Successful Sludge Dewatering

Case History: Cationic Flocculant Chemistry Delivers Multiple Benefits

Athlon Solutions
The chemistry of results™

Athlon Solutions was able to significantly reduce the costs of sludge dewatering at the belt press for a valued customer. The solution was the application of a cationic flocculant, PL-1682. Benefits seen:

- Reduced Chemical Cost
- Reduced Maintenance Cost
- Reduced Turbidity & Total Suspended Solids
- Reduced Dewatering Time
- Six-Figure Annually Treating Savings

Managing Sludge Dewatering

Sludge dewatering is a method of separating sludge into liquid and solid phases, making it easier to handle and reduce costs associated with transportation, composting, and incineration or disposal in a landfill. Synthetic organic polymers are widely used by the industry to facilitate dewatering of sludge bio-solids. Effective sludge conditioning produces a floc that remains intact and is strong enough to sustain shearing forces during the mechanical dewatering process. The amount of polymer needed for good floc properties varies from plant to plant and depends on polymer, sludge type, and other operating parameters.

Not All Polymers are Created Equally

Different polymer types have different optimum dosages and dewatering efficiency when tested on the same sludge. Choosing the “right” polymer optimizes sludge coagulation and flocculation, leading to maximum water drainage. The behavior of the polymer in the aqueous solution and its ability to invert and uncoil exposing maximum surface area for the particles to adhere to is critical. Fully uncoiled polymer expedites bio-solids flocculation and formation of a porous floc, allowing for quick release of the bound water. The polymer’s physical properties (such as molecular weight, branching, charge density, functionality and cross-linking) also affects sludge floc formation characteristics and water release.

Not All Sludge Types Dewater Equally

Inudstrial sludge is classified into primary and secondary sludge. Secondary sludge, commonly referred to as “bio-solids”, often falls into one of two categories (although others exist): thickened waste activated sludge (WAS) and aerobic digestion. In general, digested sludge is much more difficult to flocculate and dewater compared to the thickened WAS. Digestion releases elevated concentrations of bio-colloids (i.e., colloidal entities of organic nature consisting primarily of proteins and polysacccarides) into the mixed liquor. During sludge conditioning, these bio-colloids bind to the polymer, decreasing the number of polymer active sites, and reducing the surface area available to flocculate bio-solids. These bio-colloids also tend to retain water, requiring more force to dewater the bio-solids.

Key to Success

The key to successful sludge dewatering is to find a polymer with the correct combination of charge, molecular weight, functionality, and cross-linking. Finding an optimum polymer dose is also crucial since overdosing can create elevated effluent water turbidity, excess foaming, and lead to additional operational issues. Highly cross-linked polymers have a tendency to retain water molecules inside the floc, compromising the release of bound water. Having insufficient cross-linking can cause floc particles to fall apart through process shearing.

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