

Poly-Solv[®] Ethylene Glycol Ethers

Monument Chemical produces three ethylene glycol ethers:

Poly-Solv[®]*EM, ethylene glycol monomethyl ether
(CH₃OCH₂CH₂OH)

Poly-Solv DM, diethylene glycol monomethyl ether
(CH₃OCH₂CH₂OCH₂CH₂OH)

Poly-Solv TM, triethylene glycol monomethyl ether
CH₃(OCH₂CH₂)₃ OH

Table 1

Typical Physical Properties

	EM	DM	TM
Boiling Point (°C)			
@ 760 mm Hg	124	194	249
@ 50 mm Hg	55	115	152
@ 10 mm Hg	27	82	126
Coefficient of Expansion			
@ 20°C	0.00095	–	–
@ 55°C	0.00099	0.00088	–
Density @ 25°C (lb/gal)	8.05	8.51	8.71
Flash Point, TCC (°C)	41	87	–
(°F)	106	188	–
Flash Point, COC (°C)	–	–	118
(°F)	–	–	245
Freezing Point (°C)	-85	-85	-55
(°F)	-121	-121	-67
Heat of Vaporization @ 760 mm Hg (joules/g)	555.9	379.1	327.6
Molecular Weight	76.09	120.15	164.20
Refractive Index @ 20°C	1.4021	1.4263	1.4381
Solubility @ 20°C			
<i>Poly-Solv</i> in water	Complete	Complete	Complete
water in <i>Poly-Solv</i>	Complete	Complete	Complete
Specific Gravity, apparent @ 20/20°C	0.966	1.021	1.048
Specific Heat @ 20°C (joules/g-°C)	2.233	2.149	–
Vapor Pressure @ 20°C (mm Hg)	6.2	0.2	<0.01
Viscosity, absolute @ 20°C (cp)	1.7	3.9	7.5

The *Poly-Solv* products contain both an ether and an alcohol group and are strong solvents for many substances. Because of their low odor and high solvency they can fill a wide range of solvent requirements.

Poly-Solv glycol ethers can be used as mutual solvents since they are miscible with both water and a variety of organic solvents. They are used in preparation of various types of cleaners, soluble oils, dry cleaning soaps and cutting oils.

Typical physical properties of *Poly-Solv* glycol ether solvents are given in Table 1.

Monument Chemical glycol ether solvents are produced from high purity ethylene oxide. Products of uniformly high standards are the result of processing by continuous distillation techniques under rigid quality control. Specifications for *Poly-Solv* glycol ethers are shown in Table 2.

Table 2
Specifications

	EM	DM	TM
Water, max (% by weight)	0.05	0.1	0.2
Acidity, as acetic acid (% by weight)	0.01	0.01	0.01
Specific Gravity @ 20/20°C	0.964 - 0.967	1.019 - 1.025	1.037 - 1.055
Color, max (APHA)	10	15	50
Odor	M	M	C
Suspended Matter	F	F	F
Boiling Range (°C)			
Initial boiling point, min	123.5	191	220
5%, min	—	—	230
95%, max	—	—	—
Dry point, max	125.5	198	—

M = Mild N = Substantially none C = Characteristic F = Substantially Free

Applications

Cellulose Acetate Solvent. *Poly-Solv* glycol ethers, *Poly-Solv* EM in particular, are excellent solvents for cellulose acetate. This property can be an advantage in the dyeing of acetate rayon. The solvents aid the penetration of the dyestuff into the fiber and tend to even the shade.

These solvents can also be used in adhesives that are designed for binding cellulose acetate plastic articles. The surface of the plastic is softened by the solvent action of the ether, producing a bond between it and the adhesive coating.

Lacquer Solvent. *Poly-Solv* glycol ether solvents may be used in the manufacture of lacquers and dopes. Generally, they are the last of the solvent mixture to evaporate, remaining in the lacquer where they serve as good solvents for the nonvolatile ingredients. They are miscible in all proportions with the ingredients of the lacquer and permit a wide range of formulations.

Best results are obtained by adding *Poly-Solv* glycol ethers for the additional properties they impart (such as non-lifting) rather than by substituting them for other solvents. Their high dilution ratios for aromatic hydrocarbons permit more nonsolvents in a given lacquer formulation.

Resin Solvent. *Poly-Solv* EM exhibits solvent powers for resins, particularly the cellulose esters. This is the basis for its use in certain adhesives. In the production of cellophane adhesive tape, for example, the glycol ether softens the lacquer surface film of moisture-proof cellophane tape, establishing a bond between the tape and the adhesive coating. This solvent action also underlies the use of *Poly-Solv* EM in the solvent sealing of moisture-proof cellophane wrappings, such as those on cigarette packages.

Mutual Solvent. The *Poly-Solv* products are completely soluble in water under most conditions. At the same time, they are strong solvents for some water-insoluble organic substances. This leads to their widespread use as mutual solvents.

They are used as components of some water-based and self-emulsifying liquid cleaners, such as glass cleaners and metal cleaners. They are also used in the preparation of some textile specialties, such as mercerizing compounds, liquid soaps and finishing agents. Inclusion of *Poly-Solv* glycol ethers in the formulation of dry-cleaning soaps increases the solubility of the soaps and the dry-cleaning solvents, and permits the introduction of small amounts of water to remove water soluble stains.

Brake Fluid and Hydraulic Fluid component. *Poly-Solv* glycol ethers, generally *Poly-Solv* TM may be used in some heavy-duty brake fluids. They serve as diluents and provide the desired fluidity over a wide range of temperatures. They are well suited to brake fluid applications because of their high boiling and flash points and their low freezing and pour points. In addition, they are excellent solvents for other brake-fluid ingredients and have practically no effect on rubber.

Finish Component. *Poly-Solv* glycol ethers are important as high potency solvents in certain types of phenolic and epoxy coatings where the resins are used in unmodified or pure form. Because these solvents evaporate relatively slowly, they level the resins and prevent early precipitation during the baking process. Two examples of areas where *Poly-Solv* glycol ethers have been used are in interior can coatings and chemically resistant coatings.

The wide solvent powers and the slow evaporation rate of the *Poly-Solv* products are properties that can be used to advantage with alkyd, urea formaldehyde and maleic modified resins, chlorinated rubber and some vinyl copolymer systems.

Dye Solvent. Collectively, *Poly-Solv* glycol ethers are good solvents for many classes of dyes, including basic, chrome, naphthol and stabilized reduced vat dyes. *Poly-Solv* DM is a fairly standard ingredient in wood stains of the non-grain raising variety, where it functions by dissolving the dyes in a methanol base.

Storage and Handling

Poly-Solv glycol ethers are relatively easy to handle under ordinary commercial conditions. Storage in mild steel is satisfactory for a limited time. For extended storage, however, the use of a lined container is preferable, especially

where color requirements are critical. If these products are to be used or stored in warm surroundings or are to be heated before use, good ventilation should be maintained.

For More Information

Technical Service

Technical service is available to facilitate further use of Monument Chemical products. If you have a specific question or need further information, please write or call Monument Chemical, Customer Service, 2450 Olin Road, Brandenburg, KY 40108; (800) 636-3786, or fax: (270) 422-6456.

Shipping Information

Containers: tank cars, compartmented tank trucks and 55-gallon resin-lined drums (440 lbs net for EM, 460 lbs net for TM and 470 lbs net for DM).

How To Order

To place orders for delivery in the U.S. or Canada and to get fast answers on order status or product availabilities, call our toll-free number: (800) 636-3786.

For written inquiries about orders, and to place confirmations, send to Monument Chemical, Customer Service, 2450 Olin Road, Brandenburg, KY 40108.

^a Lithcote Company

Please refer to the Material Safety Data Sheet (MSDS) for complete information on Storage and Handling, Toxicological Properties, Personal Protection, First Aid, Spill and Leak Procedures, and Waste Disposal. To order an MSDS, call Monument Chemical at (800) 636-3786. Before using or handling this product, the MSDS should be thoroughly reviewed.

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