Turkish Journal of Chemistry

Turkish Journal

of

Chemistry

Flow Injection Amperometric Determination of Ascorbic Acid Using a Photoelectrochemical Reaction after Immobilization of Methylene Blue on Muscovite

Yusuf DİLGİN, Zekerya DURSUN, Gürel NİŞLİ
Ege University, Faculty of Science, Department of Chemistry,
35100 Bornova, İzmir-TURKEY

Keywords
Authors

chem@tubitak.gov.tr

Scientific Journals Home Page

Abstract: The photoelectrochemical determination of ascorbic acid (AA) was studied based on the photochemical reduction of methylene blue (MB) in 0.1 M phosphate buffer (pH 7.0). MB was used as a redox mediator for the modification of a carbon paste electrode (CPE) due to its facile reducible-oxidizible behaviour. Muscovite, which has a layered structure, was found to be a good and stable supporting material for the immobilization of MB by an ion exchange reaction. The dye is strongly retained and not easily leached from the matrix. MB was reduced to nearly quasi-reversible at the modified carbon paste electrode (MCPE). The oxidation peak potential of leuco-methylene blue (LMB) shifted from --100 mV to 50 mV in the presence of AA. For photoelectrochemical amperometric studies, the operational potential was kept constant at + 50 mV according to the oxidation of LMB, which was produced from the chemical reaction between AA and MB on the modified electrode surface. A laboratory-built flow cell system was constructed for the direct irradiation of the electrode surface with a 500-W halogen lamp. The optimum conditions for the flow injection (FI) amperometric determination of AA were 1.5 mL/min flow rate, 50 μ L sample loop and 50 cm transmission tubing length and at a frequency of 60 samples per hour. AA could be determined in the concentration range 1.0×10^{-6} - 1.0×10^{-4} M by using a photoelectrochemical FI method. The detection limit of this method was 1.0×10^{-8} M. The relative standard deviation of five replicate injections of 6.0×10^{-5} M AA was 2.0% in photoelectrochemical FI. The results obtained by the proposed procedure are in good agreement with those established using the triiodide procedure for the AA determination of pharmaceutical products.

Key Words: Photoelectrochemical analysis, flow injection analysis, ascorbic acid, muscovite, methylene blue

---

Turk. J. Chem., **27**, (2003), 167-180.
Full text: pdf
Other articles published in the same issue: Turk. J. Chem.,vol.27,iss.2.