Short Communication

Determination of Ascorbic acid by Using a Belousov-Zhabotinsky Oscillating System Catalyzed by a Macrocyclic Complex

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An appropriate analytical technique for determination of ascorbic acid (AA) by its perturbation effect on Belousov-Zhabotinskii (BZ) oscillating system was reported in this article. The macrocyclic copper (II) complex ($[\text{Cu}(\text{ClO}_4)_2]$) was used as a catalyst while malic acid as substrate in BZ system. The ligand L in the macrocyclic-complex is 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene. Experimental outcomes shown the perturbation effect of AA could cause the change in the amplitude of oscillation (ΔA) and change in the period of oscillation (ΔT) which were directly related to its concentration (3×10^{-6} to 1.05×10^{-4} M) with correlation coefficient of 0.99 respectively. The calculated relative standard deviation (RSD) is 2.71 % by eight samples (1.2×10^{-5} M) and the observed lower limit of detection is 1.5×10^{-6} M. The cyclic voltammetry (CV) experiments were used to confirm the redox reaction between ascorbic acid and sodium bromate. Furthermore, the reaction perturbation mechanism, was derived from the well-known FKN (Field-Koros-Noyes) oscillation mechanism.

Keywords: Antioxidant; Belousov-Zhabotinskii; Chemical Oscillator; Ascorbic acid; Oscillation Amplitude

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