Kinetic Determination of 2,7-Dihydroxynaphthalene by Using Belousov-Zhabotinsky Electrochemical Oscillation System

Waqar Uddin

Office of Research Innovation and Commercialization, Bahria University, Karachi Campus, Pakistan
E-mail: vickyfuelche@yahoo.com

Received: 27 September 2021 / Accepted: 9 November 2021 / Published: 6 December 2021

A new analytical approach for the kinetic determination of 2,7-dihydroxynaphthalene (2,7-DHN) by perturbation effect with its narrow concentration range on Belousov-Zhabotinsky (BZ) oscillator catalyzed by tetra-aza-macrocyclic copper complex catalyst ($[\text{CuL}](\text{ClO}_4)_2$) was reported in this paper. The Ligand “L” in this complex is 5,7,7,12,14,14-hexamethyl-1,4,8,11-tetraazacyclotetradeca-4,11-diene. Perturbation experiments were performed after optimizing the oscillation parameters which indicates that the change in the oscillation amplitude (ΔA) is directly proportional to the concentration of 2,7-DHN added in the range of $4.50 \times 10^{-4} \text{ mol L}^{-1}$ to $1.80 \times 10^{-3} \text{ mol L}^{-1}$ with the correlation coefficient of 0.98. The calculated relative standard deviation (RSD) from the 6 measurements obtained by the injection of $5.00 \times 10^{-3} \text{ mol L}^{-1}$ is 1.90 %. The lower limit of detection (LOD) is $2.10 \times 10^{-4} \text{ mol L}^{-1}$. Factors that influence the oscillation system were studied. A reaction perturbation mechanism was proposed based on a novel FKN model.

Keywords: Oscillating System; Perturbation; Dihydroxynaphthalene; Macrocyclic Catalyst; Belousov-Zhabotinsky

[FULL TEXT](#)

© 2022 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).