

### Nitrogen removal in metal plating wastewater by electrochemical methods

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Metal plating wastewater has become a significant environmental issue due to produce large amount of pollutants such as chemical oxygen demand (COD), heavy metals, toxic compounds and nitrogen. Especially, the nitrogen consisted with the majority in the form of nitrate makes the removal of nitrogen difficult. In this study, electrochemical reduction step to reduce nitrate and electrochemical oxidation step to oxidize ammonia were applied to convert nitrogens to nitrogen gas. Firstly, in nitrate reduction step, zinc cathode and zinc coated cathode were used to reduce nitrate to nitrite and sulfamic acid was added to convert the reduced nitrite to nitrogen gas rapidly under acidic condition. In ammonia oxidation step, dimensionless stable anode (DSA) was used to generate hypochlorite and sodium chloride was added to enhance the generation of hypochlorite under basic condition. We experimentally studied to obtain the most appropriate operating conditions such as pH, sulfamic acid dosage ratio, sodium chloride dosage ratio, current density and operation voltage.