.0 %
Mixed cresol novolak resin		15.0 - 25.0 %
Diazo Photoactive Compound		1.0 - 10.0 %
Fluorinated Surfactant		< 1.0 %
Cresol	1319-77-3	< 0.5 %

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

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 conciousness, is unconcious or is convulsing.

Notes to physician: Treat symptomatically.

5. FIREFIGHTING MEASURES

Flash point	ca.40 - 46 °C (104 - 115.00 °F)	
Ignition temperature	ca.333.0 °C (631 °F) Literature	Propylene glycol monomethyl ether acetate
Lower explosion limit	1.5 % volLiterature	Propylene glycol monomethyl ether acetate
Upper explosion limit	7.0 % volLiterature	Propylene glycol monomethyl ether acetate

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

Specific hazards during firefighting: 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 firefighters: 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.

Component	Regulation	Type of listing	Value
Electronic grade propylene glycol monomethyl ether acetate	Rohm and Haas	TWA	30 ppm
Electronic grade propylene glycol monomethyl ether acetate	Rohm and Haas	TWA	30 ppm
Electronic grade propylene glycol monomethyl ether acetate	Rohm and Haas	STEL	90 ppm
Electronic grade propylene glycol monomethyl ether acetate	Rohm and Haas	STEL	90 ppm
Electronic grade propylene glycol monomethyl ether acetate	Rohm and Haas	Absorbed via skin	
Electronic grade propylene glycol monomethyl ether acetate	Rohm and Haas	Absorbed via skin	
Electronic grade propylene glycol monomethyl ether acetate	US WEEL	TWA	50 ppm
Cresol	OSHA P1	TWA	22 mg/m3 5 ppm
Cresol	OSHA P1	TWA	
Cresol	OSHA P0	TWA	22 mg/m3 5 ppm
Cresol	ACGIH	TWA	

Cresol	ACGIH	TWA Inhalable fraction and vapor	20 mg/m3
Cresol	ACGIH	TWA	
Cresol	OSHA P0	TWA	22 mg/m3 5 ppm

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 (295.00 °F)
Flash point	ca.40 - 46 °C (104 - 115.00 °F)
Evapouration rate	Slower than ether
Lower explosion limit	1.5 % volLiterature Propylene glycol monomethyl ether acetate
Upper explosion limit	7.0 % volLiterature Propylene glycol monomethyl ether acetate

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	ca.1.07
Water solubility	insoluble
Auto-ignition temperature	ca.333 °C (631 °F) Literature Propylene glycol monomethyl ether acetate

VOC's	642 - 1,038 g/L

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

10. STABILITY AND REACTIVITY

Chemical stability	Stable under normal conditions.
Hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Exposure to sunlight. Heat, flames and sparks. contact with incompatible materials
Materials to avoid	Oxidizing agents
Hazardous decomposition products	Combustion will generate:, oxides of carbon, nitrogen oxides (NOx), phenols, Hydrogen fluoride, Aldehydes, acrid smoke and irritating fumes,
polymerisation	Product will not undergo hazardous polymerization.

11. TOXICOLOGICAL INFORMATION

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

Carcinogenicity:

Not considered carcinogenic by NTP, IARC, and OSHA

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

Acute oral toxicity	LD50 rat > 5,000 mg/kg

Component: **Fluorinated Surfactant**

Acute oral toxicity	LD50 rat > 2,000 mg/kg

Component: **Cresol**

Acute oral toxicity	LD50 rat 100 - 300 mg/kg

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

Acute inhalation toxicity	LC50 rat 6 Hour > 10.8 mg/l

Component: **Cresol**

Acute inhalation toxicity	LC50 rat 8 Hour 35.38 mg/l

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

Acute dermal toxicity	LD50 rabbit > 5,000 mg/kg

Component: **Fluorinated Surfactant**

Acute dermal toxicity LD50 rabbit > 2,000 mg/kg

Component: **Cresol**
Acute dermal toxicity LD50 rabbit 213 - 426 mg/kg

Component: **Electronic grade propylene glycol monomethyl ether acetate**
Skin irritation No skin irritation
Prolonged contact is essentially nonirritating to skin.
Repeated contact may cause skin irritation with local redness.

Component: **Cresol**
Skin irritation rabbit Causes burns.

Component: **Electronic grade propylene glycol monomethyl ether acetate**
Eye irritation No eye irritation
May cause pain disproportionate to the level of irritation to eye tissues.
May cause slight eye irritation.
May cause slight corneal injury.

Component: **Cresol**
Eye irritation rabbit Corrosive

Component: **Electronic grade propylene glycol monomethyl ether acetate**
Sensitisation NOT a contact sensitizer
Did not cause allergic skin reactions when tested in guinea pigs.

Component: **Electronic grade propylene glycol monomethyl ether acetate**
Sensitisation For respiratory sensitization:
No relevant data found.

Component: **Electronic grade propylene glycol monomethyl ether acetate**
Subchronic toxicity In animals, effects have been reported on the following organs:
Kidney.
Liver.
Nasal tissue.

Component: **Electronic grade propylene glycol monomethyl ether acetate**
Carcinogenicity: Similar material(s) did not cause cancer in laboratory animals.
Component: **Electronic grade propylene glycol monomethyl ether acetate**
Reproductive toxicity
In animal studies, did not interfere with reproduction. In animal studies, did not interfere with fertility.
Component: **Electronic grade propylene glycol monomethyl ether acetate**
Teratogenicity
Did not cause birth defects or other effects in the fetus even at doses which caused toxic effects in the mother.
Component: **Electronic grade propylene glycol monomethyl ether acetate**
Mutagenicity
In vitro genetic toxicity studies were negative.
Component: **Cresol**
Teratogenicity
Developmental effects were seen in laboratory animals only at dose levels that were maternally toxic.
Component: **Cresol**
Mutagenicity

In vitro genetic toxicity studies were negative in some cases and positive in other cases. Animal genetic toxicity studies were negative.

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

Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.
Material is ultimately biodegradable (reaches > 70% mineralization in OECD test(s) for inherent biodegradability).

Biodegradability	OECD Test Guideline 301F or Equivalent Biodegradable 83 % 10-day Window: Pass
Biodegradability	OECD Test Guideline 302B or Equivalent 100 % 10-day Window: Not applicable

Ecotoxicity effects

Toxicity to fish	Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
Toxicity to fish	LC50 Oncorhynchus mykiss (rainbow trout) 96 Hour no data available 134 mg/l
Toxicity to algae	static test ErC50 Pseudokirchneriella subcapitata 96 Hour OECD Test Guideline 201 or Equivalent > 1,000 mg/l
Toxicity to aquatic invertebrates	EC50 Daphnia magna (Water flea) 48 Hour no data available 408 mg/l

Material is not classified as dangerous to aquatic organisms (LC50/EC50/IC50/LL50/EL50 greater than 100 mg/L in most sensitive species).

Cresol

Ecotoxicity effects

Toxicity to fish	LC50 Zebra fish (Danio/Brachydanio rerio) 96 Hour Method Not Specified 9 mg/l
Toxicity to fish	LC50 Bluegill sunfish (Lepomis macrochirus) 96 Hour Method Not Specified 10 mg/l

Toxicity to fish	LC50 Pimephales promelas (fathead minnow) 96 Hour Method Not Specified 12.8 mg/l
Toxicity to bacteria	EC0 Pseudomonas putida 0.5 Hour 250 mg/l
Toxicity to aquatic invertebrates	LC50 Daphnia 48 Hour 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

Proper shipping name	Resin solution
UN number	UN 1866
Class	3
Packing group	III

Classification for SEA transport (IMO-IMDG):

Proper shipping name	RESIN SOLUTION
UN number	UN 1866
Class	3
Packing group	III

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

Target organ effects

WHMIS: This product is a 'controlled product' under theCanadian 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.

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

California (Proposition 65)
This product contains a component or components known to the state of California to cause cancer and/or reproductive harm.
Contains the following trace impurities.
Components: Dioxane 123-91-1

16. OTHER INFORMATION

NFPA Hazard Rating

Health	Fire	Reactivity
2	2	0

Legend

ACGIH	American Conference of Governmental Industrial Hygienists
BAc	Butyl acetate
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
STEL	Short Term Exposure Limit (STEL):
TLV	Threshold Limit Value
TWA	Time Weighted Average (TWA):
|	Bar denotes a revision from prior MSDS.

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.

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