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Reg. No. : .....

Name : .....

Fourth Semester B.Sc. Degree Examination, August 2022

First Degree Programme under CBCSS

Chemistry

Complementary Course for Zoology

CH 1431.4 : PHYSICAL CHEMISTRY

(2019 Admission)

Time : 3 Hours Max. Marks : 80

SECTION – A

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

1. Define instantaneous rate of reaction.
2. The reaction $A + B \rightarrow C$ has zero order. Write its rate equation.
3. Define ionic product of water. What is its value at 298 K?
4. Calculate the hydronium ion concentration of a solution having pH=5.
5. What are micelles?
6. Give mathematical expression for Beer-Lambertz law.
7. What are Chromophores?
8. What are the applications of Flame emission photometers?

P.T.O.

9. Define the term mole fraction.

10. What are ideal solutions?

(10 × 1 = 10 Marks)

SECTION – B

Short answer type (Not to exceed one paragraph)

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

11. For a first order reaction, k=0.693 S^{-1}. What is the half- life period of the reaction?

12. Explain why finely divided metals are more efficient catalyst as compared to their massive forms.

13. What is buffer action?

14. Explain the term levelling effect of a solvent with a suitable example?

15. Mention the limitations of Ostwald dilution law.

16. Distinguish between multimolecular and macromolecular colloids.

17. What is dialysis?

18. Differentiate between electrophoresis and electro osmosis.

19. Explain the diamagnetic shielding in NMR spectroscopy?

20. Write a note on spin-spin coupling.

21. What is resolution in Gas Chromatography?

22. What is Woodward-Fieser rule?

23. Write the principle and applications of Atomic Absorption spectroscopy.

24. What are the different factors affecting λ_{max} ?

25. What is capillary electrophoresis? How does it work?

26. What happens to the vapour pressure of a liquid during the addition of a non-volatile solute?

(8 × 2 = 16 Marks)

SECTION – C

Short essay (Not to exceed 120 words)

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

27. What is a complex reaction? Comment on the significance of the term order and molecularly in case of complex reaction?

28. Distinguish between the terms threshold energy and activation energy *of a* reaction. How they are related?

29. What are conjugate acid and conjugate base? Give one example for each.

30. Define degree of dissociation of an electrolyte in solution? What happens to the degree of dissociation on dilution?

31. What is meant by peptization? How is collodion prepared?

32. Discuss

    (a) Tyndall effect

    (b) Brownian Movement.

33. Define the term chemical shift. What are the factors influencing chemical shift? Explain.

34. What are the different types of shift noted in UV-vis spectrum? Explain.

35. Write briefly about the detectors in Gas Chromatography?

36. Draw the vapour pressure composition curve for ideal solution and explain its essential characteristics.

37. The half-life of Na-24 is 14.8 hours. How long will it take for the radioactivity to fall to 10% of the initial value? The half-life of Na-24 is 14.8 hours.

38. Write a short note on fractional distillation.

(6 × 4 = 24 Marks)

SECTION – D

Long Essay

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

39. What are the main postulates of the collision theory of bimolecular gaseous reactions? How does collision theory explain the effect of temperature on the rate of a reaction?

40. Derive expressions for the hydrolysis constant of a salt of a strong acid and weak base in aqueous solution, its degree of hydrolysis and the pH of the solution.

41. (a) What are the various types colloids? Explain.

    (b) What are the applications of colloids?

42. (a) What is molar extinction coefficient? Give its importance.

    (b) Give the applications of UV-Visible spectroscopy?

    (c) Write a note on coupling constant in NMR.

43. Describe the principle, instrumentation and applications of HPLC.

44. (a) What are non-ideal solutions? Explain the deviation of non-ideal solutions from Raoult's law?

    (b) Define azeotropes. Mention their important characteristics.

    (c) Explain the theory of steam distillation.

(2 × 15 = 30 Marks)