half change of chromium chloride of the same molar strength at different temperatures, it is seen that the transformation is accelerated to a great extent by a rise in temperature, the rate of the change in equimolar solutions at 25° C. being 2·2 times of that at 19·85° C. and 43 times of that at 0° C. The high temperature coefficient also shows that the order of the reaction is less than unity.

The chlorides of sodium and potassium have no effect on the rate of the transformation. On the other hand, the reaction is considerably retarded by H^+ ions. Further work is in progress to elucidate the mechanism of this semi-molecular process.

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1. Datar and Qureshi., *J. Osm. Univ.*, 1940, **8**, 6–20. 2. Bjerrum, *Z. Physik Chem.*, 1907, **59**, 336; 1910, **73**, 724. 3. Lamb and Fonda, *J. Amer. Chem. Soc.*, 1921, **43**, 1154.

A METHOD OF CALCULATING "SINGLE-VALUE-FIGURE" FROM THE RESULTS OF AGGREGATE-ANALYSIS OF THE SOIL

The most common and the one very widely used method of presenting the results of aggregate analysis of a soil is by drawing a size-distribution-curve in which the summation percentages of fractions are plotted against the logarithms of their settling velocities in water. In their studies on the effect of different irrigational, manurial and cropping treatments on the periodical changes in the structure of the soil, the authors noticed that the size-distribution-curve failed to bring out prominently the small differences in the structure of the soil brought on as an effect of season and treatment. The mathematical formula suggested by Baver and Rhoades (1932) for characterising the state of aggregation of the soil could not be used, as the aggregate-analysis of the soil was carried out on field-moist sample without dispersion. Similarly the formula suggested by Cole (1938-39) for working out the relative surface area contributed by the soil aggregates graded by sieving could not be correctly applied as the analysis of the soil was carried out by combining the sieving operation with elutriation. In recent years the use of a single-value-figure for specifying a particular property of the soil has gained much favour and it is proposed to give in this note a method of working out a "single-value-index" for studying the structural condition of the soil when the aggregate analysis is carried out by combining the two operations.

Sieving of the Soil

The sieving of the soil is carried out under the surface of water and the bank consists of sieves having apertures of the following diameters:—No. 1=7 mm., No. 2=4 mm., No. 3=2 mm., No 4=1 mm., and No. 5=½ mm.

If a, b, c, d and e are percentage fractions collected on sieves 1 to 5 respectively, then the area contributed by each of the fractions can be obtained by dividing the percentage fraction by the average diameter of the fraction and would be equal to:—

$$a/7\,;\ b/\frac{7+4}{2}\,;\ c/\frac{4+2}{2}\,;\ d/\frac{2+1}{2}\ \text{and}\ e/\frac{1+0{\cdot}5}{2}$$

the fraction collected on the first sieve being arbitrarily assigned a value of 7 mm. The total area contributed by all the aggregates graded by sieving would be the sum of all the figures shown above and denoted as "S".

Elutriation of the Soil

The elutriator (Kopecky's type) has four cylinders, each separating the particles into aggregates having the ranges of diameters shown below:—

No. 1 = 0·50 mm. to 0·20 mm.; No. 2 = 0·20 mm. to 0·10 mm.; No. 3 = 0·10 mm. to 0·05 mm.; No. 4 = 0·05 mm. to 0·02 mm. Particles smaller than 0·02 mm. in diameter pass out of the elutriator, and their percentage is calculated by difference. If x_1, x_2, x_3 and x_4 are the percentage fractions collected in cylinders 1 to 4 the area contributed by each of the fractions would be equal to:—

$$x_1/\frac{0{\cdot}5+0{\cdot}2}{2}\,;\ x_2/\frac{0{\cdot}2+0{\cdot}1}{2}\,;\ x_3/\frac{0{\cdot}1+0{\cdot}05}{2}\ \text{and}\ x_4/\frac{0{\cdot}05+0{\cdot}02}{2}.$$

The fraction passing out of the elutriator would contribute an area =

$$\frac{\text{percentage fraction less than } 0{\cdot}02 \text{ mm.}}{0{\cdot}02}$$

The total area contributed by all the fractions graded by the elutriator would be the sum of all the above figures and denoted by letter 'E', and the total area contributed by all the soil aggregates graded by sieving as well as by elutriation would be the sum of the two figures S and E, calculated in the manner described above.

The elutriator separates particles of very fine size and so it will be seen that even small differences in their percentage greatly influence the value for the total surface area of the soil. On the other hand, large differences in the coarser fractions graded by sieving do not affect this value to a great extent. It would, therefore, be evident that soils which contain larger amounts of the finer fractions will show very much higher figures for the total surface area than those which contain smaller amounts of finer fractions. Assuming that high proportions of aggregates less than 0·50 mm. in diameter would affect the structure of the soil adversely, it follows that higher the figure for the total surface area worse the structure.

It is suggested that the single-value-figure calculated in the manner described above would furnish a very useful index for the structural condition of the soil when the grading of the soil is carried out by combining the sieving operation with elutriation.

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June 17, 1946.

1. Baver, L. D., and Rhoades, H. F., *Jr. of the Amer. Soc. of Agron.*, 1932, **24**, 920. 2. Cole, R. C., *Hilgardia*, 1938–39, **12**, No. 6, 429–471.

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