CCLXXIII.—*A Note on the Calculation of the True Adsorption.*

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The formula developed by Williams (*Medd. Vetenskapsakad. Nobel-Inst.*, 1913, **2**, No. 23) for the calculation of the true adsorption is modified by Jones and Outridge (J., 1930, 1574) by taking advantage of the fact that the adsorbates are not subject to any considerable compression in the adsorption space. For the true adsorption of the first component, they get

$$U_{\mathrm{W}} = x/m \text{ (obs.)} + VDC/100 \quad . \quad . \quad . \quad . \quad (1)$$

where x/m is the apparent adsorption, V the internal volume per g. of gel, D the mean density of the liquid adsorbed, and C the concentration of the first component in the equilibrium solution. In the special case of such liquids as exhibit an approximately linear variation of the density with concentration, they suggest an interesting but tedious method of successive approximations for finding the value of the true adsorption. A method is herein suggested by which the calculation is rendered easier. Also it can be applied even in the case of liquid mixtures of which the density–concentration curves do not approximate to a straight line.

If C_g is the concentration of the first component in the gel phase, and D is the density corresponding to the concentration, it can be easily shown that

$$U_{\mathrm{W}} = C_gVD/100 \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

So, by making use of the density–concentration curve of the mixture, it is easy to construct the curve connecting $C_gVD/100$ and D, on which U_{W} must lie (see Curve I and Table I). Also, we know that U_{W} must satisfy the relation (1); hence it must lie on the curve corresponding to the equation with D as the independent variable (see Curves II and Table II). Hence U_{W} must be given by the point of intersection of the two curves. Of course, D is to be plotted along a common axis in both cases; and the same units and scale must be employed in drawing both the curves. Table II gives some of the results obtained by adoption of the two methods; even the slight differences would not have arisen but for the fact that the curve connecting $C_gVD/100$ and D had to be constructed from the very few points given by Jones and Outridge. Cols. 2 and 3 in this table are the calculated values of $x/m + VDC/100$ for the two different values of D shown at the heads of the columns.

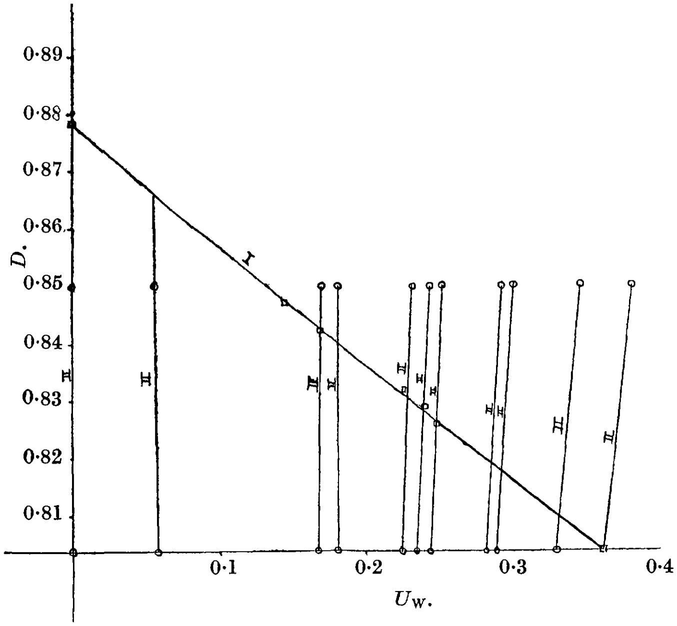

TABLE I.

C_g.	D.	$C_gVD/100$.	C_g.	D.	$C_gVD/100$.
100·00	*0·8042	0·3614	44·83	0·8422	0·1699
67·39	0·8245	0·2500	37·98	0·8470	0·1447
64·59	0·8286	0·2408	0·00	*0·8787	0·0000
60·85	0·8313	0·2277			

* From Landolt–Börnstein Tables.

TABLE II.

	$x/m + VDC/100$.			
C.	D = 0·8042.	D = 0·8500.	Uw (new).	Uw (J. and O.).
0·05	0·056	0·056	0·056	0·056
9·93	0·168	0·170	0·169	0·169
16·45	0·180	0·183	0·182	0·181
38·30	0·226	0·234	0·230	0·231
45·00	0·235	0·244	0·240	0·240
48·84	0·244	0·254	0·249	0·251
67·39	0·280	0·294	0·284	0·288
70·59	0·288	0·302	0·292	0·293
88·18	0·329	0·347	0·331	0·332
100·00	0·362	0·382	0·362	0·362

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