

Sodium Aluminate: The Cost-Effective Choice for the Removal of Phosphorus from Wastewater

This alkaline, inorganic coagulant boosts pH and alkalinity while removing phosphorus.

Liquid sodium aluminate (LSA) is becoming an increasingly popular choice for the removal of phosphorus in municipal and industrial wastewater plants. As discharge limits for nitrogen and phosphorus become more stringent, many plants are implementing both biological and chemical treatment systems for their reduction. However, both these treatment processes can deplete the available alkalinity and depress effluent pH below discharge limits. To precipitate phosphorus, plants typically use an inorganic coagulant such as:

- ◆ Ferric chloride
- ◆ Ferric sulfate
- ◆ Aluminum chloride
- ◆ Aluminum sulfate

These inorganic coagulants are all made with acids that reduce the pH and alkalinity of the water. To offset this, many plants add a source of alkalinity upstream in the treatment process. Typical sources of alkalinity include:

- ◆ Lime
- ◆ Soda ash
- ◆ Magnesium hydroxide
- ◆ Caustic soda

This dual chemical approach is expensive and increases sludge volumes. LSA can solve this dilemma by providing a highly concentrated source of aluminum in an alkaline media. Unlike its acidic counterparts, LSA *contributes* alkalinity to the treatment process, thereby eliminating the need for additional alkalinity. In fact, LSA provides practically the same amount of alkalinity as 25% caustic soda and substantially more aluminum than other aluminum-based products.

More Aluminum. LSA contains more aluminum than its acidic counterparts. The table below lists the weight percentage of alumina (Al₂O₃) in aluminum coagulants. When it comes to giving you the most concentrated form of aluminum, LSA is the clear winner.

| Aluminum Coagulant | Weight % Al ₂ O ₃ |
|-----------------------|---|
| Liquid Alum | 8.3% |
| Polyaluminum Chloride | 10.5% |
| Aluminum Chloride | 10.7% |
| USALCO 38% LSA | 20.0% |
| USALCO 45% LSA | 25.0% |

Aluminum versus Iron: A pound is not a pound. When it comes to precipitating phosphorus, a pound of aluminum is not the same as a pound of iron. The aluminum molecule weighs less than half the iron molecule. This means that

one pound of aluminum has twice as many molecules as one pound of iron and can combine with two times as much phosphorus. Chemically removing one pound of phosphorus requires 0.87 pounds of aluminum or 1.8 pounds of iron. LSA provides the best value by reducing the amount of chemical required to precipitate phosphorus.

Anoxic – No problem. Unlike iron phosphate, aluminum phosphate does not re-dissolve under anoxic conditions. Feeding LSA at the front of biological treatment to boost pH and alkalinity is an attractive alternative to feeding an alkaline product followed by an acidic, inorganic coagulant at the clarifier. Feeding LSA prior to the anoxic zone increases operational flexibility and reduces the number of chemicals needed in the treatment process.

Where Can I Feed LSA? The unique ability of LSA to elevate pH and increase alkalinity gives it more flexibility than other chemicals with respect to its prospective feed points. LSA can be fed:

- ◆ At the head of the plant
- ◆ In the aeration system
- ◆ In the return sludge
- ◆ Into the clarifier

In fact, some plants use multiple feed points to optimize the benefits of LSA in their system.

LSA Benefits. LSA benefits treatment plants that feed an inorganic coagulant for phosphorus removal and have low pH or insufficient alkalinity. These benefits include:

- ◆ Cost Savings
 - \$ Replacing two chemicals with one
 - \$ Reduced transportation costs
 - \$ Capital savings (one feed system)
 - \$ Reduced sludge generation
- ◆ Increased flexibility (multiple feed points)

The USALCO Advantage! USALCO has been manufacturing liquid sodium aluminate for over 25 years. Our customers have come to rely on our:

- ◆ Product consistency
- ◆ Product stability
- ◆ Low contaminants
- ◆ Nationwide availability
- ◆ Application support

Contact USALCO. For additional information, please contact us at (800) 882-3883 or e-mail info@usalco.com.