



Spectrophotometric kinetic and determination of quinones and barbiturates

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Abstract

The kinetics of 1,3-dimethylbarbituric acid with some quinones, namely 1,4-benzoquinone, 1,4-naphthoquinone and *p*-chloranil in 50% methyl alcohol–water mixture have been investigated spectrophotometrically at 30–50°C. The reaction follows overall second-order kinetics, first order each in reactant. From the dependence of the rate constants on temperature, activation parameters have been calculated. A plot of ΔH^\ddagger versus ΔS^\ddagger for the reaction gave a good straight line with an isokinetic temperature of 387.66 K. The rate of reaction increases with increasing dielectric constant of the medium. Based on this reaction, a spectrophotometric determination method of quinones is described. Beer's law was obeyed within the concentration range 2.7–61.5 $\mu\text{g ml}^{-1}$ quinone. The method was applied for determination of barbituric, thiobarbituric and 1,3-dimethylbarbituric acids with 1,4-naphthoquinone within a concentration range of 3.2–39.5 $\mu\text{g ml}^{-1}$ barbiturate. The reaction mechanism and reactivity have been discussed.



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Keywords

1,3-Dimethylbarbituric acid; Quinones

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2015, Karbala International Journal of Modern Science

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...Thus, for the reasons above and for biological and industrial processes, the development of a simple, rapid, sensitive, and selective method for determination of trace amounts of barbituric acid is an important issue. Different approaches have been developed for the determination of BA in various matrices such as pharmaceutical formulation, blood, urine and aqueous solutions included spectrophotometry [2–5], high performance liquid chromatography [6–8], capillary electrophoresis [9], electrochemical [10–12], chemiluminescence [13], a narrow-bore porous graphitized carbon column using water–dioxane mixtures as mobile phases for simultaneous effect of organic modifier and physicochemical parameters of barbiturates [14], reversed-phase thin-layer chromatography using methanol:water mixtures as a mobile phase for the determination of lipophilicity of thiobarbituric acid derivatives assessed [15], little attention have been paid to develop a new method for the spectrophotometric determination of barbituric acid. The purpose of this work is to determine barbituric acid using batch and flow injection (FI) spectrophotometric methods since FI become a popular method utilized in the analysis and application in various samples....

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