



InfoBrief: IB02

Polymer Coagulants and Flocculants to Improve Water Quality in Construction Site Runoff

Removal of fine-grained sediments from construction site runoff sometimes cannot be accomplished by traditional gravity settling or filtration methods. This is particularly true with the advent of the more stringent NPDES (National Pollution Discharge Elimination System) rules enacted in 2003, which impose strict standards on allowable sediment discharges. To meet the new discharge criteria, it is often necessary to treat runoff with a coagulation/flocculation system, particularly with water containing high levels of very fine grained or colloidal materials, such as some silts, clays, or iron oxides.

Coagulation and flocculation methods are proven technology, having long been used in many types of water treatment systems, but only recently have they been applied to construction sites and other temporary projects. In brief, coagulation/flocculation systems are designed to promote settling and removal of fine-grained particles from water. Coagulation eliminates the mutual repulsive effect between particles (due to a common negative charge, for example), which promotes agglomeration. Coagulation by itself may or may not produce a particle mass with sufficient density for rapid settling. Flocculation, which is the process of physically connecting or bridging suspended particles to increase particle mass or density, may also be necessary to assure sediment removal.

Coagulation/flocculation systems operate by adding a chemical agent to the influent water, mixing, and removing (normally by settling) the resulting agglomerated particles. Coagulant and flocculant chemicals are generally organic or inorganic polymers (large molecules of repeating units), a variety of which are used in water treatment. The particular variety to be used for a given project is determined based on the water chemistry of the site, because the polymers are specific in their reactions with various types of sediments. Appropriate polymer selection and dosage must be carefully matched to the characteristics of each site. ProTech conducts site-specific testing for each project to determine the proper polymer and dosage.

The potential toxicity of the polymers is an important consideration, especially at sites that discharge to surface waters. ProTech always designs its water treatment systems to use the most environmentally-friendly coagulants and flocculants practical. The toxicity of dissolved free polymers varies over a wide range, from a few parts per million (ppm) to over 1000ppm, depending on the specific polymer as well as the type of organism. Toxicity data is included in the Material Data Safety Sheets (MSDS) for each polymer; MSDSs for the specific polymers used on a given project are available upon request from ProTech. Note however, that the MSDS toxicity data is based on free polymer, or pure polymer dissolved in water. When properly applied in a treatment system, virtually 100% of the polymer is irreversibly bound with the sediment and removed from the water, and the effluent water is rendered completely nontoxic. Furthermore, it has been demonstrated that free polymer is completely adsorbed even when applied at several times the proper dosage, allowing a large margin of safety in system operation.

As specialists in water treatment, ProTech recognizes that clean water and a healthy environment are the lifeblood of society. ProTech is committed to environmental stewardship, and conducts all of its operations in a manner that protects and preserves natural resources. ProTech has an ongoing research program evaluating environmentally-friendly water treatment methods. For more information on water treatment and water quality issues, contact a ProTech representative.