

PERP Program – New Report Alert

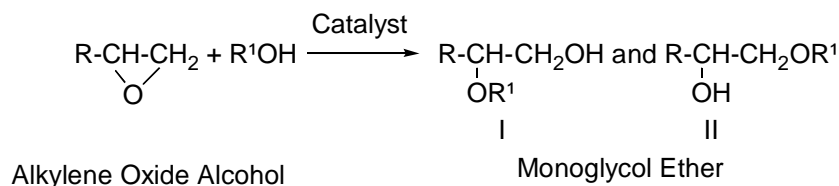
September 2002

Chem Systems' Process Evaluation/Research Planning program has published a new report, ***Glycol Ethers (01/02S6)***.

Glycol ethers, consisting of a series of over 30 ethylene glycol (E-Series) and propylene glycol (P-Series) derivatives are produced by reacting an alkylene oxide with an alcohol. During the reaction, monoglycol, diglycol, and triglycol ethers are produced and then separated. The monoglycol and diglycol ethers are used primarily as solvents in coatings and cleaners; the triglycol ethers are used primarily in brake fluids.

The reaction of an alkylene oxide with an alcohol may be carried out in liquid or vapor phases. The former is preferred and requires sufficient pressure to maintain the reactants in the liquid state.

In general, the reaction is as follows:



R = H or CH₃

R¹ = CH₃, C₂H₅, n-C₄H₉

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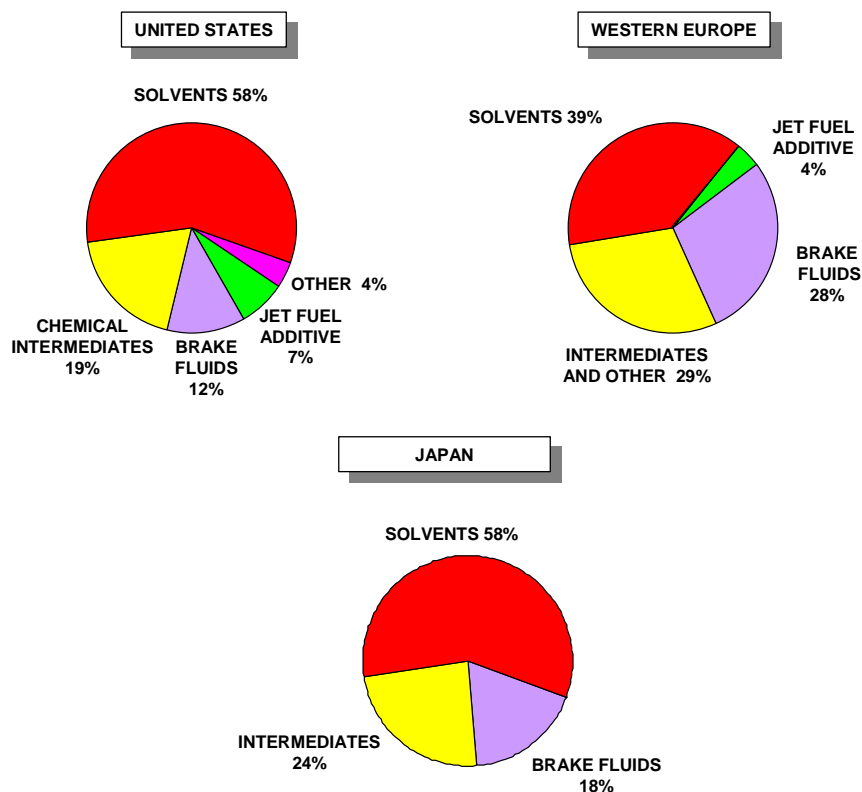
Propylene glycol ethers are of increasing interest, since the corresponding ethylene glycol ethers are more toxic and volatile. This has motivated a shift toward using propylene glycol analogues of ethylene glycol ethers and/or ethylene glycol ethers of higher alcohols.

A homogeneous catalyst such as an alkali metal hydroxide or an alkali metal alcoholate is generally used. Anion exchange catalysts or acidic catalysts also can be used.

Although typically a tenfold molar excess of alcohol is used, the molar alkylene oxide selectivity to the monoglycol ether is about 75-85 percent. Diglycol, triglycol, and higher glycols are formed as by-product.

Because of their physical properties, the largest end-use of E-series glycol ethers is solvents, as shown in the figure below, primarily in paints, coatings, inks, cleaners, and polishes. The next largest volume is for derivative products such as the glycol ether acetates, which are also used principally as solvents. Monoglycol ethers are also used as intermediates to produce diglycol and triglycol ethers.

PRINCIPAL APPLICATIONS OF E-SERIES GLYCOL ETHERS, 2001



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Brake fluids are the third largest application of the E-series. The high boiling diethylene glycol and, principally, triethylene glycol and higher ethers are used in this application. Jet fuel deicers is the last significant application.

The market for P-series glycol ethers is also focused on solvent uses. End-uses are similar to those for the E-series solvents, however, with a greater focus on use in cleaners. Production of intermediates accounts for most of the remaining demand. The propylene glycol ethers are used as intermediates almost exclusively in glycol ether acetate production. The acetates are used in solvents as well.

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