



Patent Search

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Abstract:

The "Sequential Anaerobic-Aerobic Biofilm Reactor System for Effective Treatment of Tannery Wastewater" offers an advanced solution for treating tannery effluents, anaerobic and aerobic biological processes to achieve efficient pollutant removal. In the anaerobic stage, the system breaks down complex organic pollutants in the absence of oxygen, significantly reducing the chemical oxygen demand (COD) and producing biogas as a valuable by-product. This biogas can be captured and used for energy generation, contributing to the system's sustainability. Following this, the partially treated wastewater flows into the aerobic biofilm reactor, where aerobic microorganisms degrade the remaining pollutants, such as ammonia and other nitrogen and phosphorus compounds, ensuring that the effluent meets stringent discharge standards. A key feature of this system is its focus on resource recovery and sludge minimization. By reducing sludge production, the system enhances operational efficiency and minimizes waste. The biogas produced during the anaerobic stage can be utilized for energy, making the process more cost-effective and environmentally friendly. The system's design is scalable, making it suitable for both small to large-scale tannery operations. It provides an energy-efficient, cost-effective, and sustainable treatment option, reducing the environmental impact of tanner wastewater and supporting the principles of circular economy by reusing resources and minimizing waste.

Complete Specification

Description: The invention is illustrated with the help of the accompanying diagram, Figure 1, which outlines the functional components of the invention.

Tannery Wastewater Input (Raw Wastewater)

The raw tannery wastewater, which contains high levels of organic matter, salts, and toxic chemicals, is initially collected and fed into the anaerobic stage of the reactor system (as shown in Figure 1). In this stage, the wastewater enters the anaerobic biofilm reactor, where microorganisms thrive in an oxygen-free environment, breaking down complex organic pollutants..

Anaerobic Biofilm Reactor

The anaerobic biofilm reactor is designed to create the ideal conditions for anaerobic microorganisms. As wastewater flows through the reactor, anaerobic bacteria break down the organic compounds into simpler substances, producing biogas and reducing the organic load in the effluent. This process is highly effective in reducing chemical oxygen demand (COD) and removing a significant portion of organic contaminants from the wastewater.

Aerobic Biofilm Reactor

After passing through the anaerobic stage, the partially treated effluent is directed to the aerobic biofilm reactor, where oxygen is introduced to promote the activity of aerobic microorganisms. These microbes further degrade the remaining pollutants, including ammonia and residual organic compounds. The aerobic process ensures effective removal of soluble pollutants, such as nitrogen and phosphorus, thereby bringing the effluent closer to meeting regulatory discharge standards.

Resource Recovery and Sludge Minimization

A significant advantage of this system is its ability to recover resources. The biogas produced during the anaerobic stage is captured and can be used for energy generation.

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