



A Thermodynamic and Comparative Study of Pharmaceutical Drug by Ir(III) and Pd(II) Catalyzed Oxidation in Acidic Medium (HClO₄): Kinetic Model

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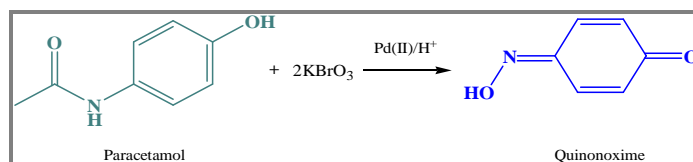
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ABSTRACT

A comparative study of Pharmaceutical drug (Paracetamol) by Ir(III) and Pd(II) catalysed oxidation in acidic medium (HClO₄) at 35 °C to 45 °C. The reaction is carried out in the presence of mercuric acetate as a scavenger for bromide ion. 1-carboxy cyclohexane 1-acetic acid was obtained as the oxidation product and identified chromatographically. The rate law followed a first order and zero order dependence with respect to KBrO₃ and potassium chloride [KCl] respectively. The reaction followed first order with respect to Ir(III) and Pd(II) chloride. Negligible effect of [Hg(OAc)₂] and ionic strength of the medium was observed. The rate of reaction decreased with increasing [H⁺] was observed for the oxidation of paracetamol. Rate of reaction exhibits fractional positive order kinetics with respect to [PA]. The values of rate constants observed at different temperatures (30 to 45 °C) were utilized to calculate the activation parameters. Quinoneoxime and acetic acid have been identified as main oxidation products of the reactions. Feasible mechanism is proposed which are composed with the kinetics, stoichiometry and product of the reaction. The rate law has been derived from obtained kinetic data.

Graphical Abstract



Keywords: Kinetics, Ir(III) chloride, Pd(II) chloride oxidation, Paracetamol, Potassium bromate, Acidic medium.