

THE SURFACE TENSIONS OF ETHYL ALCOHOL AND CARBON DISULPHIDE AT LOW TEMPERATURES.

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The surface tensions of some organic compounds were measured by the method of capillary rise by one of the present writers and were communicated in this Bulletin.⁽¹⁾ The present paper contains the results of the further measurements with ethyl alcohol and carbon disulphide. The details of the measurements were mentioned in the previous paper.⁽¹⁾

Ethyl alcohol and carbon disulphide used in the present measurements were the pure chemicals from Kahlbaum and purified in the usual ways. Their boiling points were 78.26°C. (759.5 mm.) and 46.00–46.10°C. (760.7 mm.) respectively.

The experimental results are shown in Table 1 and 2 and diagrammatically in Fig. 1 and 2. The formula given at the bottom of each table has been obtained from the experimental data by the method of the least squares, and expresses the relation between temperature and surface energy, τ in the formula for carbon disulphide being the temperature measured from the critical temperature, 277.7°C.⁽²⁾ The formula for ethyl alcohol is quadratic and not of Eötvös type, for it is considered to have anomalous properties in several respects just like methyl alcohol dealt with in the previous paper. From these formulae the surface tensions at the corresponding temperatures have been calculated and are given in the sixth columns of the tables.

(1) Tonomura and Chujo, this Bulletin, 7 (1932), 259.

(2) Landolt-Börnstein's Tables, 5th ed. (1923), Vol. 1, 261.

Table 1.
The Surface Tension of Ethyl Alcohol.

Temp. °C.	Height cm.	Radius cm.	Density $D^{(4)}-d^{(3)}$	Surface Tension Dynes/cm.		Capillary
				σ (obs.)	σ (calc.)	
30.00	2.201	0.02498	0.7810	21.14	21.22	B
20.00	1.530	0.03692	0.7894	22.00	22.00	A
-12.16	2.523	0.02497	0.8166	25.30	25.19	B
-22.02	2.576	0.02498	0.8250	26.10	26.10	B
-31.49	1.789	0.03692	0.8332	27.15	27.04	A
-43.21	2.708	0.02498	0.8453	28.11	28.32	B
-52.83	2.786	0.02497	0.8517	29.12	29.27	B
-62.49	1.926	0.03692	0.8602	30.17	30.29	A
-69.75	2.905	0.02497	0.8667	30.90	31.06	B
-74.73	1.989	0.03692	0.8710	31.54	31.59	A
-80.52	2.995	0.02497	0.8762	32.21	32.22	B
-89.09	3.054	0.02497	0.8838	33.12	33.17	B
-93.03	2.083	0.03692	0.8874	33.64	33.61	A

$$\sigma\left(\frac{M}{D}\right)^{\frac{2}{3}} = 703.09 - 1.3901T + 0.0004318T^2$$

Table 2.
The Surface Tension of Carbon Disulphide.

Temp. °C.	Height cm.	Radius cm.	Density $D^{(5)}-d^{(6)}$	Surface Tension Dynes/cm.		Capillary
				σ (obs.)	σ (calc.)	
20.00	2.089	0.02497	1.2617	32.38	32.33	B
10.00	2.152	0.02497	1.2772	33.76	33.89	B
-1.85	1.510	0.03691	1.2939	35.66	35.75	A
-11.98	1.567	0.03691	1.3082	37.42	37.37	A
-14.43	1.576	0.03692	1.3117	37.69	37.76	A
-14.65	2.354	0.02497	1.3120	37.93	37.79	B

(3) Landolt-Börnstein's Tables, 5th ed. (1923), Vol. 1, 271.

(4) International Critical Tables, Vol. 3, 27.

(5) Ibid., 23.

(6) Landolt-Börnstein's Tables, 5th ed. (1923), 281.

Table 2. (Concluded)

Temp. °C.	Height cm.	Radius cm.	Density $D-d$	Surface Tension Dynes/cm.		Capillary
				σ (obs.)	σ (calc.)	
-21.29	1.613	0.03691	1.3214	38.85	38.87	A
-24.80	2.427	0.02497	1.3265	39.53	39.43	B
-29.93	2.467	0.02498	1.3338	40.42	40.27	B
-31.47	1.669	0.03691	1.3359	40.63	40.53	A
-41.80	2.539	0.02497	1.3506	42.10	42.22	B
-42.39	1.725	0.03691	1.3514	42.47	42.32	A

$$\sigma\left(\frac{M}{D}\right)^{\frac{2}{3}} = 2.0007 (\tau-9.28)$$

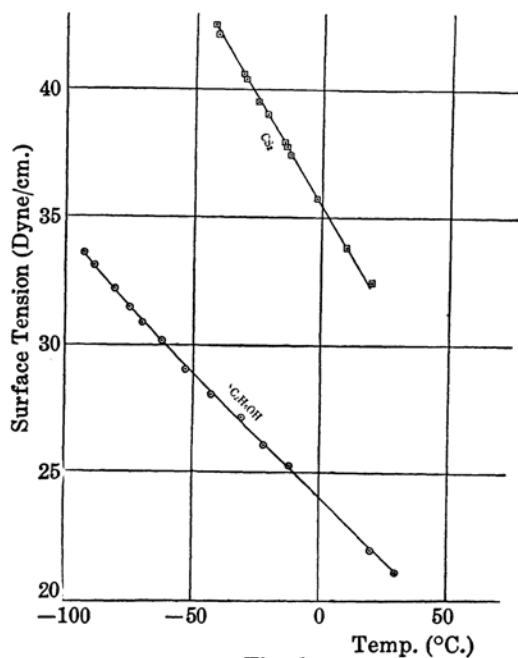


Fig. 1.

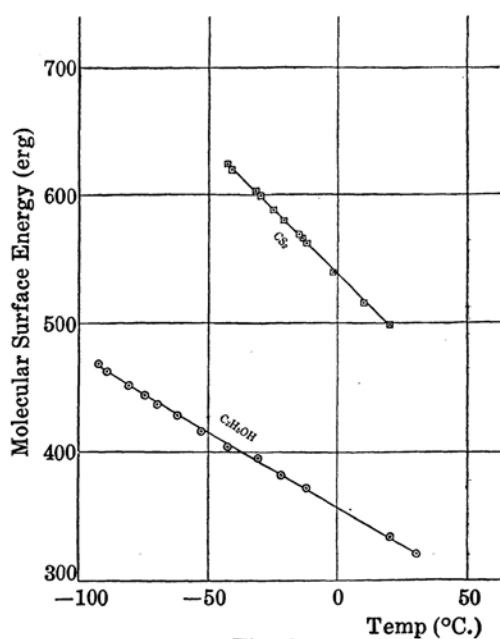


Fig. 2.

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