

# Impact of CPC micellar medium on Ru(III) promoted oxidation of L-Valine by diperiodatocuprate(III)

Abhishek Srivastava<sup>\*a</sup>, Neetu Srivastava<sup>b</sup> & Ruchi Singh<sup>c</sup>

<sup>a</sup> Department of Chemistry, GLA University, Mathura 281 406, Uttar Pradesh, India

<sup>b</sup> Department of Chemistry, D.D.U. Gorakhpur University, Gorakhpur 273 009, Uttar Pradesh, India

<sup>c</sup> Department of Chemistry, B. N College of Engineering & Technology, Lucknow 226 201, Uttar Pradesh, India

E-mail: aabhichem@gla.ac.in

*Received 24 July 2024; accepted(revised) 28 April 2025*

The objective of the proposed investigation is to examine the influence of cationic surfactant on the Ru(III) facilitated L-Valine oxidation using diperiodatocuprate(III) (DPC) in an alkaline medium. The oxidation rate was ascertained by measuring the decrease in absorbance at a wavelength of 415 nm, an indicator of the Cu(III) concentration. The reaction's advancement was assessed employing the pseudo-first-order condition as a gauge for  $[\text{OH}^-]$ ,  $[\text{DPC}]$ , ionic strength,  $[\text{L-Valine}]$ ,  $[\text{Ru(III)}]$ ,  $[\text{IO}_4^-]$ ,  $[\text{Surfactant}]$ , and temperature. L-Valine and DPC interact stoichiometrically in a ratio of 1:4. Across the spectrum of concentrations examined, the reported reaction reflects less than unit order kinematics in relation to both  $[\text{L-Valine}]$ , and  $[\text{OH}^-]$ , first-order reliance on the  $[\text{DPC}]$  and  $[\text{Ru(III)}]$ , and negative fractional-order for  $[\text{IO}_4^-]$ . A zero salt effect is suggested by the observed constancy in oxidation rate with the inclusion of electrolytes. The oxidation rate is significantly enhanced by Ru(III) solution (as a catalyst) at ppm concentration. Cetylpyridinium chloride (CPC) micellar media facilitates an additional enhancement in the rate of the desired reaction. CPC thus exhibits an excellent compatibility with Ru(III) for the L-Valine oxidation using (DPC).

**Keywords:** Surfactant, Micellar medium, Oxidation, Diperiodatocuprate(III), Ru(III) catalyzed, L-Valine