Wastewater Solutions

Novozymes BioRemove™ 5400

Application Sheet

BioRemove 5400 is an advanced biological formulation for improving the degradation of nonionic and anionic surfactants. BioRemove 5400 reduces foaming and helps minimize the effects of surfactant-related upsets.

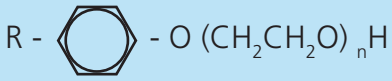
Benefits

Surfactants are a common component in industrial wastewater. Surfactants are used in many industrial processes and are also common in detergents used for cleaning operations. They typically enter the waste stream during rinsing.

Surfactants can be a major contributor of COD and can result in operational problems at the wastewater plant. Excessive foaming can occur when surfactants encounter turbulence and air bubbles in the aeration basin. Typical controls include expensive defoamers, physical removal, or temporarily reducing aeration, which can adversely affect treatment. In high concentrations, surfactants can cause toxicity and disperse floc particles, leading to poor settling and other operational problems.

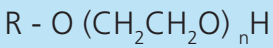
BioRemove 5400 contains a blend of microorganisms that can degrade a variety of surfactants, including nonylphenol ethoxylates (NPEs) as well as linear and branched-chain alcohol ethoxylates. Enhancing a microbial community's capability for surfactant degradation with BioRemove 5400 reduces surfactant-related foaming and improves plant stability.

Nonionic and anionic surfactants

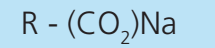


Alkylphenol exthoxylate (APE)

Linear alkyl sulfonate (LAS)
and
Alkylbenzene sulfonate (ABS)



Alcohol ethoxylate (AE)



Soaps (alkali salts of fatty acids)

R - branched or linear alkyl, typically C_8 to C_{10}
n - average ethylene oxide groups per mole

Performance

BioRemove 5400 has been proven to be an effective biological solution for surfactant degradation in both industrial plants and municipal plants that receive industrial flows. A municipal treatment plant in New Jersey needed to restart a 4,500 m^3 per day (1.2 mgd) system. The influent contained approximately 40% industrial waste with high surfactant concentrations. The main objective was to quickly establish a healthy microbial community capable of BOD, TSS, and ammonia removal, but controlling foaming was a concern because of the high surfactant load in the influent wastewater. After a few days, foaming was so excessive that it overflowed onto the walkways surrounding the plant. This slowed the start-up because some of the microbial community was also being lost in the foam and created a serious safety concern.

Foaming is typical for new plants, but in this case surfactants exacerbated the problem and preventative actions were needed, so the plant contacted Novozymes. Novozymes recommended BioRemove 5400 to enhance the microbial community's ability to handle surfactants and minimize foaming. After beginning a biological program, the foam soon subsided, and the plant met its start-up goals ahead of schedule. Following the start-up, the plant continued adding BioRemove 5400 to prevent surfactant-related issues on an ongoing basis.

Fig. 1. Excess foaming from surfactants in wastewater.

Fig. 2. Normal operations using Novozymes BioRemove™ 5400.

Recommended use

BioRemove 5400 is added directly to the aeration tank. BioRemove 5400 performs within the pH range 6.0–9.0, with an optimum of 7.0, which allows it to perform well in most biological wastewater systems. Wastewater temperature affects the bacterial activity, with an approximate doubling of maximum growth rate for each 10 °C (18 °F) increase in temperature to an approximate upper limit of 40 °C (104°F). Very low activity can be expected below 5 °C (41 °F).

The dosage rate for BioRemove 5400 is dependent on average daily flow, the volume of the biological reactor, and the COD or surfactant load. During the initial seeding period, an increased dosage is used to quickly establish the microorganisms in the system. When the microbial community is properly developed, regular dosing is necessary to maintain an accelerated level of biological activity. Specific dosing recommendations are determined based on plant-specific conditions. Increased dosing of BioRemove 5400 is needed for seeding new systems or recovery from a surfactant-related upset.

Product characteristics

BioRemove 5400 is available as a tan powder.

Safety, handling, and storage

Store product in a cool, dry place. Wash hands thoroughly with warm, soapy water after handling. Avoid contact with eyes.

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