



AkuaPro

It's not your backyard clay

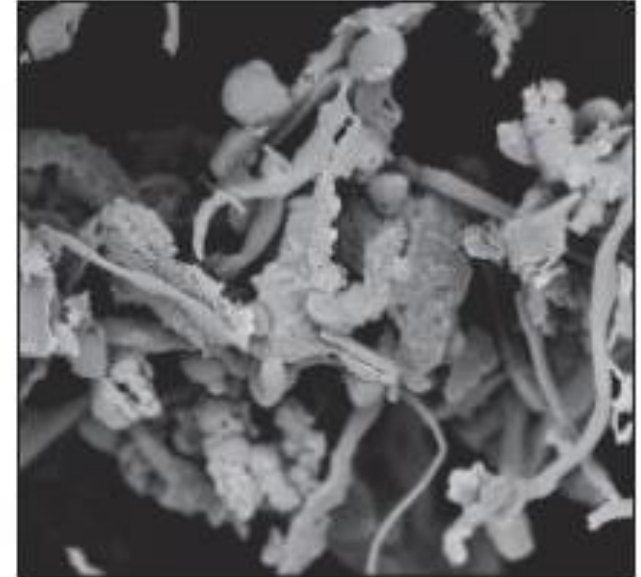
What Is It:

- AkuaPro is an all-natural antibiotic free mineral that has shown in scientific studies to purify water by removing organics such as general bacterial loads, specifically, Columnaris, and Aeromonas; numerous types of algae.

Scanning Electron Microscope Images



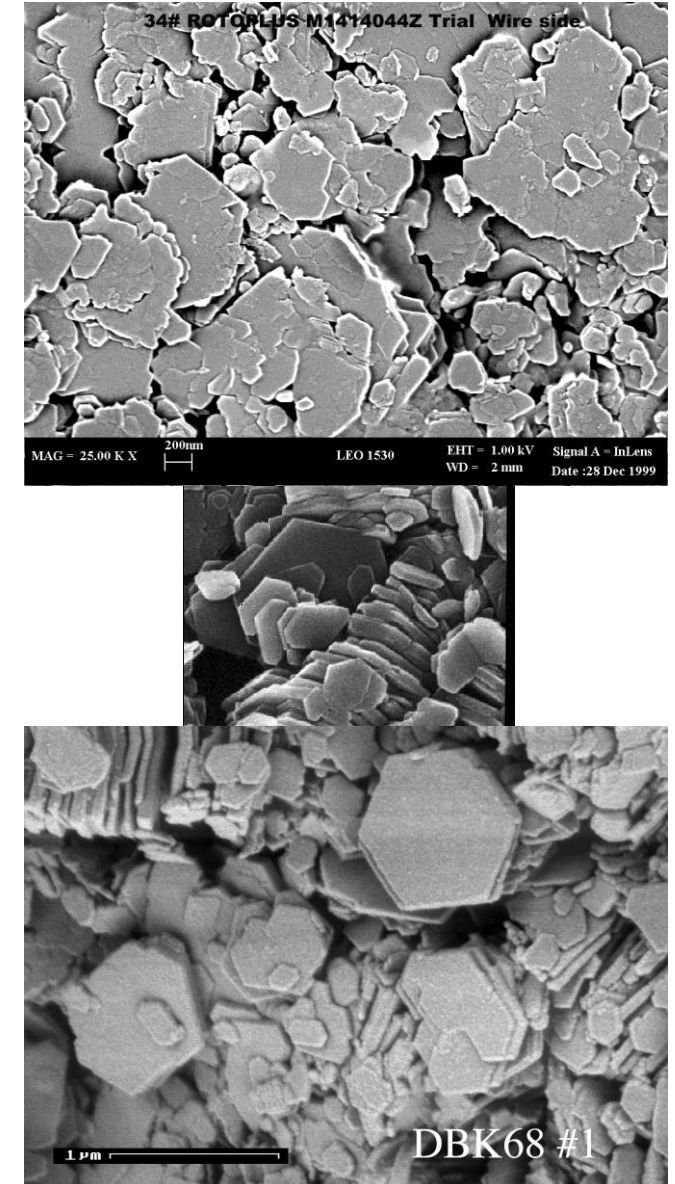
*F. Columnare bacteria
No kaolin addition*



*F Columnare bacteria
1 g/L kaolin*

KAOLINITE

- Kaolinite is a 2 dimensional layer silicate where the alumina-silicate layers (0.71 nm thick) are hydrogen bonded together to form crystals that are around 1 micron (1000 nm) diameter and between 30 to 100 nm thick
- Kaolinite clay particles have three distinct faces
 - Aluminum hydroxide face able to hydrogen bond
 - Silicate face that is partly hydrophobic
 - Edges that change from negative charge above pH 7 to positive charge below pH 7
- This complexity allows it to stick to the complex polysaccharide coatings on the pathogens.
- Intercalation allows a molecule to access the interlayer and provide access to other molecules such as formaldehyde. With proper treatment several hundred meter² of surface area will be exposed per gram.



Is It Safe for Fish

AkuaPro™ does not negatively impact the fish health after treatment. Extensive histological examinations of gills, fins, and tissues have shown that all treated fish were healthy.

Histological examination were conducted when fish were exposed at many times the recommended dose for 65 days and when in water treated with 298mg/L and there are no adverse effects. Only when the fish were exposed to >4 g/L for long duration were any branchial lesions observed, however these findings were attributed to the presence of a parasitic outbreak during the study, and not directly linked to kaolin

All Green

All natural Product: Made from kaolin clay, mined from Georgia, USA

No Risk of Antibiotic Resistance: Due to the clay's structure and positive charge it binds to the negatively charged organics and pulls them to the bottom of the ponds or tanks where they are no longer in the position to pose a threat to fish. This does not affect the bacteria in a way to cause mutation and can therefore be used repeatedly on the same water pollutant, without any resistance.

AkuaPro Applications

Salmonid Hatcheries to reduce bacterial levels in the water (ex. Columnaris, aeromonas, etc.)

Any open pond cultured fish including Catfish, shrimp, etc.

Removing of algae causing mortality or off flavor.

Crustaceans- water cleanser

Removal of Chemicals from effluent water (please inquire about options)

Transport Water purifier

Recommended
Dosage

Control	Dosage
Columnaris	1g/L (3.79g/gallon)
Aeromonas	1g/L (3.79g/gallon)
Management of Bacterial Load	100mg/L (.0038g/gallon)
Algae	1g/L (3.79g/gallon) might be more if dense bloom
Formalin	1g/25ml (151.42g/gallon)
Depuration (Purge Before Transport)	1g/L (3.79g/gallon)
Transportation	1g/L (3.79g/gallon)
Larval Contrast	100mg/L (.0038g/gallon)
MS222	TBD
MT17	TBD

Columnaris, Aeromonas, Gen. Bacteria Load

Based on the results, we believe AkuaPro performs on all gram-negative bacteria.

Columnaris

- When water was treated with 1 g/L of kaolin clay, the clay drastically reduced the number of *F. columnare* cells that were available to adhere and colonize on the gills of fish. This resulted in a 96% post trial survival versus 78% survival in tanks without water treatment. Other studies have shown it produces significantly higher survival rates than copper sulfate when the water was treated after the first signs of disease.

Aeromonas

- Initial Studies have been very promising showing kaolin concentrations of 0.05% or higher (**1g/L**), the adhesion of *A. hydrophila* cells to catfish mucus was greatly reduced due to its removal from the water column. When fish were tested against *Aeromonas* in water treated with kaolin, the survival was 66.7% versus 28.9% in fish in untreated water.

General Bacteria

- Tested on cod larvae that are sensitive to infectious bacteria, the experiment showed that water treated with clay had lower bacteria abundance than those with algae akas the contrast agent.

Algae

A number of papers have studied kaolin's effects on algae blooms in the water column and it has had positive results in reducing blooms of Dinoflagellates, toxic *Chattonella* sp., microalgae, Cyanobacteria, single celled and filamentous green algae, blue-green algae's and more.

Depuration and Transport

In Brazil they are selling commercially for use in the depuration process, were fingerlings sit before transportation, giving the fish time to clean out the gut.

During transportation, after an increase in handling and stress, the fish will be more likely to contract opportunistic diseases. Treating the transport water with clay will reduce the bacterial load that is available to attack the fish(as in the larval tanks).

Larval Contrast

When rearing larval fish it has been well established that treating the water with a contrast agent dramatically increases feed consumption and growth, while reducing cannibalism. Across a number of species, the addition of clay has shown better results than that of algae both live and paste.

For fish being raised for fisheries release, the addition of turbidity (clay) can promote schooling behaviors.

An added bonus to using clay as the contrast agent is it also reduced the bacterial load in the water that might negatively effect the developing fish.

Make Sure to Note

Although Bacterial Control is just one use; Kaolin is a prevention tool NOT a treatment. It is used for prophylactic treatments or control of an outbreak in unaffected ponds.

Fish in referenced trials were not being treated for any disease; kaolin was then put in the water as a water treatment to see if it would reduce the possibility of outbreak.

In some trials if kaolin was put in the water after a disease was established, and an outbreak was occurring, there were no changes in the fish's condition.

Easy to apply

Method of Application Depends on the size of the treatment:

Very large usages may require the use of a pump or sprayer to disperse the clay

For larger volumes it may be advantageous to add water, create a slurry, and add to the treatment water

Regardless of the application approach, good water movement is important for effective dispersion. Increased water movement will help to keep AkuaPro in suspension for a longer period.

Disposal

It is a natural clay and therefore unregulated.

- When used in earthen ponds, no removal required.
- If used in raceways and flow through systems, removal only as necessary, however with good flow this should be minimal.
- Use and removal in recirculation systems would be system dependent

Even after it has been used it is an unregulated silt

- the bacteria that it has attached to will die and will have no long lasting effects.
- When pulled out of tanks or ponds it is classified as dirt and can be placed anywhere.