



Kinetics And Mechanistic Investigation of Oxidation of D-Mannitol By Periodate In Aqueous Alkaline Medium

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ABSTRACT

The kinetics of oxidation of D-Mannitol (D-Man) by periodate in aqueous alkaline medium at 298 K and at a constant ionic strength of 0.04 mol dm^{-3} was studied. The reaction exhibits 1:2 stoichiometry ($[D\text{-Man}] : [\text{periodate}]$). The reaction shows first order kinetics in $[\text{periodate}]$ and less than unit order both in $[D\text{-Man}]$ and $[\text{OH}^-]$. The ionic strength has positive effect and dielectric constant of the medium did not affect the rate significantly. The main products were identified by spot tests, FT-IR and LC-MS spectral studies. Based on the experimental results, the possible mechanisms were proposed. The reaction constants involved in the different steps of the mechanisms were evaluated. The activation parameters with respect to the slow step of the mechanisms were computed and also thermodynamic quantities determined. Kinetic studies suggest that the active species of periodate was found to be $[\text{H}_2\text{IO}_6^{3-}]$.

Keywords: Periodate, D-Mannitol, Oxidation, Mechanism.
