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TREATMENT OF DAIRY WASTEWATER BY ELECTROCOAGULATION AND ULTRASONIC-ASSISTED ELECTROCOAGULATION METHODS

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Abstract

The application of electrocoagulation and ultrasonic-assisted electrocoagulation technologies for the treatment of dairy wastewater was addressed in the current work. The study highlights the effect of the key parameters such as applied current, ultrasound power amplitude, electrolyte concentration of NaCl, and wastewater concentration on the process removal efficiency. The energy consumption and the consequent operation cost were evaluated in order to assess the economic feasibility of the process. The results demonstrated that the increase of applied current from 0.1 to 0.5 A decreases the electrolysis time that is required to obtain the maximum removal efficiency of 99 % by a factor of 6.2. Consequently, the operation cost of the process was duplicated. The results cast a new light on the ultrasonic-assisted electrocoagulation of dairy wastewater. It is indicated that the removal efficiency of ultrasonic-assisted electrocoagulation was higher than that obtained with electrocoagulation for the first 20 minutes of the process, thereafter the removal efficiency of electrocoagulation was superior. Utilizing of the ultrasonic waves added a massive charge to the process operation cost. Furthermore, increasing the level of solution salinity has a positive effect on both of removal efficiency and cost of operation. This was demonstrated by increasing the electrolyte concentration of NaCl from 0.06 to 4 g/L which resulted in the reduction of the electrolysis time required to reach the maximum removal efficiency to the half. This reduced cost of operation by around 73%. The rate of removal was distinctly decreased when the concentration of the artificially made dairy wastewater increased.

Keywords: dairy wastewater, electrocoagulation, ultrasound waves

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