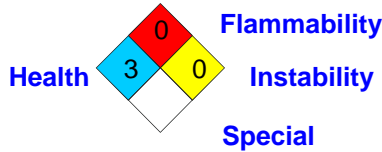


Material Safety Data Sheet

Emergency phone: Enthone Chemtrec #7827
 US & Canada: 800 424-9300
 Mexico: 01 800 022 1400, (55) 5559 1588



Health	3
Flammability	0
Physical hazards	0
Personal protection	

1. Product and company identification

Product name : MICROFAB® DVF 200-B
Patent Number : U.S. PATENT NO. 7,670,950
Product Code : 414200
Material uses : Specialty chemicals for the electronics and surface finishing industries.
Manufacturer : Enthone Inc
 Enthone OMI de Mexico S.A. de C.V.
 350 Frontage Road
 Norte 59 No. 896
 West Haven, CT 06516
 Col. Industrial Vallejo
 Phone: (203) 934-8611
 Mexico, D.F. 02300
 Fax: (203) 799-8179
 Mexico
 www.cooksonelectronics.com
 Phone: 52 55 5078 3904
 Fax: 52 555 567 6326
 www.cooksonelectronics.com

Validation date : 4/24/2010. **Supersedes Date** : 12/20/2009.
Prepared by : T. Valverde
 (203)-799-4940

2. Hazards identification

Physical state : Liquid.
Odor : Mild.
OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Emergency overview : DANGER!
 Toxic by inhalation and if swallowed. Corrosive to the eyes, skin, respiratory system and digestive tract. Causes burns. Do not breathe vapor or mist. Do not ingest. Do not get in eyes or on skin or clothing. Contains material that may cause target organ damage, based on animal data. Contains material which can cause cancer. Risk of cancer depends on duration and level of exposure. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.
Routes of entry : Inhalation. Ingestion.
Potential acute health effects
Inhalation : Toxic by inhalation. Can cause target organ damage. Corrosive to the respiratory system. May cause severe irritation or burns. Exposure can cause lung irritation, chest pain and edema, which may be fatal.

2. Hazards identification

- Ingestion** : Toxic if swallowed. Corrosive to the digestive tract. May cause burns to mouth, throat and stomach. Can cause target organ damage. Adverse symptoms may include the following: nausea or vomiting stomach pains Ingestion may cause gastrointestinal irritation and diarrhea.
- Skin** : Corrosive to the skin. Causes burns. Adverse symptoms may include the following: blistering, redness, itching, swelling, pain
- Eyes** : Corrosive to eyes. Causes burns. Direct contact with the eyes can cause irreversible damage, including blindness.

Potential chronic health effects

- Chronic effects** : Contains material that can cause target organ damage. Adverse symptoms may include the following:
Sulfuric acid: skin lesion/eczema, conjunctivitis. Prolonged exposure may cause damage to the teeth.
- Target organs** : Contains material which may cause damage to the following organs: lungs, mucous membranes, upper respiratory tract, skin, eyes, central nervous system (CNS), teeth.
- Carcinogenicity** : Contains material which can cause cancer. Risk of cancer depends on duration and level of exposure.
- Special remarks on chronic effects on humans** : **Sulfuric acid**: (Carcinogen status relates to inhalation of mist form of sulfuric acid only)
- Mutagenicity** : No conclusive data is available to indicate product or any component present at greater than 0.1% may cause heritable genetic effects.
- Developmental effects** : No conclusive data is available to indicate product or any component present at greater than 0.1% may cause developmental abnormalities.
- Fertility effects** : No conclusive data is available to indicate product or any component present at greater than 0.1% may impair fertility.
- California Prop. 65** : **WARNING**: This product contains a chemical known to the State of California to cause cancer.
- Medical conditions aggravated by over-exposure** : Pre-existing respiratory and digestive disorders and disorders involving any other target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

3. Composition/information on ingredients

<u>Name</u>	<u>CAS number</u>	<u>% by weight</u>
Sulfuric acid	7664-93-9	1-5

Any ingredient not listed in Section 3 is non-regulated or present in the product in concentrations below legal disclosure limits.

4. First aid measures

- Eye contact** : Get medical attention immediately. Chemical burns must be treated promptly by a physician. Check for and remove any contact lenses. Immediately flush eyes with running water for at least 60 minutes, keeping eyelids open. Provide a readily-accessible eyewash facility and quick-drench safety shower.
- Skin contact** : Get medical attention immediately. In case of contact, immediately flush skin with plenty of water for at least 60 minutes while removing contaminated clothing and shoes. Provide a readily-accessible eyewash facility and quick-drench safety shower. Chemical burns must be treated promptly by a physician. Remove contaminated clothing and shoes. Wash contaminated clothing before reuse. Clean shoes thoroughly before reuse.

4 . First aid measures

- Inhalation** : Get medical attention immediately. Chemical burns must be treated promptly by a physician. Move exposed person to fresh air. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. Keep person warm and at rest. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. Move affected person to fresh air. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs.
- Ingestion** : Get medical attention immediately. Chemical burns must be treated promptly by a physician. Wash out mouth with water. Remove dentures if any. Move exposed person to fresh air. Keep person warm and at rest. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wear suitable protective clothing, gloves and eye/face protection. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

5 . Fire-fighting measures

- Flammability of the product** : In a fire or if heated, a pressure increase will occur and the container may burst. Reacts violently when water is added to this product.
- Extinguishing media**
- Suitable** : Use an extinguishing agent suitable for the surrounding fire.
- Not suitable** : None known.
- Special exposure hazards** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
- Hazardous combustion products** : sulfur oxides
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6 . Accidental release measures

- Personal precautions** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

6 . Accidental release measures

- Large spill** : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). The spilled material may be neutralized with sodium carbonate, sodium bicarbonate or sodium hydroxide. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see section 1 for emergency contact information and section 13 for waste disposal.
- Small spill** : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

7 . Handling and storage

- Handling** : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not get in eyes or on skin or clothing. Provide a readily-accessible eyewash facility and quick-drench safety shower. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or approved alternative container. Containers should be kept closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container. Always add acids to water and basic solutions slowly and cautiously. Never add water to acids. The extreme heat generated can cause a violent reaction.
- Storage** : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Separate from alkalis. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. Avoid contamination by any source including metals, dust and organic materials. Provide a readily-accessible eyewash facility and quick-drench safety shower. Keep container tightly closed. Keep container in a cool, well-ventilated area.

8 . Exposure controls/personal protection

Product name

Sulfuric acid

Exposure limits

ACGIH TLV (United States, 1/2008). Notes: Refers to Appendix A -- Carcinogens. Thoracic fraction. See Appendix C, paragraph B. Thoracic Particulate Mass TLVs (TPM-TLVs) for those materials that are hazardous when deposited anywhere within the lung airways and the gas-exchange region. Sulfuric acid contained in strong inorganic acid mists ACGIH 2004 Adoption

TWA: 0.2 mg/m³ 8 hour(s).

NIOSH REL (United States, 6/2008).

TWA: 1 mg/m³ 10 hour(s).

OSHA PEL (United States, 11/2006).

TWA: 1 mg/m³ 8 hour(s).

OSHA PEL 1989 (United States, 3/1989).

TWA: 1 mg/m³ 8 hour(s).

Consult local authorities for acceptable exposure limits.

- Recommended monitoring procedures** : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

8 . Exposure controls/personal protection

- Engineering measures** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. Provide a readily-accessible eyewash facility and quick-drench safety shower. Processes should be designed to minimize airborne and skin exposure to hazardous substances.
- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location. Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Remove/Take off immediately all contaminated clothing. Contaminated work clothing should not be allowed out of the workplace.
- Personal protection**
- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with NIOSH if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. The user must check that the final choice of type of glove selected for handling this product is the most appropriate and takes into account the particular conditions of use, as included in the user's risk assessment.
- Eyes** : Avoid contact with eyes. Safety eyewear should be used when there is a likelihood of exposure. Direct contact with the eyes can cause irreversible damage, including blindness. Use safety eyewear designed to protect against splash of liquids.
- Skin** : Avoid contact with skin and clothing. Wear protective clothing. Body garments used should be based upon the task being performed (e.g., lab coat, chemical resistant protective suit, sleevelets, synthetic apron, gauntlets) to avoid exposed skin surfaces. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9 . Physical and chemical properties

- Physical state** : Liquid.
- Flash point** : Closed cup: Not applicable.
- Auto-ignition temperature** : Not applicable.
- Flammable limits** : Not available.
- Color** : Clear.
- Odor** : Mild.
- pH** : <1
- Boiling/condensation point** : >100°C (>212°F)
- Melting/freezing point** : Not available.
- Relative density** : 1.011
- Vapor pressure** : 2.3 kPa (17.5 mm Hg)
- Vapor density** : 0.62 [Air = 1]
- Odor threshold** : Not applicable.
- Evaporation rate** : 1 (butyl acetate = 1)
- VOC** : 3.4 g/l
- Solubility** : Easily soluble in the following materials: cold water and hot water.

Continued on next page

10 . Stability and reactivity

- Stability** : The product is stable.
- Conditions to avoid** : No specific data.
- Incompatibility with various substances** : Extremely reactive or incompatible with oxidizing agents, reducing agents, metals, alkalis.
Highly reactive with organic materials.
Slightly reactive to reactive with acids.
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.
- Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.

11 . Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Sulfuric acid	LC50 Inhalation Vapor	Mouse	320 mg/m ³	2 hours
	LC50 Inhalation Vapor	Mouse	160 mg/m ³	4 hours
	LC50 Inhalation Vapor	Rat	510 mg/m ³	2 hours
	LD50 Oral	Rat	2140 mg/kg	-
	LD50 Oral	Rat	2140 mg/kg	-

Carcinogenicity Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Sulfuric acid	A2	1	-	-	Proven.	-

Enthone has not conducted specific studies on the toxicity of this product.

12 . Ecological information

Aquatic ecotoxicity

Product/ingredient name	Result	Species	Exposure
Sulfuric acid	Acute LC50 42500 ug/L Marine water	Crustaceans - Pandalus montagui - Adult	48 hours
	Acute LC50 42000 ug/L Fresh water	Fish - Gambusia affinis - Adult	96 hours


13 . Disposal considerations

- Waste disposal** : The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG* Label	Additional information
DOT Classification	UN2796	SULFURIC ACID SOLUTION	8	II 	ERG# 157

PG* : Packing group

15 . Regulatory information

United States

HCS Classification : Toxic material
Corrosive material
Carcinogen
Target organ effects

U.S. Federal regulations : **TSCA 5(a)2 proposed significant new use rules:** No products were found.
TSCA 5(a)2 final significant new use rules: No products were found.
TSCA 12(b) one-time export: No products were found.

United States inventory (TSCA 8b) : All components are listed or exempted.

SARA 313

	Product name	CAS number	Concentration
Form R - Reporting requirements	Sulfuric acid	7664-93-9	1-5
Supplier notification	Sulfuric acid	7664-93-9	1-5

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer.

Canada

WHMIS (Canada) : Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class E: Corrosive material

Canada inventory : All components are listed or exempted.

International lists

China inventory (IECSC) : All components are listed or exempted.

Europe inventory : All components are listed or exempted.

Australia inventory (AICS) : All components are listed or exempted.

Japan inventory (ENCS) : All components are listed or exempted.

Korea inventory (KECI) : All components are listed or exempted.

Philippines inventory (PICCS) : Not determined.

16 . Other information

Definition of Terms

ACGIH	American Conference of Governmental Industrial Hygienists
Ceiling	Maximum exposure limit defined by OSHA
CAS	Chemical Abstract Service
IARC	International Agency for Research on Cancer
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit

Continued on next page

16 . Other information

REL	Recommended Exposure Limit
RTK	Right to Know
SARA	Superfund Amendments and Reauthorization Act
STEL	Short Term Exposure Limit
TLV	ACGIH Threshold Limit Value
TLV-C	ACGIH Threshold Limit Value, Ceiling
TRADE SECRET	Claimed as allowed under 29CFR§1910.1200
TSCA	Toxic Substances Control Act
PPE	Personal Protection Equipment
CEPA	Canadian Environmental Protection Act
DSL	Domestic Substance List
NDSL	Non-Domestic Substance List
NSN	New Substance Notification Rules

Disclaimer

This Material Safety Data Sheet may be used to comply with OSHA's Hazard Communication Standard, 29CFR§1910.1200. This Material Safety Data Sheet may also be used to comply with the requirements of Workplace Hazardous Materials Information System, of the Controlled Products Regulations, under the Hazardous Products Act. Enthone furnishes the data contained herein in good faith without liability or legal responsibility for same whatsoever, and no warranty or guarantee, express or implied, is made with respect to such data; nor does Enthone grant permission, recommendation, or inducement to infringe any patent whether owned by Enthone or others. The data is offered solely for your information and consideration. Since conditions of use are beyond Enthone's control, user assumes all responsibility and risk.

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