

Oxidation of fatty acids by hydrogen peroxide in an aqueous medium under supercritical fluid conditions

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Abstract

The advantage of supercritical aqueous oxidation (SCWO) of organic waste by solutions of hydrogen peroxide before thermal neutralization is demonstrated. Principal schemes of SCWO devices of periodic action with the use of a liquid oxidizer and continuous (continuous) operation are given, with the perspective possibility of using oxygen as an oxidizer, which is more profitable in the future. For the analysis of reaction products, one of the main qualitative indicators of the degree of sewage contamination is selected: chemical oxygen demand (COD), and also as an additional indicator, the activity control of pH of hydrogen ions. The essence of the method for measuring the chemical consumption of oxygen using potassium dichromate at a given temperature in the presence of silver sulfate and mercury sulfate is described. The results of investigations of the oxidation of 10% aqueous solution of acetic acid and oleic acid with 30% hydrogen peroxide at a temperature of 673-748 K, a pressure of 25-30 MPa and a process duration of up to 30 minutes, realized in an aqueous medium in supercritical fluid conditions at a periodic actions. Also, studies of the oxidation of a 10% aqueous solution of acetic acid with 30% hydrogen peroxide at a temperature of 673-748 K and a pressure of 25 MPa, realized in an aqueous medium in supercritical fluid conditions in a continuous installation, are also described. The dependences of the efficiency and COD values of the reaction products of supercritical aqueous oxidation of acids on the duration of the process are revealed. The dependence of the pH of acetic acid subjected to oxidation on a continuous-action plant on the duration of the oxidation process is given. The most effective parameters for carrying out the oxidation reaction in supercritical conditions of acids at the plants of periodic and continuous action are revealed.

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