

EXPERIMENT #4

Coagulation

Due to the dissolved and suspended particles in surface waters, two processes namely Coagulation and Flocculation are used to separate solids from water. Here the suspended particles can vary considerably in source like charge, particle size, shape and density. Thus the selection of coagulants mainly depends on the understanding the interaction between these factors. Meanwhile most of the solids suspended in water possess a negative charge and since they have the same sign on surface, repel each other when they come closer.

Considering these factors, the first step should be overcoming these forces and neutralize the suspended particles in suspension. In coagulation process, coagulants with opposite charges of those suspended solids are added to the water for neutralizing the negative charges on dispersed non-settable solids such as clay and other color-producing organic substances and destabilizing the colloidal particles. The reverse process involving the stabilization of colloid particles is known as “peptization”. In general coagulation refers to the formation of compact aggregates leading to the macroscopic separation of a coagulum while flocculation is used for implying the formation of a loose or open network which may or may not separate macroscopically.

Certain ions are necessary to cause coagulation. The amount of electrolyte required to induce coagulation depends upon the valence of the counter ion in the salt. This concentration of electrolyte is known as critical coagulation concentration (CCC). In this manner, the most important parameter is the valence of the counter ion in coagulation processes where the effect of counter ion can be explained by the Schulze-Hardy rule (1).

Materials

- Glass Beads (with d_{50} 10 μm)
- Different salts as NaCl, CaCl₂, BaCl₂ as coagulants

Experimental Procedure

For investigating the effect of electrolyte and by the way valence of the counter ion in the salt, different salts will be added to the suspension involving 5 wt. % glass beads. After certain time intervals the settling ratio will be recorded for each salt. In addition, different concentrations of salts will be examined.

Report

Discuss the source of differences in coagulation characteristics for different salts and salt concentrations.