1077-34-1156   **Diego Torrejon*** (`dito_656@hotmail.com`), 7214 Highland St., Springfield, VA 22150. *An Analytical Approach to Solving Green Oxidation Processes.*

Oxidation, a process in which oxygen is added to break pollutants or organic wastes, is important in many industries. However, this process often uses chemicals that can result in the production of hazardous substances, so it is imperative to be able to control the process to make it environmentally safe.

In this talk, we study the problem of suicidal inactivation of enzymes and man-made oxidation catalysts. Based on experimental data obtained from our colleagues at Carnegie Mellon University, we formulate a system of differential equations that models chemical reactions and analyze its numerical and analytical properties. The main goal is to be able to estimate the rates of the reactions based on limited experimental observations. The nonlinear 3-dimensional ODE system under investigation does not allow for an exact solution. However, noticing its similarity with Michaelis-Menten system, we have been able to develop quasi-state approximation of the model that together with perturbation techniques has allowed us to derive a highly accurate approximate solution. Analytical results developed using this approach, generalized upon previously known relations between the rate constants, allow for a much deeper understanding and control of the oxidation processes. (Received September 17, 2011)