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Contents

OXIDATIVE DESTRUCTION OF METHYL VIOLET AND METHYLENE BLUE DYES BY FENTON REACTION

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Fenton reaction is widely used to generate hydroxyl radicals in water media: $Fe^{2+} + H_2O_2 \rightarrow Fe^{3+} + OH^{\cdot} + OH^{-}$ [1, 2]. One of the ways to use this system is oxidative destruction of different organic compounds, including ecotoxicants and water pollutants. Dyes are common models for the investigation and development of methods for water purification [3, 4]. The goal of the present paper was investigation of oxidative destruction of methyl violet and methylene blue by Fenton reagent under different conditions.

Spectrophotometry was used to investigate the kinetics of dyes decoloration by Fe^{2+}/H_2O_2 system. All the experiments were carried out at ambient temperature. The parameters that have been varied were concentrations of each component – dye, hydrogen peroxide, Fe^{2+}, and pH value.

The kinetic curves demonstrate that the oxidation process includes two main stages – faster (up to 10 min) and 5–12 times slower. The duration of each stage and the reaction rate in it strongly depend on the concentrations of components in the reaction media. It was shown that the rate of degradation is dependent non-linearly on the initial concentration of dye, hydrogen peroxide, and Fe^{2+}, as well as pH value. The optimal conditions were determined to provide conversion of the dye 90 % after 20–30 minutes of reaction at pH 2.2.

The additional experiments also showed that some compounds of natural origin (e.g. amino acids, carbohydrates) could be used to effectively control the reaction rate. The higher the content of the additives the higher the dye conversion. It was shown that the most catalytic effect in Fenton reaction in our case demonstrates fructose.

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