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LABORATORY INVESTIGATION ON THE PURIFICATION OF FOOD WASTEWATER BY FREEZE CONCENTRATION

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Abstract

This study was carried out to determine the feasibility of applying a freeze–concentration technique to rarefy milking wastewater using either a stationary wastewater vessel (the first series of tests) or a rotary ice–making machine (the second series of tests). In this study, we investigated the impact of freezing temperature, initial milking wastewater concentration and vessel depth upon the removal rate of chemical oxygen demand (COD). Results show that when the freezing temperature was decreased (from –3 °C to –15 °C), the freezing rate increased. The freezing rate was not significantly affected for the different concentrations of the wastewater solution. The COD removal rates at 0–25 mm of ice layer for the COD concentrations of 500 mg/L, 1000 mg/L and 2000 mg/L were 94.56 %, 92.78 % and 91.25 % respectively at the freezing temperature of –3 °C in the first test. In the second test, the milking wastewater (500 mg/L) was frozen using a rotary ice-making machine. The COD removal rates at –6 °C and –15 °C in the round ice (99.12 % and 95.24 %) and the surrounding ice (98.37 % and 90.28 %) were higher than the removal rate in the revolving ice (91.47 % and 85.68 %). Therefore, the freeze–concentration method can become a powerful, simple and low–cost treatment method for purifying milking wastewater in the environment.

Key words: COD, freeze–concentration, ice crystal, removal rate, wastewater

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