Full Paper _____ *Thematic Section:* Research into New Technologies.
The Reference Object Identifier – ROI: jbc-01/20-64-12-76 *Subsection:* Physical Organic Chemistry.
The Digital Object Identifier – DOI: 10.37952/ROI-jbc-01/20-64-12-76
Submitted on December 14, 2020.

Application of the reaction of oxidation of *N*-methyl-*p*-aminophenol with hydrogen peroxide, catalyzed by Fe(II) and Fe(III) ions in flow-injection analysis of tap water

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Keywords: flow injection analysis (FIA), catalytic reactions, selective determination of iron(II) and iron(III) ions, spectrophotometry, tap water.

Abstract

The article presents the results of the application of the oxidation reaction of *N*-methyl-*p*-aminophenol with hydrogen peroxide, catalyzed by Fe(II) and Fe(III) ions in the flow injection analysis (FIA) of tap water. Using a commercially available system for FIA with spectrophotometric detection, an optimal scheme for conducting an indicator catalytic reaction in a liquid stream was proposed, which was used to determine the total iron content in tap water. Spectrophotometric detection of colored products of the indicator catalytic reaction of the oxidation of *N*-methyl-*p*-aminophenol with hydrogen peroxide is carried out at the absorption maximum of the absorption spectrum in the visible region at λ_{max} = 490 nm. It was shown that, under nonequilibrium FIA conditions, it is possible to significantly minimize the contribution of the noncatalytic reaction to the total analytical signal. The latter is accompanied by the expansion of the range of determined catalyst contents to lower concentrations. Taking into account the proposed FIA scheme for determining the total iron content in tap water by the oxidation of *N*-methyl-*p*-aminophenol with hydrogen peroxide, catalyzed by Fe(II) and Fe(III) ions, the linearity range of the analytical signal remains in the range of 0.05-0.4 μg/ml. The lower limit of the determined iron content is 0.02 μg/ml with a productivity of 40 samples per hour. Sample preparation of tap water consists in filtering and maintaining the required pH for the catalytic indicator reaction and subsequent FIA. The cations Al, Zn, Ni, V(V), Pb, Cd, Mn(II), and Cr(VI) do not have a significant interfering effect; only the presence of complexing agents can reduce the rate of the catalytic reaction, which, accordingly, affects the analysis results.

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