

Dairy Wastewater Treatment by Electrochemical and Catalytic Method

Authors : Basanti Ekka, Talis Juhna

Abstract : Dairy industrial effluents originated by the typical processing activities are composed of various organic and inorganic constituents, and these include proteins, fats, inorganic salts, antibiotics, detergents, sanitizers, pathogenic viruses, bacteria, etc. These contaminants are harmful to not only human beings but also aquatic flora and fauna. Because consisting of large classes of contaminants, the specific targeted removal methods available in the literature are not viable solutions on the industrial scale. Therefore, in this on-going research, a series of coagulation, electrochemical, and catalytic methods will be employed. The bulk coagulation and electrochemical methods can wash off most of the contaminants, but some of the harmful chemicals may slip in; therefore, specific catalysts designed and synthesized will be employed for the removal of targeted chemicals. In the context of Latvian dairy industries, presently, work is under progress on the characterization of dairy effluents by total organic carbon (TOC), Inductively Coupled Plasma Mass Spectrometry (ICP-MS)/ Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES), High-Performance Liquid Chromatography (HPLC), Gas Chromatography-Mass Spectrometry (GC-MS), and Mass Spectrometry. After careful evaluation of the dairy effluents, a cost-effective natural coagulant will be employed prior to advanced electrochemical technology such as electrocoagulation and electro-oxidation as a secondary treatment process. Finally, graphene oxide (GO) based hybrid materials will be used for post-treatment of dairy wastewater as graphene oxide has been widely applied in various fields such as environmental remediation and energy production due to the presence of various oxygen-containing groups. Modified GO will be used as a catalyst for the removal of remaining contaminants after the electrochemical process.

Keywords : catalysis, dairy wastewater, electrochemical method, graphene oxide

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