

ClariPhosTM

Rare Earth Coagulant

Achieve ultra-low phosphorus limits and
reduce sludge production





Achieve P levels as low as 0.07 mg/L without tertiary filtration.

ClariPhos™ Rare Earth Coagulant is a game-changing technology that dramatically outperforms alum- or ferric-based coagulants for phosphorus removal. With this advanced coagulant, wastewater treatment plants can achieve ultra-low phosphorus limits—as low as 0.07 mg/L—without the need to install or upgrade costly tertiary filtration systems.

ClariPhos also produces **up to 50% less sludge** than alternatives and improves dewaterability; helping treatment plants to significantly reduce costs for solids management.

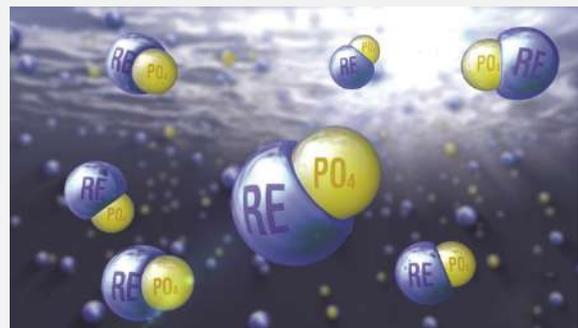
Municipal and industrial wastewater treatment plants throughout the United States and Canada are switching to ClariPhos to improve phosphorus removal in conventional activated sludge systems, membrane bioreactors, sequencing batch reactors, lagoon systems, rotating biological contactors, trickling filters and more.

Why does ClariPhos work so well to remove phosphorus?

ClariPhos is made with the rare earth (RE) elements cerium and lanthanum, which have a very high affinity for phosphorus. These elements form a tight ionic bond with phosphorus to create rhabdophane ($Ce/LaPO_4$), a dense and insoluble precipitate.

By comparison, the metal salts in conventional coagulants typically form weak intermediates, where phosphate just adsorbs to the surface.

Since ClariPhos precipitate is more stable and heavier, it **settles up to two times faster than conventional coagulants**, improving clarifier performance and reducing the risk of carryover of suspended solids.



ClariPhos offers benefits that go beyond phosphorus removal.



A comparison of sludge produced to remove an equivalent amount of phosphorus.

Reduce sludge production by up to 50% and improve dewaterability

ClariPhos forms a tight preferential bond with phosphorus, which means that far less coagulant is needed to achieve regulatory requirements—typically **30 to 70% dose reduction over alternatives**.

This lower dose is possible because ClariPhos binds to phosphorus at a 1:1 molar ratio, whereas Al/Fe coagulants bind at a ratio of approximately 5:2. Dose rates for Al/Fe coagulants can rise as high as 8:1 to achieve higher levels of phosphorus removal. With lower dose rates and better performance, ClariPhos can **reduce sludge production by as much as 50%**.

ClariPhos also improves sludge dewatering and can help **increase the solids concentration in dewatered materials by up to 40%**.

These performance benefits can contribute to significant reductions in sludge management and disposal costs for treatment plants.

Low acidity for reduced impact on pH

ClariPhos is 100 times less acidic than alum- or ferric-based coagulants and is typically dosed at a much lower rate. That means it is far less likely to lower pH of the wastewater system and require pH adjustment with alkaline chemicals.

Many more advantages:

Extensive application and testing with ClariPhos has proven its ability to reduce phosphorus to ultra-low levels, lower sludge production and provide numerous other advantages including:

- Low freeze temperature (-40°C); eliminating the need for heated storage or pipe heat tracing;
- Non-hazardous rating; safer to handle than alum- or ferric-based coagulants;
- Inhibits struvite buildup;
- Repeatedly passes whole effluent toxicity testing at 100% effluent concentration;
- Doesn't stain or discolour structures and equipment;
- Biosolids can be land applied—rare earth elements have low toxicity and are not bioavailable to plants.



Make the switch.

ClariPhos easily replaces conventional coagulants.

In most cases, plant operators can easily replace conventional alum or ferric coagulants with ClariPhos to cost-effectively improve the chemical precipitation and settling of phosphorus. ClariPhos requires no special chemical feed equipment and will often work with existing feed pumps.

Bishop Water provides comprehensive services for a trial and full-scale implementation of ClariPhos. Our team will assess your plant's current phosphorus removal equipment and operation to determine the optimal dosing location and dose rate. Samples will also be obtained at various points in the treatment process to optimize ClariPhos performance through steady conditions as well as variable flows and loads.

Once ClariPhos is fully implemented, Bishop Water can provide ongoing support through routine technical service visits and ongoing sampling, analysis and optimization.



Simple, customizable nutrient removal solutions

Bishop Water Technologies provides simple, reliable nutrient removal and solids management solutions that enable communities and industries to affordably solve water and wastewater challenges while protecting the environment.

Hundreds of sites throughout Canada trust our low-energy, low-complexity customizable solutions to deliver robust performance and easy operation with low capital and operating costs.

Our highly experienced and talented team relentlessly supports our clients and works collaboratively with like-minded, environmentally focused partners to continuously enhance the performance, value and sustainability of our solutions portfolio.

Visit bishopwater.ca to learn more about:

- Bishop Solids Management Solution;
- Bishop BioCord™ Reactors;
- ClariPhos™ Rare Earth Coagulant;
- VEPAS chemical conditioning and polymer injection system;
- Beneficial bacteria.



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