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## APPLICATION OF FREEZING SEPARATION FOR WASTEWATER PRECONCENTRATION TREATMENT

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### Abstract

In this study, a fixed wastewater container was used to determine the feasibility of the application of freezing concentration technology for wastewater purification. Several factors affecting COD removal rate were discussed, including initial COD concentration, freezing temperature and depth of the vessel. It was found that the freezing rate increased as the temperature decreased (-10 °C to -30 °C). The variation of COD concentration had no significant effect on the freezing rate. When the freezing temperature was -10 °C and the COD concentration was 250 mg/L, 500 mg/L and 1000 mg/L, respectively, the COD removal rates of the ice layer (0-30mm) were 92.56%, 90.12% and 85.47%, respectively. With the increase of COD concentration (250 mg/L-1000 mg/L), the energy consumption declined from 935.25 kWh/kg COD to 321.64 kWh/kg COD. On this basis, the energy consumption of different treatment processes was compared, and the motion model of water molecules and pollutant molecules in the freezing process was established.

*Key words:* energy consumption, freeze-concentration, ice crystal, pollutants molecules, separation efficiency

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