



Oxidation of Acetaminophen by N-Bromosuccinimide: A Kinetic and Mechanistic Study

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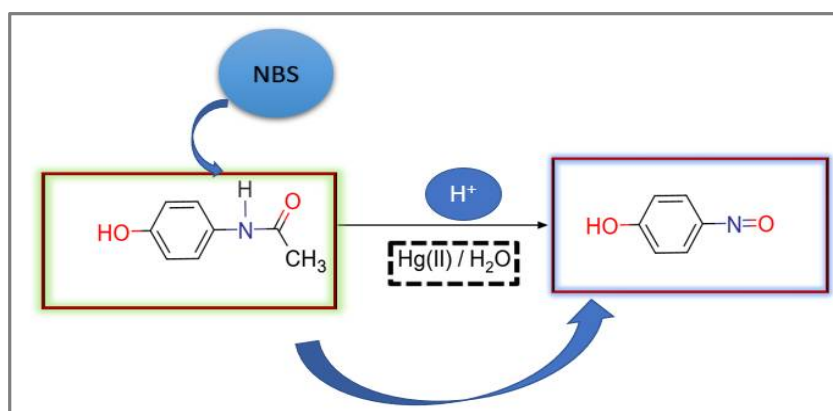
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Accepted on 2nd September, 2020

ABSTRACT

The kinetics and mechanism of oxidation of Acetaminophen (commonly known as Paracetamol) by N-Bromosuccinimide (NBS) has been studied in acidic medium at 313 K. The reaction exhibits first order in [NBS] and fractional order each in [acetaminophen] and [acid]. No change in reaction rate, when subjected to changes in concentration of succinimide, the reduction product of NBS. Variation of ionic strength had no effect on the reaction rate. The decrease in the rate of reaction with an increase in dielectric constant of the medium was observed. The reaction is failed to induce the polymerization of acrylonitrile. The stoichiometry of the reaction has been determined and oxidation products were identified and characterized. The reaction was studied at seven different temperatures and the activation parameters were obtained from Arrhenius plot. Protonated NBS has been postulated as reactive oxidizing species in acidic medium. The observed results have been explained by the proposed plausible mechanism which involves the decomposition of acetaminophen-NBS complex in the slow step, resulting in the corresponding quinone oxime. Rate law has been derived.

Graphical Abstract



Keywords: Acetaminophen, N-bromosuccinimide, Oxidation, Kinetics, Mechanism.