International Journal of ChemTech Research
CODEN (USA): IJCRGG, ISSN: 0974-4290, ISSN(Online):2455-9555
Vol.10 No.9, pp 426-436, 2017

Role of $IrCl_3(H_2O)_3$ in the oxidation of glycine by N-chlorosuccinimide in acidic medium: A kinetic and mechanistic study

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Abstract : The present study performs the kinetics and mechanism of oxidation of glycine by N-chlorosuccinimide (NCS) in the presence of chloro-complex of Ir(III) i.e.$IrCl_3(H_2O)_3$ in acidic medium at 40^0C using mercuric acetate as scavenger. The redox reaction shows unity order with respect to [glycine] and follows first order kinetics with respect to N-chlorosuccinimide. The reaction shows negative effects with respect to $[H^+]$ and [Ir(III)]. The rate of oxidation of glycine is not affected by the change of concentration of $[Cl^-]$, [NHS], [Hg(II)], ionic strength (μ) and dielectric constant of the medium. The reaction was studied at four different temperatures (from 308K-323K) and observed values of rate constant were used to calculate various activation parameters specially the entropy of activation ($\Delta S^{\#}$). NCS itself and $IrCl_3(H_2O)_3$ have been postulated as the reactive species of NCS and Ir(III) chloride in acidic medium, respectively. On the basis of kinetic orders, activation parameters and spectrophotometric evidence, a most probable reaction mechanism has been proposed for the oxidation of glycine in presence of Ir(III) as an inhibitor in acidic medium.

Keywords : Kinetic studies, Glycine, Ir(III)-chloride, Inhibitor, N-Chlorosuccinimide, Acidic medium.

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