SAFETY DATA SHEET

ROHM AND HAAS ELECTRONIC MATERIALS LLC

Product name: MICROPOSIT™ MF™ -321 DEVELOPER

Issue Date: 04/06/2015
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ROHM AND HAAS ELECTRONIC MATERIALS LLC encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. IDENTIFICATION

Product name: MICROPOSIT™ MF™ -321 DEVELOPER

Recommended use of the chemical and restrictions on use
Identified uses: Chemical Specialty

COMPANY IDENTIFICATION
ROHM AND HAAS ELECTRONIC MATERIALS LLC
A Subsidiary of The Dow Chemical Company
455 FOREST STREET
MARLBOROUGH MA 01752
UNITED STATES

Customer Information Number: 215-592-3000
SDSQuestion@dow.com

EMERGENCY TELEPHONE NUMBER
24-Hour Emergency Contact: 1 800 424 9300
Local Emergency Contact: 800-424-9300

2. HAZARDS IDENTIFICATION

Hazard classification
This material is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29CFR 1910.1200.
Skin irritation - Category 2
Eye irritation - Category 2A
Specific target organ toxicity - single exposure - Category 1 - Oral
Specific target organ toxicity - repeated exposure - Category 1 - Dermal

Label elements
Hazard pictograms

Signal word: **DANGER!**

Hazards
Causes skin irritation.
Causes serious eye irritation.
Causes damage to organs (Central nervous system) if swallowed.
Causes damage to organs (Liver, thymus gland) through prolonged or repeated exposure in contact with skin.

Precautionary statements

Prevention
Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
Wash skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Wear eye protection/ face protection.
Wear protective gloves.

Response
IF ON SKIN: Wash with plenty of soap and water.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
IF exposed: Call a POISON CENTER or doctor/ physician.
If skin irritation occurs: Get medical advice/ attention.
If eye irritation persists: Get medical advice/ attention.
Take off contaminated clothing and wash before reuse.

Storage
Store locked up.

Disposal
Dispose of contents/ container to an approved waste disposal plant.

Other hazards
no data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature: Solution of organic compounds
This product is a mixture.

Component	CASRN	Concentration
Water	7732-18-5	> 95.0 %

Polyalkylene glycol		< 1.0 %
Tetramethylammonium hydroxide	75-59-2	1.91 %

4. FIRST AID MEASURES

Description of 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. Immediate medical attention is required. Never administer anything by mouth if a victim is losing conciousness, is unconcious or is convulsing.

Most important symptoms and effects, both acute and delayed: Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

Indication of any immediate medical attention and special treatment needed
Notes to physician: Treat symptomatically.

5. FIREFIGHTING MEASURES

Suitable extinguishing media: Not readily combustible. Select extinguishing agent appropriate to other materials involved.

Unsuitable extinguishing media: no data available

Special hazards arising from the substance or mixture
Hazardous combustion products: no data available

Unusual Fire and Explosion Hazards: No specific measures necessary.

Advice for firefighters
Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry.

Special protective equipment for firefighters: Wear full protective clothing and self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Wear suitable protective clothing.

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 and materials for containment and cleaning up: Cover with absorbent or contain. Collect and dispose.

7. HANDLING AND STORAGE

Precautions for safe handling: Use only in well-ventilated areas. Avoid breathing vapor. Avoid contact with eyes, skin and clothing. Keep container tightly closed.

Conditions for safe storage: Store in original container. Storage area should be: cool dry well ventilated out of direct sunlight away from incompatible materials
No special precautions necessary.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters
Exposure limits are listed below, if they exist.

Exposure controls
Engineering controls: 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	
Physical state	liquid
Color	colourless
Odor	Amines.
Odor Threshold	no data available

pH	12
Melting point/range	no data available
Freezing point	no data available
Boiling point (760 mmHg)	> 100 °C (> 212 °F)
Flash point	Not applicable
Evaporation Rate (Butyl Acetate = 1)	Slower than ether
Flammability (solid, gas)	Not Applicable
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapor Pressure	no data available
Relative Vapor Density (air = 1)	no data available
Relative Density (water = 1)	1.05
Water solubility	completely soluble
Partition coefficient: n-octanol/water	no data available
Auto-ignition temperature	no data available
Decomposition temperature	no data available
Kinematic Viscosity	no data available
Explosive properties	no data available
Oxidizing properties	no data available
Molecular weight	no data available
Volatile Organic Compounds	Not applicable

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

10. STABILITY AND REACTIVITY

Reactivity: no data available

Chemical stability: Stable under normal conditions.

Possibility of hazardous reactions: No dangerous reaction known under conditions of normal use. Product will not undergo hazardous polymerization.

Conditions to avoid: contact with incompatible materials

Incompatible materials: Acids. Oxidizers

Hazardous decomposition products: None known.

11. TOXICOLOGICAL INFORMATION

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

Acute toxicity

Acute oral toxicity
Product test data not available.

Acute dermal toxicity
Product test data not available.

Acute inhalation toxicity
Product test data not available.

Skin corrosion/irritation
Product test data not available.

Serious eye damage/eye irritation
Product test data not available.

Sensitization
Product test data not available.

Specific Target Organ Systemic Toxicity (Single Exposure)
Product test data not available.

Specific Target Organ Systemic Toxicity (Repeated Exposure)
Product test data not available.

Carcinogenicity
Not considered carcinogenic by NTP, IARC, and OSHA

Teratogenicity
Product test data not available.

Reproductive toxicity
Product test data not available.

Mutagenicity
Product test data not available.

Aspiration Hazard
Product test data not available.

COMPONENTS INFLUENCING TOXICOLOGY:

Polyalkylene glycol

Acute oral toxicity

Single dose oral LD50 has not been determined.

Acute dermal toxicity
The dermal LD50 has not been determined.

Acute inhalation toxicity
The LC50 has not been determined.

Skin corrosion/irritation
No relevant data found.

Serious eye damage/eye irritation
No relevant data found.

Sensitization
For skin sensitization:
No relevant data found.

For respiratory sensitization:
No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)
Available data are inadequate to determine single exposure specific target organ toxicity.

Specific Target Organ Systemic Toxicity (Repeated Exposure)
No relevant data found.

Teratogenicity
No relevant data found.

Reproductive toxicity
No relevant data found.

Mutagenicity
No relevant data found.

Aspiration Hazard
No aspiration toxicity classification

Tetramethylammonium hydroxide

Acute oral toxicity
LD50, Rat, female, 7.5 - 50 mg/kg

Acute dermal toxicity
LD50, Rat, male and female, 25 - 50 mg/kg

Acute inhalation toxicity
The LC50 has not been determined.

Skin corrosion/irritation
Brief contact may cause skin burns. Symptoms may include pain, severe local redness and tissue damage.

Serious eye damage/eye irritation

May cause severe eye irritation.

Sensitization
For skin sensitization:
No relevant data found.

For respiratory sensitization:
No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)
Causes damage to organs.
Route of Exposure: Oral
Target Organs: Central nervous system

Specific Target Organ Systemic Toxicity (Repeated Exposure)
In animals, effects have been reported on the following organs:
Central nervous system.
Liver.
Thymus.

Teratogenicity
Did not cause birth defects or any other fetal effects in laboratory animals.

Reproductive toxicity
In animal studies, did not interfere with reproduction.

Aspiration Hazard
No aspiration toxicity classification

Carcinogenicity
Not considered carcinogenic by NTP, IARC, and OSHA

12. ECOLOGICAL INFORMATION

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

Toxicity

Polyalkylene glycol

Acute toxicity to fish
No relevant data found.

Tetramethylammonium hydroxide

Acute toxicity to fish
LC50, Pimephales promelas (fathead minnow), flow-through, 96 Hour, 426 mg/l

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna, 48 Hour, 3 mg/l

Acute toxicity to algae/aquatic plants

EC50, Pseudokirchneriella subcapita, 72 Hour, Growth rate, 96.3 mg/l
NOEC, Pseudokirchneriella subcapita, 72 Hour, Growth rate, 6.25 mg/l

Toxicity to bacteria
EC50, activated sludge, 3 Hour, Respiration rates., > 1,000 mg/l

Chronic toxicity to aquatic invertebrates
LC50, Daphnia magna, 11 d, mortality, 0.130 mg/l
NOEC, Daphnia magna, 11 d, mortality, 0.030 mg/l

Persistence and degradability

Polyalkylene glycol
Biodegradability: No relevant data found.

Tetramethylammonium hydroxide
Biodegradability: Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.
Biodegradation: > 60 %
Exposure time: 28 d
Method: OECD Test Guideline 301B or Equivalent

Bioaccumulative potential

Polyalkylene glycol
Bioaccumulation: No bioconcentration is expected because of the relatively high water solubility.

Tetramethylammonium hydroxide
Partition coefficient: n-octanol/water(log Pow): -2.47 estimated **Partition coefficient: n-octanol/water(log Pow):** <-1.4

Mobility in soil

Polyalkylene glycol
No relevant data found.

Tetramethylammonium hydroxide
No relevant data found.

13. DISPOSAL CONSIDERATIONS

Disposal methods: Dispose in accordance with all local, state (provincial), and federal regulations. 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.

Treatment and disposal methods of used packaging: Empty containers retain product residues. Follow label warnings even after container is emptied. Improper disposal or reuse of this container may be dangerous and illegal. Refer to applicable federal, state and local regulations.

14. TRANSPORT INFORMATION

DOT

Proper shipping name	Tetramethylammonium hydroxide solution
UN number	UN 1835
Class	8
Packing group	III

Classification for SEA transport (IMO-IMDG):

Proper shipping name	TETRAMETHYLAMMONIUM HYDROXIDE SOLUTION
UN number	UN 1835
Class	8
Packing group	III
Marine pollutant	No
Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code	Consult IMO regulations before transporting ocean bulk

Classification for AIR transport (IATA/ICAO):

Proper shipping name	Tetramethylammonium hydroxide, solution
UN number	UN 1835
Class	8
Packing group	III

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

OSHA Hazard Communication Standard
This product is considered hazardous under the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312
Immediate health hazard

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313
This product does not contain a chemical which is listed in Section 313 at or above de minimis concentrations.

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.

United States TSCA Inventory (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.

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16. OTHER INFORMATION

Hazard Rating System
NFPA

Health	Fire	Reactivity
3	0	0

Revision
Identification Number: 101300830 / 1304 / Issue Date: 04/06/2015 / Version: 1.0
Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Information Source and References
This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

ROHM AND HAAS ELECTRONIC MATERIALS LLC urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.