

Reg. No. :

Name :

Third Semester B.Sc. Degree Examination, March 2022

First Degree Programme under CBCSS

Chemistry

Complementary Course for Botany

CH 1331.3 : PHYSICAL CHEMISTRY

(2019 Admission)

Time : 3 Hours

Max. Marks : 80

PART - A

(Answer all questions. Answer in one word to maximum of two sentences. Each question carries 1 mark).

1. The rate of a reaction _____ with increase of temperature.
2. For a first order reaction the half-life period is a _____
3. For a zero-order reaction the half-life period is _____ to the initial concentration.
4. Define pH of a solution.
5. What is hydrolysis constant? How is it represented?
6. Define boiling point of a liquid.

P.T.O.

7. What are auxochromes?
8. What is MRI?
9. On adding few drops of dil. HCl to freshly prepared ferric hydroxide, a red colloidal solution is obtained. The phenomenon is known as _____
10. Isotonic solutions have same _____

(10 × 1 = 10 Marks)

PART – B

(Short answer type. Answer **any eight** questions from the following. Each question carries **2** marks).

11. Define zero order reaction.
12. Define order and molecularity of reaction.
13. What is the expression for pH of solution containing weak acid and its salt?
14. Define a catalyst. Give one example.
15. What are the classifications of partially miscible liquids?
16. What are azeotropes? Give one example.
17. What are Chromophores? Give one example.
18. Which isotope of carbon will give NMR spectrum? Why?
19. What is Raoult's law?
20. What is Hardy-Schulz rule?
21. Explain the gold number of a colloid.
22. Lyophilic colloids are more stable than Lyophobic colloids. Why?

23. What is meant by non ideal solution? Give one example.
24. What are different type of catalysis?
25. Define osmotic pressure?
26. What is zeta potential in colloids?

(8 × 2 = 16 Marks)

PART – C

(Short answer type. Answer **any six** questions from the following. Each question carries 4 marks).

27. Derive the expression for the kinetics of first order reactions.
28. Explain the calculation of Arrhenius parameters of a chemical reaction.
29. A first order reaction is 50% complete in 100 minutes. How long will it take for 90% completion?
30. Calculate the pH of buffer solution obtained by mixing 6.0 g of acetic acid and 12.30 g. of sodium acetate and making the volume of solution to 500 ml. (K_a for acetic acid is 1.8×10^{-5}).
31. Explain the temperature-composition diagram of non-ideal solutions.
32. Explain the different types of electronic transitions in molecules.
33. Explain the origin of chemical shift in NMR spectroscopy.
34. What is Vant-Hoffs factor? What is its importance?
35. Explain the electrical properties of colloids.
36. How UV-Visible spectroscopy is used to identify geometrical isomers.
37. Explain the principle of fractional distillation.
38. Which compound is used as standard in NMR? Why?

(6 × 4 = 24 Marks)

PART – D

(Answer **any two** questions. Each question carries **15** marks).

39. (a) Explain the different types of catalysis with one example for each of them.
(b) Explain the different concepts of explaining the acids and bases.
40. (a) Explain the intermediate compound formation theory and adsorption theory of catalysis.
(b) Explain the various factors influencing the rate of a reaction.
41. Explain how colligative properties are used in determining the molecular mass of non-volatile solutes?
42. Explain the chemical shift and spin-spin coupling in NMR spectroscopy. Also explain the NMR spectrum of pure ethanol.
43. (a) Derive the expression for kinetics of first order reaction.
(b) Explain the different methods of preparation and properties of colloids.
44. (a) Explain the vapour pressure-composition curve for non-ideal solutions.
(b) Discuss the different types of shifts in the absorption maximum of UV-Visible spectra.

(2 × 15 = 30 Marks)