

84. *Some Physical Properties of Carbonyl Sulphide.*

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THE surface tension of carbonyl sulphide and its density at the ordinary temperature have been determined by the methods employed in the case of carbonyl selenide (preceding paper). The density of the sulphide was only known at -87° (Stock and Kuss, *Ber.*, 1917, **50**, 159).

Carbonyl sulphide, prepared by the action of carbon monoxide on sulphur in a manner analogous to the selenide, was dried by distillation over phosphoric oxide and fractionated in a vacuum with the elimination of head and tail fractions. The middle fraction

was sampled, and the vapour density of the portion abstracted was determined by the Hofmann method [0.0931 g. gave 34.90 c.c. (corr. to N.T.P.); hence vap. density 0.002668 g./c.c. and M , 59.74. Calc. for COS : M , 60.00].

TABLE I.

Temp.	Liquid, c.c. (corr.).	Liquid, g.	D , g./c.c.
0.0°	0.2109	0.2261	1.073
17.0	0.2201	0.2261	1.028
32.2	0.2293	0.2261	0.986

TABLE II.

Temp.	D , g./c.c.	d , g./c.c.	h , mm.	γ , dynes per cm.	Parachor.
2.3°	1.067	0.0375	4.40	13.00	110.8
17.8	1.025	0.0584	3.79	10.48	111.4

($r_1 = 0.04992$ cm., $r_2 = 0.027165$ cm., $g = 981.45$.)

Discussion of Results.

From the density at 0°, 1.073, and the coefficient of expansion between 0° and 32.2°, 0.002710, the density at -87° is found to be 1.30 (Stock and Kuss, *loc. cit.*, give 1.24). The temperature coefficient of the surface tension is 0.1626 dyne per cm. per degree.

Hempel's value (*Z. angew. Chem.*, 1901, **14**, 865) for the critical temperature, *viz.*, 105°, and the above data enable the Eötvös-Ramsay-Shields constant to be calculated: its value, 2.02, indicates that the liquid is not associated.

From the above data the molecular parachor of carbonyl sulphide is found to be 111.1 units (the value calculated from Sugden's atomic and structural data is 119.4).

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