0124984 K19P 1081

Reg. No. : .....

Name : .....

III Semester M.Sc. Degree (CBSS-Suppl./Imp.) Examination, October - 2019

(2014 Admission Onwards)

CHEMISTRY

CHE 3C 10 : PHYSICAL CHEMISTRY-III

Time : 3 Hours Max. Marks : 60

SECTION - A

Answer **All** questions. Answers may be in one word or sentence. Each question carries **1** mark. **(8×1=8)**

1. Write equation for relaxation time for the reaction $A \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} B$.
2. Define steric factor.
3. What is cage effect.
4. Write Hammett equation. Explain terms.
5. Write Langmuir adsorption isotherm for adsorption of a gas on a solid in the linear form. What is the significance of slope and intercept of the linear plot?
6. What is the significance of LEED in surface analysis?
7. Define zeta potential.
8. Name two methods for the determination of weight average molar mass of a polymer.

P.T.O.

SECTION - B

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

9. For the reaction $A \xrightarrow{k1} B \xrightarrow{k2} C$, find the steady state concentration of B.

10. Unimolecular gas phase reactions follow first order kinetics at high pressures and second order kinetics at low pressures. Why?

11. Explain the significance of enthalpy and entropy of activation.

12. Account for the first and second explosion limits in H_2–O_2 reaction.

13. Define Michaelis Menten constant. Explain its significance.

14. What do you mean by linear free energy relations. Show that Hammett equation is a linear free energy relationship.

15. Following Langmuir theory, derive an equation for the fractional surface coverage θ for the dissociative chemisorption $A_{2(g)} \underset{k-1}{\overset{k_1}{\rightleftharpoons}} 2A_{ads}$.

16. Define isosteric heat of adsorption. How is it measured?

17. Write BET adsorption isotherm in the linear form. Explain terms.

18. What the factors affecting stability of a colloid? Explain.

19. Explain the term electrokinetic phenomenon. Write two examples.

20. How does diffusion coefficient depend on molecular size? Explain.

SECTION - C

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

21. The pre exponential term for a first order reaction is $5\times10^{13}\ 5^{-1}$. Find the entropy of activation at 500k.

22. When a sample of water is heated by a pulse of microwave radiation the equilibrium in the water dissociation is disturbed. The relaxation time for the reestablishment of the equilibrium is 36 μs. Find k_1 and k_{-1} for $H^+ + OH^- \underset{k_{-1}}{\overset{k1}{\rightleftharpoons}} H_2O$. Ion product of water at 25°c is 10^{-14}.

23. Derive an equation to show primary salt effect.

24. Discuss Rice Herzfeld mechanism for organic decomposition reaction taking a specific example.

25. 130 ml of N_2(corrected to STP) was required to form a monolayer on 1g of a solid. Find the surface area of the solid. Cross sectional area of N_2 is 16.2 $\AA^2$.

26. Discuss Eley Rideal mechanism for bimolecular surface catalysed reactions.

27. Discuss one method of determining zeta potential .

28. What is micelle ? How is it formed ? Discuss.

SECTION - D

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

29. a) Discuss briefly collision theory of reaction rates.

(OR)

b) What are the methods of studying fast reactions? Discuss.

P.T.O.

30. a) Write mechanism for the photochemical reaction between H_2 and Cl_2. Derive rate law.

(OR)

b) Discuss Somenoff Hinshelwood theory of branching chain reaction.

31. a) What is ESCA ? Discuss its applications in surface analysis.

(OR)

b) Derive Langmuir adsorption isotherm from statistical point of view.

32. a) What is Donnan membrane equilibrium? Discuss its applications.

(OR)

b) Briefly discuss light scattering method of molar mass determination of polymers.
