Important Instructions

- **There are THREE questions printed in the question paper**
- **Answer all questions in the answer booklet only**
- **DO NOT use pencils for answering any part, even graphics**
- **Start answering each question from a fresh page, all sub-sections together**

Q.1.(a) What is the idea behind "alternative modes of chemical activation" concept in green chemistry? Explain with the example of any one such alternative mode how is this an advancement towards attaining green chemistry targets. **[1+1=2M]**

(b) Describe the basis of SCF extraction processes? Cite an industrial process where such a SCF-based extraction is in practice. How is SCFs different than gas expanded liquids (GXLs) as alternative solvents? **[2+1+1=4M]**

(c) Which phasic systems (G/L/S) are associated with the terms, TOF, GHSV? Explain using a line of justification **[2M]**

(d) Discuss the implications of the Michaelis-Menten equation? **[3M]**

Q.2. (a) Synthesis of ibuprofen by Hoechst-Celanese won the Kirkpatrick Award for implementation of green chemistry principles is 1991

(i) Describe the green process briefly mentioning the reactions involved,

(ii) State FOUR advantageous aspects of the new route from green chemistry perspective. **[3+2=5M]**

(b) Explain the basis of classification of reactions as 'diffusion controlled' and 'chemically (kinetic) controlled', **[2M]**

(c) How is the new allyl alcohol process different than the traditional process? How would you improvise a further better process in light of green chemistry requirements. **[3M]**

(d) Explain how cavitation effect (while using ultrasounds) is different in homogeneous and heterogeneous catalyst cases. **[3M]**

Q.3. (a) Explain in brief how creating a pseudo-order reaction helps to understand the kinetics of a catalytic reaction. **[2M]**

(b) Discuss the different types of processes involved in sintering of a heterogeneous catalyst. **[2M]**

(c) What do you understand by a 'volcano plot'? **[1M]**

(d) The acid-catalyzed reaction $A \rightarrow B$ follows first-order kinetics. If it takes 20 min to reach 50 % conversion at 300 K, how much time will it take to reach 99 % conversion at 300 K. **[1M]**

(e) What do you understand by the term 'Tolman's cone angle'? How was the new concept consisting of the terms R_{max}, W_{max} and S_{occ} offer better accountability of steric factors in ligands for an organometallic catalyst? **[3M]**

(f) Write four advantageous aspects of catalytic click reaction **[2M]**

------------ END ----------

DO NOT SCRIBBLE ON THE QUESTION PAPER