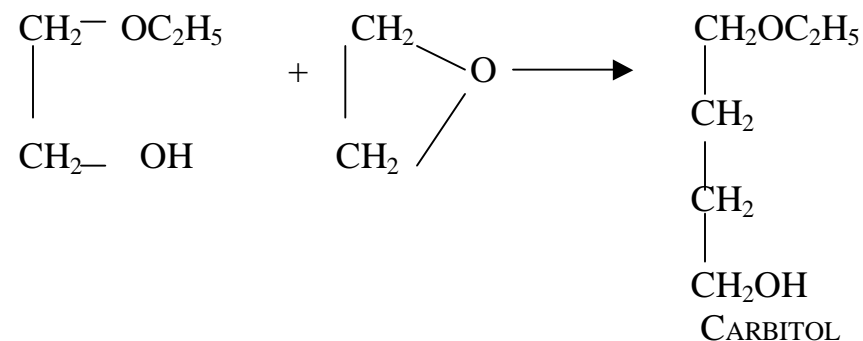
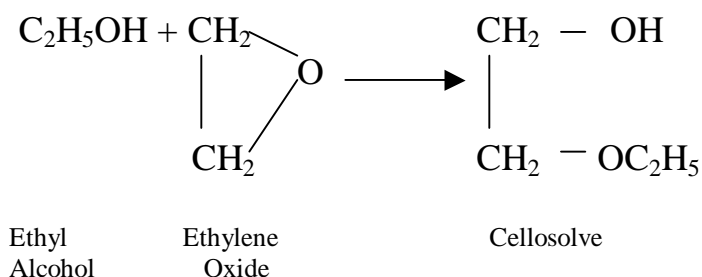


PRODUCTION OF CARBITOL.

Polyethylene glycols as high as the octaethylene glycol have been prepared. The ethers of these polyethylene glycols have attained commercial significance, and this is particularly true of the diethylene glycol ethyl ether, which is sold commercially under the name of carbitol. This product is especially useful in the manufacture of laminated glass, wherein the celluloid interleaf is misted over with a spray of carbitol, which increases the adhesion to the glass. In the printing and dyeing of textile fabrics, it makes possible more economical use of dyes. Carbitol is a solvent with a mild odor, a low rate of evaporation, and a boiling point of 201.9°C. It enters into the manufacture of wood stains and automobile polishes and is used as a lacquer solvent. However, it is particularly valuable in the cosmetic field, where it is employed for creams and hair tonics.

Preparation of Glycol Ethers (carbitol)



There is a large quantity of data available on the German process for the manufacture of the glycol ethers. The monomethyl, ethyl, and n-propyl ethers of ethylene glycol are manufactured by the continuous reaction of ethylene glycol are manufactured by the continuous reaction of ethylene oxide with the anhydrous alcohol at about 200°C and at 25-45 atm pressure. One volume of ethylene oxide and 6 volume of alcohol are fed to a pressure tower packed with iron raschig rings. Excess of alcohol is used to give the required high ratio of glycol ether: diglycol ether, to control the heat liberated in the reactor, and to avoid high concentrations of the ethylene oxide and alcohol is exothermic, about 20-25 kg-cal per g mole of ethylene oxide reacted. The reaction product emerges from the base of the pressure tower and is distilled semi continuously. The alcohol is recycled; the pure glycol and diglycol ethers are isolated by batch fractionation. After removal of excess alcohol, the crude product contains about 85 percent glycol ether, 10 percent diglycol ether, and 2-3 percent polyglycol ethers. The yield of ethers is about 90-95 percent on ethylene oxide and alcohol consumed. The reaction is controlled to give complete conversion of ethylene oxide. Conditions in the pressure tower and feed ratios for methyl, ethyl and n-propyl alcohols are given in table. The contact time has been calculated on the assumption that the reactor capacity is 3.5 cubic m.

Either acids or bases may be used as catalysts in the reaction between ethylene oxide and alcohol. However, acids are corrosive and must be neutralized before treating the crude reaction product, and alkalies lead to the formation of resins with the acetaldehyde present in the ethylene oxide. Because of the above reasons a noncatalytic process was developed. The

Germans also developed a process using aqueous ethyl alcohol, but as this involves a difficult products separation, it is not preferred.

Conditions for Preparation of Glycol Ethers

Alcohol	Temp, °C	Pressure atm	Rate, lb/hr		Contact time, hr
			Ethylene oxide	Alcohol	
Methyl	200	40	120	720	About 4
Ethyl	200-210	35	100	600	About 5
n-propyl	220-230	25	80-90	450-540	About 6