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Rethink Tomorrow

ARM 1010

AMMONIA REDUCING MICROBES

Application Sheet

ARM 1010 is a blend of nitrifying bacteria that removes ammonia from wastewater. It is used in a variety of industries that use aerobic treatment to establish, maintain, or restore nitrification.

Benefits

ARM 1010 is the quickest and most reliable solution for nitrification. It helps prevent ammonia-related permit violations and simplifies wastewater operations.

Bioaugmentation with ARM 1010 makes the nitrification process more robust, enabling industrial wastewater plants to withstand higher loading of toxic waste streams and waste streams containing high concentrations of ammonia or other nitrogenous compounds. ARM 1010 helps ensure compliance by shortening the recovery time after process upsets and reducing the impact of shock loads on effluent quality.

ARM 1010 promotes consistent and reliable treatment and reduces the need for nitrification-related operational changes. It has a wide range of activity and helps ease operations in cold temperatures.

Performance

Nitrification is a two-step aerobic process. In the first step, beneficial microorganisms oxidize ammonium (NH_4^+) to nitrite (NO_2^-) and nitrite is oxidized to nitrate ($N0_3^-$) in the second reaction. Nitrification is a sensitive process and is more easily interrupted than other biological wastewater treatment processes. The most frequent sources of nitrification problems include environmental factors, toxicity, solids washout, and loading variation. In some cases, environmental factors must be corrected prior to using ARM 1010.

After ARM 1010 is added to a wastewater system, nitrifying bacteria colonize on floc particles and become part of the biomass (Fig. 1). Having a healthy floc-forming microbial community helps maintain nitrifiers in the system and is important for the success of any nitrification program.

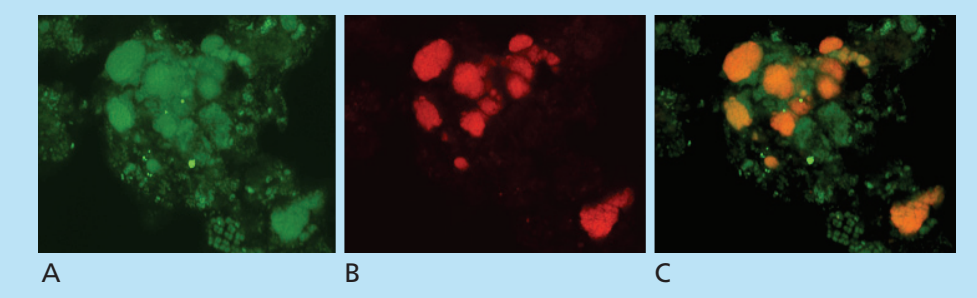


Fig. 1. This series of pictures of the same floc particle was taken using molecular probes and various microscopy techniques. A shows a floc particle from a nitrifying biomass stained green for all bacterial types. B shows the same floc particle stained red only for ammonia-oxidizing bacteria. C is an overlay of the two pictures showing the spatial distribution of nitrifiers within a well-formed floc particle.

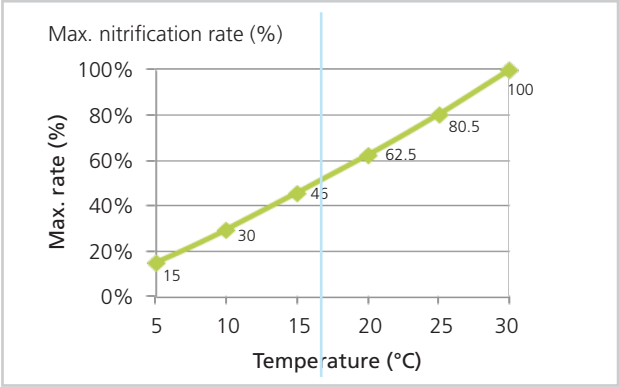
Application guidelines

Key environmental factors include but are not limited to temperature, toxicity and solids loss. To get optimal performance from ARM 1010, the following guidelines should be observed, For guidance on other factors and conditions please consult IFM or your supplier.

Temperature

Nitrification readily occurs at 15–30 °C. As
temperatures decrease below 15 °C, nitrification becomes inhibited and often fails.

ARM 1010 is active at temperatures below 4.0 °C and can protect systems from losing nitrification.



Toxicity

Rapid inhibition can be caused by exposure to certain organic and inorganic compounds. Even intermittent exposure can cause nitrification disruptions.

ARM 1010 can increase a plant's tolerance to toxic compounds and actually allow it to accept higher loadings. This provides potential cost savings by minimizing off-site disposal costs for toxic waste streams.

Sometimes inhibition is caused by the accumulation of compounds on floc particles where nitrifiers are colonized. Long-term exposure to these compounds can cause a steady decline in nitrification performance.

To regain nitrification, the toxic sludge often needs to be removed from the system before using ARM 1010.

Compounds which cause acute toxicity include:

- Cyanide
- Phenol
- Chlorinated hydrocarbons
- Metals
- Amines
- Spent caustic waste

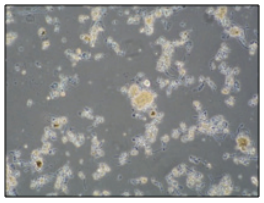
Compounds which cause chronic toxicity include:

- Fluorides
- Surfactants
- Metals
- Oils
- Long-chain fatty acids

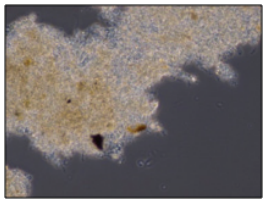
Solids loss

Nitrification can be impacted when a large amount of solids is lost from the system. This can result from a hydraulic surge or from settling problems due to poor floc structure.

Heavy dosing of ARM 1010 can bridge the gap during the recovery period. This gap can be further shortened by using IFM's biomass reinforcement products for improving settling and building solids.



Pin floc can lead to excess solids loss from the clarifier and contribute to nitrification problems.



Healthy floc is important for consistent and reliable nitrification.

Figure 2 shows the recovery of nitrification at a chemical plant. ARM 1010 was added directly to the aeration basin in decreasing quantities over 10 days to ensure a complete start-up of the nitrification process. Nitrification was achieved after just 5 days.

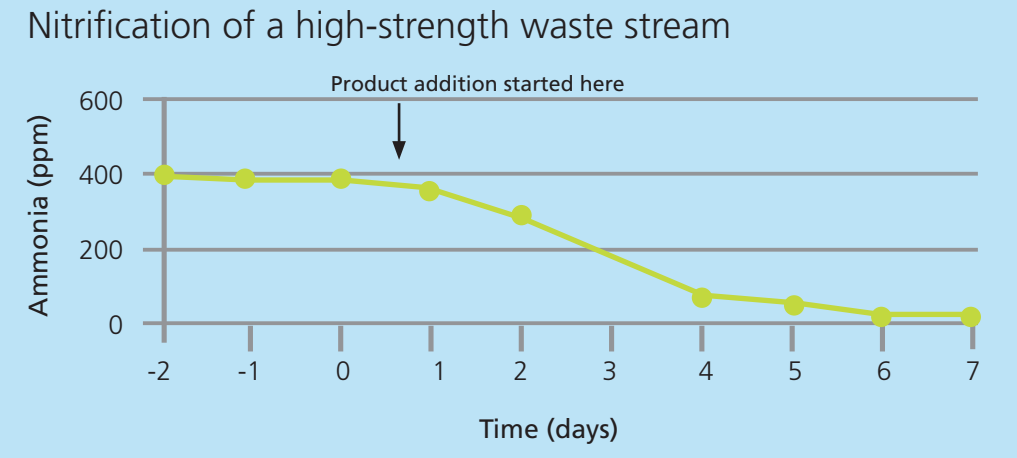


Fig. 2. Recovery of nitrification at a chemical plant.

ARM 1010 is the fastest and most reliable biological nitrification product on the market. Figure 3 shows ARM 1010 compared to a leading competitor nitrifying product. After a 24-hour bench test, ARM 1010 removed 136% more ammonia than the competitor product.

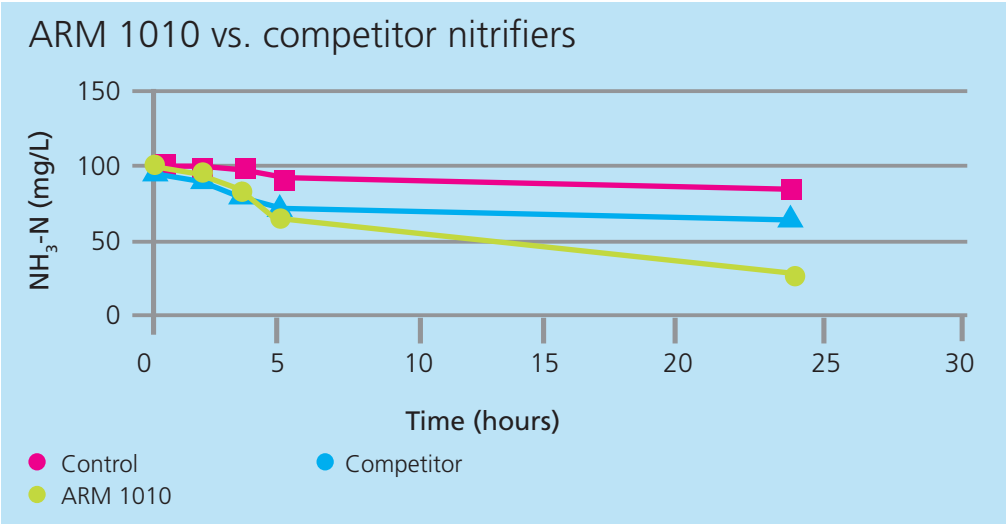


Fig. 3. ARM 1010 removed 136% more ammonia compared to the competitor.

Recommended use

ARM 1010 is added directly to the influent of the aeration basin in active sludge systems or lagoons. This product has been successfully used in activated sludge plants and lagoons in refineries, food processing plants, renderers, municipalities, paper mills, landfills, steel plants, and chemical plants.

The dosage rate is dependent on the influent flow rate, hydraulic retention time, sludge age, and influent ammonia concentration. During an initial seeding period, an increased amount is used to quickly establish the microorganisms in the system, with lower daily dosages continuing for a week or more. The effluent should be monitored for ammonia, nitrate, nitrite, dissolved oxygen, and pH as a minimum. Additional recommended monitoring includes TKN, alkalinity, and effluent BOD.

Product characteristics

ARM 1010 contains *Nitrosomonas* and *Nitrobacter* species in a highly concentrated liquid. It has an ammonia removal rate specification of > 500 mg NH_4^+/kg/hr and is the industry standard for nitrifiers.

Safety, handling, and storage

Refrigerate ARM 1010 upon receipt and throughout the period of use. Do not allow the product to freeze. Avoid excessive skin contact with liquids. Wash hands thoroughly with warm, soapy water after contact. Avoid contact with eyes.

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