

(Pages : 4)

P – 3872

Reg. No. :

Name :

Third Semester B.Sc. Degree Examination, January 2023

First Degree Programme under CBCSS

Chemistry

Complementary Course for Botany

CH 1331.3 — PHYSICAL CHEMISTRY

(2020 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

PART – A

Answer **all** questions. Each question carries **1** mark.

1. Mention the major types of electronic transitions in UV-visible spectroscopy.
2. Define chemical shift in NMR spectroscopy.
3. Define rate of a reaction.
4. What is an ideal solution?
5. What is Hardy Schulz rule?
6. What are colloids?
7. Define molarity of a solution.
8. What are isotonic solutions?

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9. What is Lewis acid? Give one example.
10. What is ionic product of water?

(10 × 1 = 10 Marks)

PART – B

Answer **any eight** questions from the following. Each question carries **2** marks.

11. What is meant by order of a reaction?
12. What is a gel? Give an example.
13. What are micelles?
14. Calculate the pH of .002N Calcium hydroxide.
15. Calculate the mass of sodium carbonate that is to dissolve to prepare 500ml of its 0.1 N solution.
16. What is leveling effect?
17. Derive the relation between ionization constant K_a and degree of dissociation.
18. Explain why an aqueous solution of sodium acetate is basic?
19. What is buffer index?
20. What is fractional distillation?
21. What is the effect of conjugation in UV spectroscopy?
22. What kind of nuclei gives NMR spectrum?
23. What is zero order reaction? Give one example.
24. What is reverse osmosis?

25. What is Van't Hoff factor? Explain its significance.
26. Define average rate of reaction.

(8 × 2 = 16 Marks)

PART – C

Answer **any six** questions from the following. Each question carries **4** marks.

27. Derive integrated rate equation for first order reaction.
28. Discuss the theory of steam distillation
29. What is CST? Draw the phase diagram of a binary partially miscible liquid system showing upper consolute temperature.
30. Explain the term azeotropic mixture with a suitable example.
31. Explain zeta potential.
32. Give any two method for the preparation of lyophobic colloids.
33. A buffer solution contains 0.40 mole of acetic acid and 0.20 mole of sodium acetate per litre. Calculate the pH of the solution. K_a of acetic acid = 1.75×10^{-5}
34. Calculate the pH of 1×10^{-8} M HCl.
35. Derive the relation between K_w and K_h for salts of strong acid and weak base.
36. Briefly discuss the NMR spectrum of $\text{CH}_3\text{CH}_2\text{Br}$.
37. What are the factors influencing the rate of reaction?
38. Write a note on ultramicroscope.

(6 × 4 = 24 Marks)

PART – D

Answer **any two** questions from the following. Each question carries **15** marks:

39. (a) Discuss intermediate compound formation theory of homogeneous catalysis and illustrate it with suitable example
- (b) What are the main postulates of collision theory of bimolecular gaseous reactions? **8 + 7 = 15**
40. (a) State and explain Nernst distribution law.
- (b) Discuss the application of distribution law in solvent extraction **8 + 7 = 15**
41. (a) Discuss any two application of colloids.
- (b) Write short notes on ultrafiltration and electrodialysis. **8 + 7 = 15**
42. (a) Discuss the applications of uv spectroscopy. **7**
- (b) Explain the basic principle and spin-spin coupling of NMR spectroscopy. **8**
43. Prove that elevation in boiling point is a colligative property. How it is useful for the determination of molar mass of unknown solute?
44. (a) Write a brief note on buffer solutions and explain the mechanism of buffer activity with an example.
- (b) What is pH? How is it determined potentiometrically? **8 + 7 = 15**

(2 × 15 = 30 Marks)