mixtures from the mixture law do not exceed 2–3 per cent except in the case of acetone-chloroform, where a maximum deviation of about 4 per cent is obtained : results which are substantially in agreement with those of our critics.

Since our new apparatus came into use, full details have been published for the mixtures of acetone and trichloroethylene[4]. Details of other binary mixtures of organic liquids are to be found in the same paper and in a further paper[5]. The general conclusions to be drawn from the values obtained for about fifteen series of binary organic mixtures of substances of varying chemical type are that, in common with other physical properties, (i) the magnetic susceptibility exhibits slight deviations from the mixture law for most binary mixtures of organic substances ; (ii) where the constitution and molecular weight of the constituents of the mixtures are similar the deviations are very small, rarely exceeding 0·5 per cent ; and (iii) where there is considerable difference in chemical constitution or mass the deviations are slightly larger, about 1–4 per cent. When, however, molecular susceptibilities are compared, the deviations are much smaller, rarely exceeding 0·1 per cent, and thus come into line with the deviations of other physical properties from the mixture law.

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[1] *Proc. Roy. Soc.*, A, **131**, 209 (1931).
[2] NATURE, (Jan. 16, 1932).
[3] Trew and Watkins, *Trans. Far. Soc.*, **30**, 1310 (1933).
[4] Trew and Watkins, *loc. cit.*
[5] Trew and Spencer, *Trans. Far. Soc.*, **32**, 701 (1936).

Centrifuging in Rotating Hollow Cylinders

PROBLEMS in particle size analysis in disperse systems may be divided in general into two classes, namely, those involving the determination of the size or molecular weight of particles comprising the disperse phase of a monodisperse system, and those involving the determination of the particle size distribution function for the disperse phase of a polydisperse system.

Dr. M. Schlesinger has described[1] a most ingenious method for determining the molecular weight of units of the disperse phase in presumably monodisperse systems. The method employs the Sharples super-centrifuge run with a 'closed bowl'. Using the Sharples super-centrifuge with a continuous flow or separator bowl, we have been able to obtain sufficient data for the calculation of the particle size distribution curve in such polydisperse systems as colloidal clays, all particles of which have equivalent spherical diameters substantially below 500 mμ.

Our method, which was presented before the thirteenth Annual Colloid Symposium in St. Louis, on June 11, 1936, involves feeding at a constant rate a suspension of known concentration and temperature into the centrifuge bowl, which rotates at constant speed. As the suspension flows through the bowl, there is a partial sedimentation of the particles of the disperse phase on to a removable celluloid liner flush with the walls of the bowl. After a suitable amount of suspension has flowed through the bowl, the operation is discontinued and the liner containing the sediment withdrawn. At definite distances along

the liner, the sediment is quantitatively removed and weighed. From this data the particle size distribution curve may be calculated. As it is unnecessary to settle out the disperse phase completely, the effluent liquid, while reduced in concentration in disperse phase, may still contain some disperse phase, depending on the rate at which the suspension is fed into the bowl during the run.

This method, which will be published in detail in the volume reporting papers at the 1936 Colloid Symposium, as well as in a forthcoming issue of the *Journal of Physical Chemistry*, is particularly useful when it is desired to make a particle size fractionation of some polydisperse system ; for example, when it is contemplated studying the influence of the particle size variable upon other properties of the colloidal sol. We have developed it in particular for use in determining the influence of particle size on thixotropy and rheopexy of suspensions of the colloidal clay bentonite.

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[1] NATURE, **137**, 549 (Sept. 26, 1936).

Constitution of Tetranitromethane

IN a "Research Item" in NATURE of November 7, p. 807, attention is directed to the question of the constitution of tetranitromethane. Instead of the usual symmetrical formula, it is suggested that the substance is to be represented by the expression :
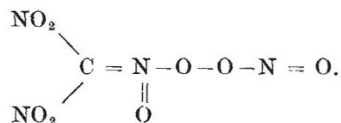
The arguments[1] have been reproduced so recently in NATURE that it is unnecessary to repeat them, but they appear to be fallacious for the following reasons : It is said that the symmetrical formula does not explain the oxidizing properties of the substance, but this statement fails to take into account the strong inductive effect of the nitroxyl groups. The molecule as a whole must be powerfully cationoid and electron-accepting, as indeed is shown by the colorations produced when tetranitromethane is dissolved in anionoid solvents without decomposition. But furthermore, the $C(NO_2)_3$ group must be that substituted methyl group with the greatest general electrical effect (electron-attracting) and it will excel in this respect even the groups CF_3 and CCl_3. It is therefore not at all surprising that the compound $C(NO_2)_3.NO_2$ simulates peroxidic character and is very readily reduced.

A perfectly analogous case is that of carbon tetraiodide, which is very readily reduced to iodoform, and in this case a special constitution would be difficult to devise. Again, it is said that one of the nitro groups of tetranitromethane is markedly different from the others in its reactions, but it should be remembered that when this first nitro group has been removed, the substance is no longer tetranitromethane. It has acquired the hydrogen atom necessary for