

# Studies on the Application of Electrocoagulation System to the Treatment of Noodle Factory Effluent

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## ABSTRACT

In noodle-making, large amount of starch (flour), together with calcium carbonate, potassium carbonate, and chlorine dioxide added during processing will cause the effluent to contain high SS, COD, and BOD. The non-starch additives of calcium carbonate, potassium carbonate, chlorine dioxide will also hinder growth of aquatic organisms. In this study, an electrocoagulation (EC) unit with varying current density, hydraulic retention time (HRT) and electrode metal types as operational parameters was used to treat the noodle factory effluent in order to understand the effects of the experimental parameters on the effluent pollution loading after the treatment. In the study, cast iron and aluminum electrode plates, current density between 43.2 and 86.6 A/m<sup>2</sup>, and HRT of 6 to 10 min were applied. The before and after treatment effluent pH, electrical conductivity, SS, COD, BOD, Al<sup>3+</sup>, Fe<sup>3+</sup>, K<sup>+</sup>, Ca<sup>2+</sup>, Na<sup>+</sup>, and B<sup>3+</sup> concentrations were analyzed. The results indicated that the effluent pH was largely not much improved with increases of ca. 0.1~0.3 unit; electrical conductivity showed the best reduction of 14.1% at conditions of 86.6 A/m<sup>2</sup>, 6 min HRT and aluminum electrodes, the removal efficiency was poor though. The SS removal rates generally were better than 60%, with the best performance of 84% removal attained at conditions of 86.6 A/m<sup>2</sup>, HRT 10 min, and aluminum electrode; for iron electrodes, the best SS removal rate of 81.5% was at 86.6 A/m<sup>2</sup>, and HRT of 8 min. Effluent COD removal with the treatment was between 40% and 90%, and the best result was reached with current density of 86.6 A/m<sup>2</sup>, HRT of 10 min and aluminum electrodes. For BOD removal, however, EC could remove 65%~90% of the loading, both iron and aluminum generated similar results, with iron electrodes showing slight edges. EC appeared to have minor effects on the ionic concentration resulted from addition of calcium carbonate and potassium carbonate, while the electrode metals would dissolve ferric and aluminum ions causing their concentration to increase. There were ca. 20% reduction in the ionic concentrations of sodium and boron.

Keywords : Electrocoagulation、current density、noodle-making effluent、electrode plates、starch (flour)、Chemical Oxygen Demand (COD)

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