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Studies on substituent effect on the oxidation kinetics of Acetophenones by acid dichromate

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Abstract: Kinetics of the oxidation of acetophenone and some of its para substituted derivatives by acidic dichromate has been investigated in acetic acid-water medium. The reaction shows first order dependence on [oxidant] and fractional order dependence on [substrate]. Benzoic acid and substituted benzoic acids were formed as the product which was proved by melting point determination and IR spectral analysis. Electron withdrawing substituents accelerate the rate of reaction while electron donating substituents retard the rate. The rate data obey Hammett's relationship. The reaction does not induce the polymerisation of added acrylonitrile which rules out the involvement of free radicals in the reaction. The effect of solvent composition shows that the rate increases with decrease in dielectric constant of the medium. Activation parameters have been evaluated and a mechanism in consistent with the obtained kinetic results have been proposed.

Key words : Acetophenone, oxidation, kinetics, mechanism, acidic dichromate.

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