



Kinetics and Mechanism of Oxidation of Ampicillin by Diperioatocuprate (III) and Cobalt (III) as Catalyst in Aqueous Alkaline Medium

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Accepted on 14th August, 2019

ABSTRACT

The kinetics and mechanism of Co(III) catalyzed oxidation of Ampicillin by diperioatocuprate (DPC (III)) in alkaline medium was studied spectrophotometrically at 298 K and at ionic strength of 0.10 mol dm⁻³. The reaction between DPC and Ampicillin in alkaline medium exhibited (AMP:DPC) 1:4 stoichiometry. The oxidation products were identified by spot test, FT-IR and LC-ESI-MS spectral studies. The reaction exhibited pseudo first-order with respect to DPC and fractional order with respect to ampicillin. Addition of alkali retarded the rate of reaction while Co(III) enhanced the rate and periodate had no effect on rate. DPC(III) was found to be the main active species in alkaline medium in the form of [Cu(H₃IO₆)₂]. Activation parameters were computed. The plausible mechanism consistent with experimental results was proposed and discussed in detail.

Highlights

- A mechanism for the Co(III) catalyzed oxidation of Ampicillin by DPC (III) is proposed based on kinetic results.
- Among various species of DPC (III) complex, [Cu(H₃IO₆)₂]⁻ is considered as the most active species for the title work.
- In carrying the reaction, the role of pH is crucial.
- Activation parameters were computed and discussed.
- The overall sequences described are consistent with the present kinetic studies.

Keywords: Kinetics, Mechanism, Oxidation, Diperioatocuprate (III), Ampicillin.
