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## 8. Studies on the Formation and Aging of Precipitates. (I)

### Electron Microscopic Investigation of the Formation of Barium Sulfate Precipitate

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The chemical and physical properties of the precipitate of sparingly soluble salts are influenced by the condition of precipitation of them. Various theories have been proposed regarding the mechanism of the crystal growth. By the electron microscope the authors observed on the particle size and shape of barium sulfate precipitate which was formed from various concentration of reactants.

The reactants were $Ba(OH)_2$ and $H_2SO_4$, but $BaAc_2$ and $MnSO_4$ were used at the concentration higher than 0.2 mole/l. The equivalent solutions of these reactants were simultaneously mixed in equal volumes in a large test tube. A drop of the reaction product was placed on the specimen holder for electron microscope and dried. The samples were photographed by means of electron microscope (SM-T4) and about 500 micrographs were taken. The relation of the particle size and shape to the total concentration of barium sulfate is shown in Table 1.

Table 1. Particle size, shape and the total concentration of barium sulfate.

| Total concentration $C_0$ mole/l | Particle size $L$ (m$\mu$) | $C_0 \times L$ | Particle shape |
|---|---|---|---|
| 1.00-0.25 | 13-51 | 12.7 | Sphere |
| 0.10-0.05 | 251-470 | 23.8 | Spindle |
| 0.04-0.02 | 182-466 | 8.2 | Cross-spindle |
| 0.01 | 1650 | | Diamond |
| below 0.01 | 2030-110 | | Diamond and rectangle |

In the ranges of total concentration, 1.00-0.25 mole/l., 0.10-0.05 mole/l. and 0.04-0.02 mole/l., hyperbolic relations were observed between the particle size and the total concentration.

In conclusion, the particle size and shape of the freshly precipitated barium sulfate were changed in responce to the precipitation process, and so far as the particle shape was same, it was verified that the particle size and the total concentration had the hyperbolic relation. The precipitation law of P. P. von Weimarn was proved in colloidal dimension by electron microscope.