

# MATERIAL SAFETY DATA SHEET

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## I. Product Name: ACCU DYNE TEST Surface Tension Test Fluids

Form: Liquid  
Color: Dark violet  
Odor: Mild, non-residual; ethereal/ammoniacal

## II. Composition/Ingredients

Constituent	CAS No.	Molecular Formula
2-ethoxyethanol, Reagent Grade (C)*	110-80-5	$C_2H_5OC_2H_4OH$
Formamide, ACS Reagent Grade (F)**	75-12-7	$HCONH_2$
Distilled, deionized water (H)	7732-18-5	$H_2O$
Methyl Violet 2B	8004-87-3	$C_{24}H_{28}N_3Cl$

\* 2-ethoxyethanol is also known as ethylene glycol monoethyl ether, cellosolve solvent, ethyl cellosolve, and glycol ether EE.

\*\* Formamide is also known as methanamide.

## Mix Percentages by Dyne Level

Level	C (vol)	F (vol)	Level	C (vol)	F (vol)	Level	F (vol)	H (vol)
30	100.0%	0.0%	44	22.0%	78.0%	57	100.0%	0.0%
31	97.5%	2.5%	45	19.7%	80.3%	58	81.2%	18.8%
32	89.5%	10.5%	46	17.2%	82.8%	59	73.1%	26.9%
33	81.0%	19.0%	47	15.0%	85.0%	60	65.0%	35.0%
34	73.5%	26.5%	48	13.0%	87.0%	61	56.0%	44.0%
35	65.0%	35.0%	49	11.1%	88.9%	62	47.0%	53.0%
36	57.5%	42.5%	50	9.3%	90.7%	63	38.8%	61.2%
37	51.5%	48.5%	51	7.8%	92.2%	64	30.6%	69.4%
38	46.0%	54.0%	52	6.3%	93.7%	65	24.4%	75.6%
39	41.0%	59.0%	53	4.9%	95.1%	66	18.2%	81.8%
40	36.5%	63.5%	54	3.5%	96.5%	67	13.4%	86.6%
41	32.5%	67.5%	55	2.2%	97.8%	68	8.6%	91.4%
42	28.5%	71.5%	56	1.0%	99.0%	69	6.1%	93.9%
43	25.3%	74.7%				70	3.6%	96.4%

Concentration of Methyl Violet 2B dye varies from 0.8 grams/liter (70 dynes/cm) to 2.0 grams/liter (30 dynes/cm).

## III. Physical Properties

Property	2-ethoxyethanol	Formamide	Water	Methyl Violet 2B
Chemical Family	Glycol Ether	Amide	n/a	n/a
Molecular Weight	90.12	45.04	18.01	n/a
Specific Gravity (20°C)	0.93	1.13	0.998	n/a
pH	n/a	4 - 5 SU @ 200 g/l water	n/a	n/a
Boiling Point @ 760 mm Hg	135 °C	210 °C	100 °C	n/a
Freezing Point @ 760 mm Hg	-90 °C	2 °C	0 °C	n/a
Vapor Pressure @ 20 °C	3.80 mm Hg	0.08 mm Hg	2.34 mm Hg	n/a
Vapor Density	3.1 g/l	1.55 g/l	n/a	n/a
Evaporation Rate (n-butyl acetate = 1)	<0.32	<0.10	n/a	n/a
Solubility in Water @ 20 °C	miscible	miscible	n/a	soluble

## IV. Fire Fighting and Explosion Information

Property	2-ethoxyethanol	Formamide	Water	Methyl Violet 2B
Flash Point	42 °C	150 °C	n/a	n/a
Explosive/Flammability Limit	1.7 - 15.6%	2.7 - 19.0%	n/a	n/a
Autoignition Temperature	238 °C	500 °C	n/a	n/a

**Hazardous Products of Combustion:**

2-ethoxyethanol may form carbon dioxide and carbon monoxide; under oxidation conditions, peroxides may also result. Formamide may form hydrogen cyanide, carbon monoxide, and ammonia when exposed to extreme heat. Victoria Blue dye may form carbon monoxide, carbon dioxide, nitrogen oxides, and hydrogen chloride gases.

**Fire and Explosion Hazards:**

2-ethoxyethanol vapors are heavier than air and may travel along the ground or be moved by ventilation and ignited by heat, pilot lights, other flames and ignition sources at locations distant from a spill or leak point.

**Extinguishing Media:**

Water fog extinguishing media, alcohol foam, carbon dioxide, or dry chemical powder.

**Fire Fighting Instructions:**

Firefighters should be equipped with self-contained breathing apparatus with a full facepiece operated in the positive pressure demand mode with appropriate turn-out gear and chemical resistant personal protective equipment, as described in the personal protection section of this MSDS.

**NFPA Rating:**

Health - 2; flammability - 2; reactivity - 1

**V. Stability and Reactivity****Hazardous Polymerization:**

Product is not known to undergo hazardous polymerization.

**Hazardous Decomposition:**

See Section IV, above.

**Chemical Stability:**

This product is chemically stable.

**Incompatibility:**

Avoid contact with excessive heat, acids, alkalis, and strong oxidizing agents.

**VI. Health Effects**

The most likely route of entry is, by far, dermal absorption. In general, routes of entry for solids and liquids include eye and skin contact, ingestion, and inhalation. Specific health effects are broken out by the two primary ingredients.

**2-ethoxyethanol:****Acute Overexposure Effects:**

Eyes - Liquid or vapor causes irritation, experienced as stinging, excess blinking, and tear production, with excess swelling of the conjunctiva. Skin - Prolonged or repeated contact may cause discomfort and local redness; prolonged or widespread contact may result in the absorption of potentially harmful amounts of material, with effects similar to those induced from swallowing. Inhalation - Causes irritation of the respiratory tract, experienced as nasal discomfort and discharge, with chest pain and coughing; headache, nausea, and vomiting may occur. Swallowing - May cause headache, nausea, vomiting, breathing difficulties, and weakness. Possible kidney damage may result from ingestion of large quantities of material.

**Acute Toxicity:**

Oral, Rat (female) LD50 - 2.46 ml/kg  
Oral, Rat (male) LD50 - 5.09 ml/kg  
Inhalation, Rat, 6 hour exposure to saturated vapor - 0/5 mortality  
Inhalation, Rat, 4 hour exposure at 2000 ppm - 0/6 mortality  
Inhalation, Rat, 4 hour exposure at 4000 ppm - 3/6 mortality  
Percutaneous, Rabbit (female) LD50 - 4.92 ml/kg  
Percutaneous, Rabbit (male) LD50 - 4.00 ml/kg

**Chronic Overexposure Effects:**

Repeated exposures at concentrations of 400 ppm or higher may cause injury to bone marrow, blood cells, kidney, and testes. Based on data from animal studies, overexposure may cause birth defects and impair fertility.

**Formamide:**

**Acute Overexposure Effects:**

Contact with the eyes may result in moderate irritation. Prolonged or repeated skin contact may result in irritation. Formamide can be easily absorbed through the skin. There are no other known acute effects associated with this material.

**Acute Toxicity:**

- Rat, Oral LD50: Slightly toxic.
- Rabbit, Oral LD50: Slightly toxic.
- Cat, Oral LD50: Slightly toxic.
- Rat, Inhalation Safety Screen, 8 hours: Not lethal, saturated vapor, room temperature.
- Rat, Inhalation LC50 - >3900 ppm: No apparent hazard.
- Rabbit, Dermal LD50 - 17000 mg/kg: Practically nontoxic.

**Chronic Overexposure Effects:**

Repeated inhalation exposures up to 1500 ppm have been known to produce kidney damage. Repeated dermal exposure at very high concentrations has been found to produce slight developmental toxicity in the form of fetal growth retardation and malformations in mice but not in rats. Repeated skin exposure in pregnant rats resulted in reduced maternal weight gain in all dose groups; the lowest group showed retarded development, but no malformations. Higher doses caused increased maternal toxicity, fetal toxicity, and malformations.

**VII. Exposure Guidelines**

Guideline	2-ethoxyethanol	Formamide	Water	Methyl Violet
ACGIH TLV, TWA (skin)	5.0 ppm	10.0 ppm	n/a	n/a
OSHA PEL, TWA (skin)	200.0 ppm	no data	n/a	n/a
OSHA VPEL, TWA (skin)	200.0 ppm	no data	n/a	n/a
Supplier Recommended Limit, TWA	2.0 ppm	no data	n/a	n/a
Supplier Recommended Limit, STEL	5.0 ppm	no data	n/a	n/a

**HMIS Rating:**

Health - 3; flammability - 2; reactivity - 1

**VIII. First Aid Procedures**

**Eyes:**

Move individual into fresh air. Gently rinse eyes for 15 minutes. Remove contact lenses, if worn. If symptoms persist or there is any visual difficulty, seek medical attention.

**Skin:**

Remove contaminated clothing. Wash exposed area with soap and water. Rinse thoroughly. If irritation persists or if contact has been prolonged, seek medical attention. Launder clothing before re-use.

**Ingestion:**

Seek immediate medical attention. If the individual is drowsy or unconscious, do not give anything by mouth. Place individual on the left side with the head down. Contact a poison center, physician, or medical facility for advice on whether to induce vomiting. If possible, do not leave individual unattended.

**Inhalation:**

Move individual into fresh air. Keep individual warm and quiet. If individual is not breathing, begin artificial respiration. If breathing is difficult, oxygen may be given by qualified personnel. Seek immediate medical attention.

**Note to Physicians:**

Pre-existing disorders of the following organs (or organ systems) may be aggravated by overexposure: lung (for example, asthma-like conditions), kidney, blood-forming system, male reproductive system, female reproductive system.

**IX. Personal Protection**

**Eye Protection:**

OSHA-approved safety glasses or chemical goggles.

**Skin Protection:**

Wear protective gloves which are resistant to both formamide and 2-ethoxyethanol. Prevent contact with any other skin surface by use of appropriate protective apparel.

**Respiratory Protection/Ventilation:**

Engineering controls should be implemented to maintain exposure levels below threshold limits.

**Other Personal Protection Data:**

Eyewash fountains and safety showers must be easily accessible. Wash thoroughly after handling.

**X. Handling and Storage**

For industrial use only. Keep bottles securely closed at all times while not in use. Do not breathe vapor; do not swallow; keep away from eyes, skin, and clothing; wash away any accidental contact immediately. Use only with adequate ventilation. Keep away from heat and flames. See section 12, below, for details on handling spent materials.

**XI. Spills and Leaks**

Absorb spills with paper toweling or vermiculite. Once absorbed, contain it to preclude evaporation, then incinerate appropriately. Dispose of waste product as described below. Do not discharge without prior written approval from all required health and environmental authorities.

**XII. Disposal of Test Fluids and Spent Samples**

Spent material samples must be handled with care: Disposal of these contaminated materials also presents exposure hazards. We suggest you allocate one trash container exclusively for dyne test waste; use an inner liner, keep it securely covered, and prominently label the lid "DO NOT HANDLE THIS WASTE WITHOUT PROTECTIVE GLOVES. AVOID SKIN CONTACT."

Outdated fluids should be dispositioned through your contracted waste handling firm, who can use this MSDS to properly classify and handle them.

**XIII. Other Information**

**Warranty:**

While Diversified Enterprises believes the information contained herein is factually correct, this information is not to be taken as a warranty for which Diversified Enterprises assumes legal responsibility. It is provided solely for consideration, investigation, and verification.

Russell E, Smith, President

May 13, 2008