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Der Pharmacia Lettre

Abstract

[Oxidation of doxycycline hyclate by periodate ion-study of kinetics](#)

The kinetics of oxidation of doxycycline hyclate (DCH) by periodate ion in aqueous medium was monitored spectrophotometrically. 1 mol of DCH reacts with 2 moles of periodate in the initial part of the reaction. The reaction follows second order behaviour. Results under pseudo first order conditions, are in agreement with the rate law: $\text{Reaction Rate} = kK_w [\text{DCH}] [\text{IO}_4^-]_0 [\text{H}^+] / \{K_2 K_w + (K_w + K_b K_2) [\text{H}^+] + K_b [\text{H}^+]^2\}$ where kK is the empirical composite rate constant, K_w is ionic product of water, K_2 is acid dissociation constant of H_4IO_6^- , K_b is base dissociation constant of DCH and $[\text{IO}_4^-]_0$ represents the concentration of periodate that has been taken in excess. The rate-pH profile shows a maximum at pH 6.0. The validity of rate law is tested by matching the experimental and calculated pH value corresponding to the rate-pH profile maximum. Increase in dielectric constant has a positive effect on rate of reaction. Free radical scavengers do not affect the reaction rate. Various thermodynamic parameters are reported. High negative value of entropy of activation and the effect of dielectric constant suggest the involvement of solvation effects in mechanism of the reaction particularly the chances of solvated transition state.

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