K21P 0970

Reg. No. : .....

Name : .....

III Semester M.Sc. Degree (CBSS – Reg./Suppl./Imp.) Examination, October 2021
(2018 Admission Onwards)
CHEMISTRY
CHE 3C.10 : Physical Chemistry – III

Time : 3 Hours Max. Marks : 60

SECTION – A

Answer **all** questions in **a** word or sentence. **Each** question carries **1** mark. **(8×1=8)**

1. What is transmission coefficient ?
2. Distinguish between collision complex and activated complex.
3. State steady state approximation.
4. Distinguish between prototropic and protolytic mechanism of acid base catalysis.
5. Explain the term KLM with reference to Auger electron spectroscopy.
6. Distinguish between associative and dissociative type of chemisorption.
7. What do you mean by electro kinetic phenomena ?
8. What is streaming potential ?

SECTION – B

Answer **eight** questions. Answers may be in **one** or **two** sentences. **Each** question carries **2** marks. **(8×2=16)**

9. For the reactions $A \xrightarrow{k_1} B$, $A \xrightarrow{k_2} C$ find concentrations of A, B and C as function of time.
10. What is the effect of pressure on the rate of gas phase reactions ?
11. How would you follow a fast reaction by NMR spectroscopy ?

P.T.O.

12. Account for the high quantum yield of $H_2 - Cl_2$ reaction.
13. Distinguish between general and specific H^+ ion catalysis.
14. What is secondary salt effect ?
15. Write Gibbs adsorption isotherm. How is it verified ?
16. Define isosteric heat of adsorption. How is it measured ?
17. Unimolecular gas phase surface catalysed reactions follow first order kinetics at low pressures and zero order kinetics at high pressures. Why ?
18. State and explain Schultz-Hardy rule.
19. Define zeta potential. Explain its significance.
20. What is isoelectric pH ? Explain its significance.

SECTION – C

Answer **four** questions. **Each** question carries **3** marks. **(4×3=12)**

21. With the help of potential energy surface explain reaction coordinate.
22. The pre exponential factor for a first order reaction is $2 \times 10^{13}\ s^{-1}$. Calculate entropy of activation at 500 K.
23. Briefly explain flow method of studying fast reactions.
24. Taking one example discuss Rice-Herzfeld mechanism of organic decomposition reaction.
25. Derive Brönsted Bjerrum equation.
26. Discuss Eley Redeal mechanism of surface catalysed reactions.
27. 160 ml of N_2 (corrected to STP) was required to form a monolayer on 1_g of a solid. Find the surface area of the solid. The cross sectional area of N_2 is 16.2 $Å^2$.
28. Briefly discuss electrophoresis.

SECTION – D

Answer either '**a**' or '**b**' of each question. **Each** question carries **6** marks. **(4×6=24)**

29. a) Briefly discuss Collision theory of reaction rates.

OR

b) Discuss briefly :
   i) Relaxation method.
   ii) Flash photolysis.

30. a) Briefly discuss Somenoff-Hinshelwood theory of branching chain reactions.

OR

b) Write mechanism for the photochemical reaction between H_2 and Br_2. Derive the rate law.

31. a) Derive BET adsorption isotherm.

OR

b) Discuss theory and applications of ESCA.

32. a) Write a briefly account of the methods for determination of molar mass of polymers.

OR

b) Discuss Donnan Membrane equilibrium. What are its applications ?
