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KAA-1761 Seat No._____

M. Sc. (Sem. II) Examination

April/May - 2013

Physical Chemistry : Paper - CHN 503

Time : 3 Hours] [Total Marks : 70

Instruction : All questions carry **equal** marks.

1 (a) Explain the activated complex (transition state) theory and get the equation relating activation energy with enthalpy of reaction. 8

(b) Give the features of fast reaction and name any three techniques to measure the rates of fast reactions. 3

(c) The rate constant for first order decomposition of ethylene oxide into CH_4 and CO follows the equation ln $K=14.34-(1.25\times10^4)/T$. Calculate the activation energy of the reaction. 3

OR

1 (a) Explain the mechanism and kinetics of unimolecular reactions. 8

(b) Write a note on enzyme catalytic reactions. 3

(c) Calculate ΔH^* and ΔS^* for second order hydrogenation of ethane at 355°C. 3

2 (a) Derive Gibb's adsorption isotherm equation. 8

(b) Write a note on surface area determination. 3

(c) Explain the mechanism of free radical polymerisation. 3

OR

2 (a) Discuss Osmometric and light scattering methods of molecular weight determination of polymers. 8

(b) Write a note on critical micelle concentration and factors affecting it. 3

(c) In the adsorption of nitrogen on a catalyst, the constants $\frac{c-1}{v_m c}$ and $\frac{1}{v_m c}$ of BET equation were found to be 98 and 0.8 respectively. Calculate the specific surface of the catalyst, if area occupied by one nitrogen molecule is 16.2×10^{-16} cm^2. 3

3 (a) Discuss the Debye-Huckel theory of strong electrolytes. 8

(b) Explain the nature and importance of Tafel plot. 3

(c) Write a note on Gouy-Chapmann model for electrical double layer. 3

OR

3 (a) What is over-potential ? Discuss the types and factors affecting over potential. What is the importance of over potential ? 8

(b) Write a note on Stern model. 3

(c) Explain the nature of ion-solvent interactons in terms of activity. 3

4 (a) Discuss the mechanism of electrocatalysis. 8

(b) Explain the working and disadvantages of hydrogen electrode. 3

(c) Write a note on halfwave potential and its significance. 3

OR

4 (a) Discuss the theory and instrumentation of polarography. 8

(b) Explain the importance of membrane phenomenon in bioelectrochemistry. 3

(c) Explain the effect of light at semiconductor solution interface. 3

5 Answer any seven : 14

(i) Write Arhenius equation and explain each term in it.

(ii) What is meant by chemical dynamics ?

(iii) What is meant by steady state of a reaction?

(iv) What is oscillatory reaction ? Give an example.

(v) Define photochemical reaction. Give an example.

(vi) Define surface tension.

(vii) What is critical micelle concentration ?

(viii) Define the terms – adsorption, adsorbent and adsorbate.

(ix) Write the expressions for number average and weight average molecular weights of polymer.

(x) Name four surfactants.

(xi) What is surface activity ?

(xii) Write the expression for Debye-Huckel-Onsager equation and define each term in it.
