

at infinite dilution) =  $29.9 \text{ ohm}^{-1} \text{ cm}^2$ .  $K$  (dissociation constant) =  $1.63 \times 10^{-6}$ .

The values for propionic acid cannot yet be given.

This work is being carried out with solutions of different electrolytes in formic acid ( $D = 58$ ), acetic acid, propionic acid and mixtures of these solvents.

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<sup>1</sup> Fuoss, R. M., and Kraus, C. A., *J. Amer. Chem. Soc.*, **55**, 21 (1933).

<sup>2</sup> Jones, G., and Josephs, R. C., *J. Amer. Chem. Soc.*, **50**, 1049 (1928).

<sup>3</sup> Jones, G., and Bollinger, G. M., *J. Amer. Chem. Soc.*, **53**, 411 (1931).

<sup>4</sup> Shedlowsky, Th., *J. Frank. Inst.*, **225**, 739 (1938).

### Micro-spherical Aggregation of Barium Sulphate

DURING an investigation of the influence of certain organometallic compounds on the velocity of sedimentation of inorganic materials in non-aqueous media, a phenomenon has been observed which does not appear to have been previously recorded. Precipitated barium sulphate, free from soluble salts, as prepared for X-ray examinations, and containing no addition agent, was dried for several days at  $110^\circ \text{C}$ ., and shaken with pure dry benzene in a stoppered Nessler tube in an automatic shaker. The shaking was carried out at the rate of five oscillations per second, the tube being shaken longitudinally, with a displacement of 2 in. After 24 hr. the solid had aggregated completely into spheres of 1.0–5 mm. in diameter, as shown in Fig. 1(a). The sediment

volume was slightly less than that of the lightly tamped dry solid, indicating a close degree of packing of the spheres. If the tube was then subjected to very violent and irregular manual shaking, the spheres broke up to form a flocculate (shown, after 24 hr. standing, in Fig. 2). On further regular shaking for 30 min., the spheres re-formed as before.

It is tentatively suggested that this phenomenon may be due to the fact that barium sulphate has a hydrophilic surface (method of Davis and Curtis<sup>1</sup>), and that it will consequently tend to aggregate so as to present to the benzene the minimum surface per unit volume. In this respect the phenomenon can be regarded as in some way analogous to the formation of drops of one liquid when shaken in another. It is to be expected that this form of aggregation would not occur in a solvent which is miscible with water, so the experiment was repeated with 1:4 dioxan. The suspension formed was very fine, and settled very slowly (about 4 cm. per hr.); Fig. 1(b) shows its appearance after standing for three days. Even after prolonged shaking, no sphere-formation was observed. In diethyl ether, however, the barium sulphate formed spheres, though somewhat larger and more easily broken up than those from the benzene suspension.

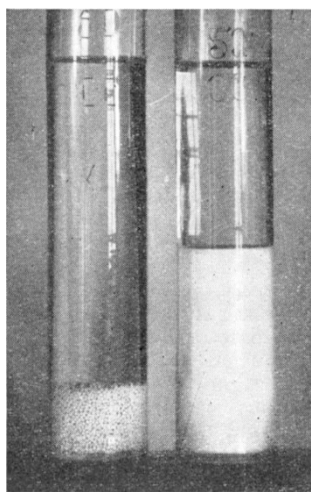


Fig. 1

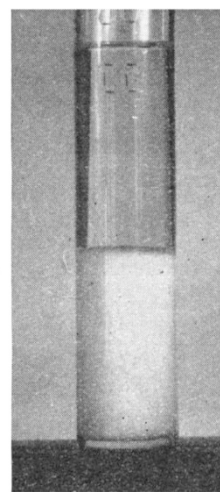


Fig. 2

In each of the tubes (Figs. 1 and 2), which were of equal diameter, the total volume of solid and liquid was 50 ml., and the weight of barium sulphate was 10.00 gm.

A further experiment was carried out, using basic lead carbonate, which is known to have an 'organo-philic' surface<sup>2</sup>. On shaking this with benzene there was, as might be expected, no sign of sphere-formation.

This work is being continued, and will be reported in detail elsewhere.

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<sup>1</sup> Davis, N. S., and Curtis, H. A., *Indust. Eng. Chem.*, **24**, 1137 (1932).

<sup>2</sup> Campbell, G. A., "Wetting and Detergency", 107 (Harvey, London, 1937).