Coagulation: Important Factors

> **Definition:** *"The process of adding chemicals to water to destabilize charges on naturally occurring particles to facilitate their subsequent aggregation and removal by flocculation or filtration."*
>
> *Centres for Disease Control and Prevention (CDC)*
> *(http://0-www.cdc.gov.mill1.sjlibrary.org/)*

There are a number of very important factors to consider when you want to ensure proper and successful coagulation:

- The best coagulant and coagulant–aid (if required) must be identified for the specific raw water, the optimum dosage must be determined for the range of turbidities normally encountered in the plant and optimum conditions of pH and alkalinity must be determined for the different chemicals and dosages. Normally this is done in a laboratory by means of beaker tests.
- The coagulant (and coagulant-aid) must be added to the water at a point and under conditions that will ensure rapid dispersion and complete mixing of the small volume of coagulant with the large body of water.
- The pH and alkalinity of the raw water must be adjusted according to the levels identified in the beaker tests.
- Coagulant storage and preparation of the solution (especially for polyelectrolytes) must be done strictly according to the directions of the supplier.
- If there are algae present in the raw water, it may be necessary to add a small amount of chlorine to the raw water (pre-chlorinate) to kill the algae before coagulation.

The Beaker Test

A typical beaker test is done in the following way:

- A specified volume (e.g. 750ml) of the water, which requires treatment, is measured into six beakers.
- Predetermined quantities (e.g. 5, 10, 15, 20, 30 and 40mg/l) of the selected coagulant are added to the water in each beaker.
- Stir the contents of each beaker rapidly for one minute, and then stir at a slow rate for approximately 20 minutes.
- After switching off the stirrers, the formation and subsequent settling of the flocs can be observed.
- After 30 minutes, the turbidity of the clear water in each beaker (supernatant) is measured.
- These measurements, as well as visual observation, are used to determine the optimum dosage of the coagulant.

References: DWAF (2002): Quality of domestic water supplies. Vol 4: Treatment Guide