



Oxidation of Threonine by Sodium Metaperiodate in Alkaline Medium using Transition metal complex species $[\text{RhCl}_4(\text{H}_2\text{O})_2]^-$ as Homogeneous Catalyst in its nano-concentration range: A Kinetic and Mechanistic Study

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Abstract:The kinetics of oxidation of threonine by $[\text{NaIO}_4]$ in the presence of Rh(III) as homogeneous catalyst in alkaline medium in its nano-concentration range has been investigated iodometrically at 35°C . The reaction follows first order kinetics with respect to $[\text{IO}_4^-]$ and [threonine]. The order of reaction is first with respect to $[\text{OH}^-]$ at its lower concentration tending towards zero order at its higher concentrations. The reaction exhibits first order dependence with respect to $[\text{Rh(III)}]$. Positive effect of $[\text{Cl}^-]$ on the rate of oxidation of threonine has been noted. Rate of reaction is not influenced by the change in ionic strength (μ) and dielectric constant (D) of the medium. To study the effect of temperature, the reaction has been studied at four different temperatures from 303K – 318K. Various activation parameters such as energy of activation, enthalpy of activation, entropy of activation and free energy of activation have been calculated. $[\text{H}_2\text{IO}_6^{3-}]$ and $[\text{RhCl}_4(\text{H}_2\text{O})_2]^-$ have been postulated as the reactive species of periodate and Rh(III)chloride respectively in alkaline medium. A most probable reaction mechanism consistent with the kinetic data, spectral evidences, stoichiometry and product analysis has been proposed for Rh(III)-catalysed oxidation of threonine.

Keywords:Kinetics, Mechanism, Oxidation, Rh(III) chloride, Sodium metaperiodate, Threonine.

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