

small particles, e.g. Brownian movement, filtration, etc., show a corresponding gradation in their action.

As regards the theory of the constitution of colloidal solutions we have the most satisfactory explanation in the case of the reversible colloids. Chiefly on account of the work of Hardy, these solutions are now looked upon as consisting of two phases. For example, in the case of the hydrosol of gelatine, we have a solution of gelatine in water, and a solution of water in gelatine, in the same sample. Any cause which alters the equilibrium state of these two phases will bring about a change in the sol. This view is important in the explanation of anomalies exhibited by these solutions in their relation to semipermeable membranes. The particles visible in the ultramicroscope in these solutions represent the water-in-solid phase. In general these particles are the smallest of those visible in any colloidal solution, while the particles of many of such solutions are invisible even in the ultramicroscope. This explanation has also been extended to apply to irreversible colloids, the particles of which are larger and appear to be merely very fine pieces of solid.

Many theories of the structure of irreversible colloids and the action of electrolytes in coagulating them have been formed, but as yet no completely satisfactory general explanation has been suggested. Besides the partial chemical action which may take place, there is the phenomenon of absorption exhibited by these particles, in a manner somewhat analogous to the absorption of gases and dye-stuffs by carbon, and the occlusion of hydrogen by platinum and many other metals. Their work on the Kerr phenomenon and the magneto-optical phenomena given by ferric hydroxide colloidal solution, has led Cotton and Mouton to the conclusion that we have in this case particles which are anisotropic<sup>12, 66, 67</sup>.

The department of the Schutzkolloid is another indication of the complexity of these solutions. In addition to the remarkable action of reversible colloids in the rôle of protecting irreversible colloids from coagulation by electrolytes, Bechhold has shown that they have an analogous action in relation to filtration.