COMMUNICATION

Densities and Refractive Indices of Diethylene Glycol Ether–Water Solutions

Diethylene Glycol Monomethyl, Monoethyl, and Monobutyl Ethers

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DURING THE year 1961–2, the authors discovered that the density and refractive index data for aqueous solutions of diethylene glycol monomethyl and monoethyl ethers by Chiao and Thompson, J. CHEM. ENG. DATA 6, 192 (1961) were in error.

The error was not noticed until the data had been published for several months and the difference detected by comparison with values for known purified material in a Union Carbide Chemicals Co. laboratory. Plans were made to obtain pure compounds and to determine the densities and refractive indices for aqueous solutions made from the new materials. Correct data for these solutions, obtained by the authors are given in Table I and plotted in Figures 1 and 2. The data for diethylene glycol monobutyl ether are correct as presented in the original paper.

Chiao and Thompson had requested samples of these two ethers in pure form from the Union Carbide Chemicals Co. They were not aware that they had received commercial products containing significant amounts of ethylene glycol. Unfortunately, the glycol, in each case, forms a minimum boiling azeotrope with the respective ether. Moreover, these azeotropes cannot be broken by distillation. Consequently, the effort made to purify their samples by careful rectification was unsuccessful due to the presence of these unsuspected constant boiling mixtures. Because diethylene glycol monobutyl ether does not form an azeotrope with ethylene glycol, high purity samples were obtained by the distillation procedure which was ineffective for the other two chemicals.

Table I. Experimental Data

Diethylene Glycol Monomethyl Ether-Water Solutions

Ether,	Densities At		Refractive Indices At			
Wt. %	20° C.	25° C.	20° C.	25° C.	30° C.	40° C.
10.16		1.0046	1.3437	1.3431		
19.65		1.0121	1.3543	1.3534		
30.56		1.0210	1.3666	1.3661		
40.45		1.0284	1.3777	1.3769		
49.81		1.0339	1.3877	1.3867		
59.87		1.0371	1.3977	1.3967		
70.82		1.0362	1.4074	1.4062		
80.67		1.0324	1.4148	1.4136		
90.39		1.0257	1.4211	1.4197		
100.00	1.0210	1.0167	1.4264	1.4245	1.4226	1.4188

Diethylene Glycol Monoethyl Ether-Water Solutions

Ether,	Densities At		Refractive Indices At			
Wt. %	20° C.	25° C.	20° C.	25° C.	30° C.	40° C.
9.98		1.0025	1.3443	1.3441		
19.57		1.0063	1.3557	1.3553		
29.19		1.0142	1.3673	1.3665		
39.37		1.0190	1.3791	1.3781		
49.65		1.0209	1.3904	1.3892		
59.65		1.0225	1.3998	1.3988		
69.42		1.0160	1.4087	1.4071		
79.71		1.0083	1.4162	1.4146		
91.40		0.9959	1.4233	1.4215		
100.00	0.9885	0.9841	1.4273	1.4254	1.4234	1.4194

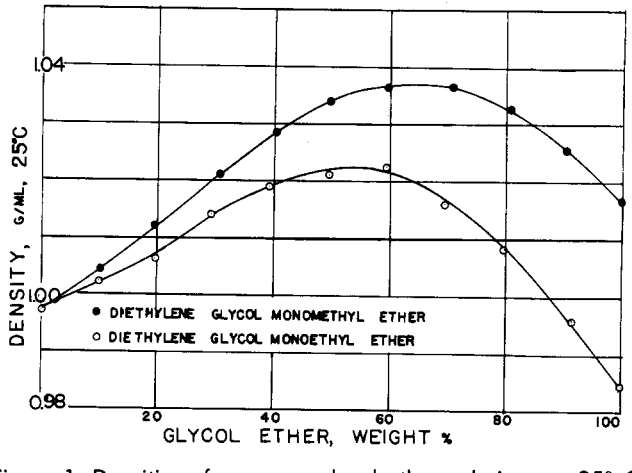

Figure 1. Densities of aqueous glycol ether solutions at 25° C.

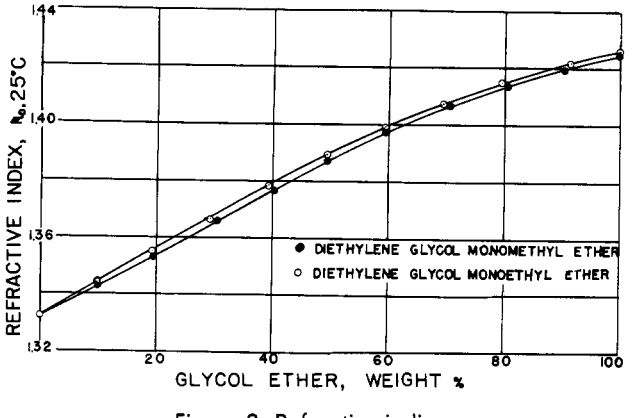

Figure 2. Refractive indices of aqueous glycol ether solutions at 25° C.