



Role of Chloro Complex of Rh(III) in The Oxidation of Valine by N- Chlorosuccinimide in Acidic Medium: A Kinetic and Mechanistic Study

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ABSTRACT

The kinetics of oxidation of valine (val) by N-chlorosuccinimide (NCS) in the presence of chloro complex of $RhCl_3(H_2O)_3$ as an inhibitor in acidic medium at 40 °C have been investigated. The reaction is first-order with respect to $[NCS]$ and $[valine]$. The reaction shows fractional negative order with respect to $[Rh(III)]$ and $[H^+]$ in the oxidation of valine. Nil effects of $[Hg(II)]$, $[NHS]$ or $[Cl^-]$ on the reaction rate were observed. Ionic strength and dielectric constant also have nil effect. The observed kinetic data, available literature and spectroscopic evidence lead us to conclude that $NCSH^+$ and $RhCl_3(H_2O)_3$ are the reactive species of NCS and Rh(III) chloride, respectively in acidic medium. The reaction has been studied at four different temperatures and with the help of observed first-order rate constant values, various activation parameters have been calculated. The main oxidation products of the reaction were identified as isobutyraldehyde and ammonia. The proposed reaction mechanism is well supported by kinetic data, spectrophotometric evidence and positive entropy of activation

Keywords: Mechanism; Valine, N-Chlorosuccinimide, Acid medium, Rh(III)-Chloride.
