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Subject Area	Water treatment
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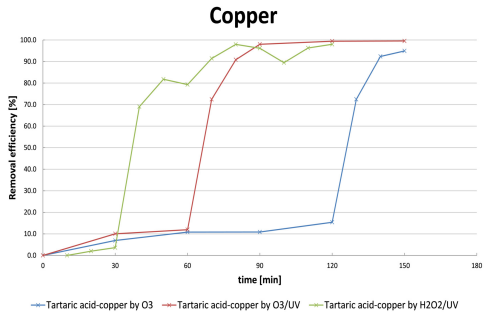
Oxidation of acid-copper complexes from electroplating wastewater

Using of advanced oxidation processes for the treatment of electroplating wastewater

Experimental set-up for the treatment with ozone and ozone with UV

Experimental set-up for the treatment with hydrogen peroxide



Removal of Copper in tartaric acid

Introduction: Chelating agents such as citric acid, tartaric acid, EDTA are widely used as detergent additives, stabilizing agents, preservatives in many different industries, especially in the electroplating industry. These chelating agents form stable complexes with heavy metals like arsenic, chrome, cadmium, copper, lead, nickel, silver and zinc. After treatment of the metal, the effluent is strongly contaminated which can affect the environment substancially. In order to deal with such effluents, there are various treatment techniques available, such as chemical precipitation, ion-exchange, adsorption, membrane filtration, flotation and electrochemical treatment technologies, flocculation etc. All of these are widely used and have advantages and disadvantages. However, it is still difficult to meet the stringent environmental regulations set forth by the ministry of environmental protection of the People's Republic of China. For remediating these effluents, the use of advanced oxidation processes (AOP) was tested during the course of this thesis. AOP works with highly reactive hydroxyl radicals (HO•) which oxidize the organic matter of the wastewater.

Proceeding: This thesis is focused citric acid-copper, tartaric acid-copper and EDTA-copper complexes and their treatment with ozone (also in combination with UV), and hydrogen peroxide combined with UV. Initially, the removal of copper was carried out with different pH for each solution to find the optimum pH for precipitation. For treatment with H_2O_2/UV another set of experiments was conducted with different initial concentrations of H_2O_2 to find the optimum concentration of H_2O_2 for the further experiments. Finally, the 3 solutions were treated by O_3, O_3/UV and H_2O_2/UV and the removal efficiencies of copper, TOC and COD were analysed.

Result: After sufficient organic matter from the wastewater was oxidised, the copper can be precipitated. It was shown that the removal efficiency of copper was improved strongly up to around 98% for each method. With regard to kinetics, the treatment method with H_2O_2/UV was the fastest and reached 90% after 60 minutes.