

Kinetics of Acetaminophen Based Oscillatory Chemical Reaction with and without Ferroin as Catalyst: An Inorganic Prototype Model for Paracetamol-Ethanol Syndrome

Authors : Nadeem Bashir, Ghulam Mustafa Peerzada

Abstract : The present study pertains to the nonlinear behavior of acetaminophen based uncatalyzed Belousov-Zhabotinsky (BZ) oscillator and its dynamics in the presence of Ferroin as the catalyst. The role of free metal ions as catalysts was examined and the results compared with corresponding complexed catalysts. Free metal ions were found to be sluggish with respect to the evolution of the oscillatory regime as compared to complexed ones. Effect of change of the ligand moiety of the catalyst complex on the oscillatory parameters was monitored. Since ethanol potentiates the hepatotoxicity caused by acetaminophen in-vivo, it is thought to understand this interaction by virtue of causing perturbation of the acetaminophen based oscillator with different concentrations of the ethanol with and without ferroin as the catalyst. Another dimension to the ethanol effect was added by perturbation of the system with ethanol at different stages of the reaction so as to get an idea whether it is acetaminophen or some reactive intermediate generated in the reaction system which reacts with ethanol. Further, the ferroin-catalyzed oscillator is taken as a prototype inorganic model of the acetaminophen-ethanol syndrome, as ferroin and HOBr were inorganic replacements to Cyt P450 and NADPH in the alcohol metabolism.

Keywords : Belousov-Zhabotinsky reaction, ferroin, Paracetamol-Ethanol syndrome, kinetics

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