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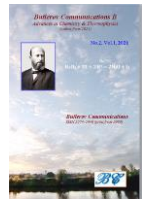

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# Photometric determination of molybdenum by catalytic action on the oxidation reaction of iodide ion with hydrogen peroxide

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## Abstract

Molybdenum is one of the main hardening alloying elements in heat-resistant steels. A method is proposed for the kinetic determination of molybdenum(VI) by the catalytic effect on the oxidation reaction of iodide ion with hydrogen peroxide. The reaction rate is determined by the concentration of iodine released per unit time. The iodine concentration is determined by the change in the optical density of the solution containing the starch. The reaction proceeds with an induction period, the duration of which is inversely related to the catalyst concentration. The optimal reaction conditions were selected: $1.2 \cdot 10^{-3}$ M hydrogen peroxide, $2 \cdot 10^{-2}$ M potassium iodide, 0.1 M hydrochloric acid or 0.01 M sulfuric acid solution, $\lambda$ = 580 nm, l = 0.5 cm. To build a calibration graph, you need to use the method tangents, having previously removed the kinetic dependences of optical density on time. The plot is linear in the range of molybdenum concentrations from 0.02 to 0.1 μg/cm$^3$. Relative standard deviation 0.002, relative error 5%. The greatest interfering influence on the determination of molybdenum is exerted by the ions $Fe^{3+}$, $W^{6+}$, $F^-$. Tungsten and iron ions have a catalytic effect on the oxidation reaction of the iodide ion with hydrogen peroxide, as does molybdenum at a 33-fold excess. Iron must be bound to an ethylenediaminetetraacetate complex prior to analysis. The results obtained for the determination of molybdenum in steels have satisfactory metrological characteristics. The developed technique requires a minimum set of reagents and equipment and is easy to carry out.

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