

Compressibility, $-\Delta V/V_0 \times 100$
543 cp.
1.16
2.24
3.18
4.06
4.87
5.62
6.32
6.95
7.57
8.15

1.2527 cp.	1.12
0.52	2.10
0.97	2.98
0.713	3.84
0.340	4.61
0.777	5.34
0.993	6.01
0.677	6.62
0.871	7.22
	7.78

1.386 cp.	0.84
0.3070	1.58
0.5761	2.23
0.8135	2.87
0.477	3.46
0.2630	4.03
0.4719	4.57
0.6681	5.08
0.8549	5.54
0.20226	6.03
0.2030	

3.3716 cp.	0.66
0.2374	1.24
0.4495	1.85
0.6679	2.37
0.8578	2.88
1.0414	3.41
1.2345	3.84
1.3896	4.31
1.5605	4.75
1.7188	5.16
1.8675	

F., $\eta_0 = 3.6054$ cp.	0.92
0.3324	1.70
0.6172	2.31
0.8388	2.88
1.0445	3.39
1.2281	3.93
1.4244	4.36
1.5827	4.80
1.7409	5.24
1.8992	5.59
2.0290	

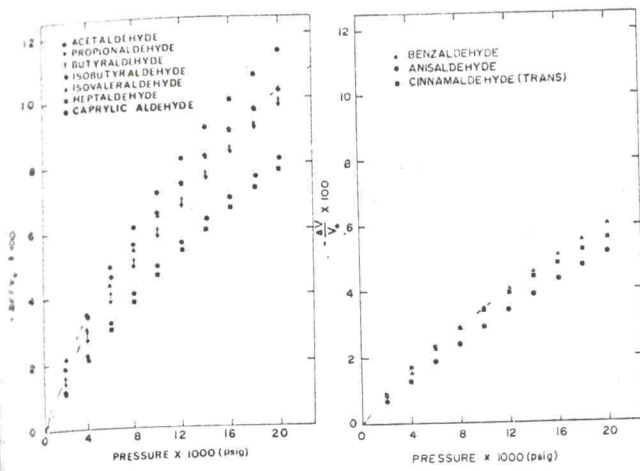


Figure 3. Compressibility diagrams

In case of highly volatile and poisonous liquids, the secondary pump was replaced by a stainless steel and aluminum bomb. The sample was forced into the system by the use of high pressure nitrogen.

#### RESULTS

Viscosity data are given in Table I with the compressibility data for all the aldehydes studied. The viscosity data are estimated to be correct within  $\pm 1\%$ . The errors associated with the compressibility data are below  $\pm 0.4\%$ .

## Densities, Refractive Indices, Molar Refractions, Viscosities, and Dielectric Constants of Triethylene Glycol Dimethyl Ether-Water Solutions at 25°C.

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Densities, refractive indices, viscosities, and dielectric constants of mixtures of water and triethylene glycol dimethyl ether have been determined at 25°C. Molar refractions are also presented. The refractive indices of the solutions increase sharply from pure water to 0.2 mole fraction ether and then increase slowly to the value for the pure ether. The partial molal volume of the ether passes through a minimum which is about 8% less than the ideal molal volume at 0.03 mole fraction ether. The viscosity exhibits a pronounced maximum at 0.14 mole fraction ether. The dielectric constant increases smoothly with water content.

DENSITIES, refractive indices, viscosities, and dielectric constants of mixtures of triethylene glycol dimethyl ether and water have been determined at 25°C. as part of a study of polyether and polyether-water systems. These data as well as the molar refractions of these solutions are presented.

#### EXPERIMENTAL

Technical triethylene glycol dimethyl ether (Ansol Chemical Co., Ansol E-161) was distilled over sodium under a

The equation which correlated the viscosity data with pressure is:

$$\eta = \eta_0 \exp mP \quad (1)$$

where  $\eta_0$  represents viscosity under atmospheric conditions and  $m$  is a constant specific to each substance.  $m$  is plotted against a number of carbon atoms in Figure 1. Equation 1 correlates aldehyde data to a confidence level of 95%.

Graphical representation of viscosity data is given in Figure 2. The slopes of the straight lines indicate the magnitude of  $m$ . Compressibility diagrams for aliphatic and aromatic aldehydes are presented in Figure 3.

#### NOMENCLATURE

$\eta$  = viscosity, cp.  
 $\eta_0$  = viscosity under atmospheric conditions, cp.  
 $m$  = constant, Equation 1  
 $P$  = pressure, p.s.i.

#### LITERATURE CITED

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pressure of 1.5 mm. of Hg at 79°C. A controlled amount of nitrogen was allowed to bubble through the boiling ether. Ether distilled under these conditions contains less than 0.01% water as measured by the Karl Fischer reagent. At 25°C., the ether has a refractive index of 1.4209 and density of 0.9795 compared with the respective values of 1.4233 at 20°C. and 0.974 at 24°C. reported by Zellhoefer (8). Water used for the solutions was distilled from dilute potassium permanganate solution in a seasoned all borosilicate glass assembly. Solutions were prepared as described earlier (6).