

Optimization of process parameters for the production of peroxydisulfuric acid oxidant

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Industries require strong oxidants which do not leave any metallic or organic residues after the reaction. Therefore, semiconductor, paper and pulp, and textile industries employ peroxydisulfuric acid, a powerful oxidant produced onsite by electrolyzing sulfuric acid solution. During electrolysis of sulfuric acid, the anodic oxidation in presence of hydroxyl radicals produce a mixture of peroxymonosulfuric acid (H_2SO_5), hydrogen peroxide (H_2O_2) and peroxydisulfuric acid ($H_2S_2O_8$). Peroxydisulfuric acid is a moderately stable oxidant and cannot be stored for longer than one day without decomposition and hence used as quickly as possible after its formation. Several previous studies have documented the production of peroxydisulfuric acid but the effect of process variables were not clearly investigated. In this study we report the effects of varying electrode material, current densities, and the ratio between anode and cathode on the oxidant production in an undivided electrolytic cell. It is found that the nature of the cathode influences the percentage of formation of peroxydisulfuric acid. Also, the smaller cathode made of DSA found to improve the yield of oxidants.