ChE Graduate Seminar Series

Departmental Seminars Presented by Ph.D. Students

Extraction of heavy metals from spent catalyst using chelation technology

Garima Chauhan (Advisor: Prof. K. D. P. Nigam)

13 June 2013, Thursday, 0400-0425 pm (15+10 mins), ChE Seminar hall

Spent catalysts, discarded as solid wastes from hydroprocessing industries contain heavy metals such as molybdenum (Mo), cobalt (Co), nickel (Ni) in considerable amount which may disrupt the ecosystem and affect the human health also, if not disposed off in proper manner. Thus, increasing concerns of environment and declining access of resources create an imperative need to recover the valuable metals from spent catalysts. The present research work is a successful demonstration of the innovative combination of chelation-dechelation process for metal (Co/Mo) extraction from spent catalyst and regeneration of new catalyst from extracted metals. Mobilization of metals was performed using ethylene-diamine-tetraacetic acid (EDTA) and process parameters were optimized by one-variable-at-a-time (OVAT) approach. Maximum extraction of 80.4% Co and 84.9% Mo was achieved under autogeneous reaction conditions at optimum reaction conditions. Kinetic investigation was done to study the effect of reaction temperature and particle size on the chelant assisted metal extraction. Different empirical models (Parabolic diffusion model, Peleg's model, Elovich Mdoel, Shrinking Core model) were compared to explain the kinetics of the aqueous solid-liquid extraction. Rate constant, equilibrium extraction capacity, and initial extraction rate were evaluated to analyze the suitability of these kinetic models to describe the chelant assisted extraction process. The present optimization study may prove useful for hydroprocessing industries intending to extract metals from spent catalyst in view of waste minimization, reutilization of the extracted metals and the noncorrosive ecofriendly approach.

Development of Targeted Delivery Systems for Cancer

Maneesha Pande (Advisor: Prof. A. N. Bhaskarwar)

13 June 2013, Thursday, 0425-0450 pm (15+10 mins), ChE Seminar hall

Intra-tumoral drug delivery system, particularly for tumors which are accessible to injection, is advantageous in that it obviates the adverse effects associated with systemic (intravenous) drug delivery systems. Oil-core bi-liquid foams are stable oil-water systems which can be used for delivering oil soluble as well as water soluble drugs into tumors. The present work relates to the development of a temperature-sensitive hydrogel which is in a liquid state below room temperature and forms a non-flowing semi-solid gel at body temperature. The possibility of using such a temperature-sensitive hydrogel as the aqueous phase in the above- mentioned bi-liquid foam is investigated. Chitosan is a linear polysachharide comprising of glucosamine and N-acetyl glucosamine units, where the $-NH_2$ groups of the glucosamine unit are capable of forming physical cross-links with other adjacent chains in presence of a cross-linking agent β-glycerophosphate at temperatures around 37-40^{0}C, resulting in the formation of a semi-solid gel. Methyl cellulose is a cellulose ether which exhibits inverse solubility-temperature behaviour, i.e. its solubility decreases with increasing temperature, with the result that it forms a turbid gel at temperatures around 60^{0}C, whereas it is a transparent sol at lower temperatures.

In the present work, the kinetics of gelation for medium molecular weight Chitosan (C76, degree of deacetylation of 76%), and methylcellulose (MC 4000cps) gels are studied. The conventional method for studying gelation kinetics in gels is by measuring rheological parameters such as loss modulus and storage modulus, and determining the rate of change in these parameters over time for specific material concentrations and temperatures. An alternative method using turbidity measurements in terms of absorbance, using a uv-visible spectrophotometer is proposed, particularly for such materials which gel with an associated increase in the turbidity. Solutions up to 2% concentration of both C76 and MC 4000 showed first-order kinetics at temperatures around 40^{0}C and 50^{0}C, respectively. The effects of polymer concentration and gelation temperature have also been studied. The results of these studies could be useful in predicting the rate of release of drugs included in the bi-liquid foams.

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0450 pm High Tea

CC
All ChE Faculty
Department N. B.
PhD Students (near biometric device)
Mr. Krishna (for audio/video help)
ChE office: refreshment arrangements
Ms. Tajinder: for information/coordination