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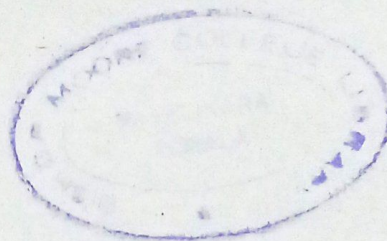
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Third Semester B.Sc. Degree Examination, March 2022

First Degree Programme under CBCSS

Chemistry

Complementary Course for Botany

CH 1331.3 : PHYSICAL CHEMISTRY

(2017 – 2018 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions.

1 word type. Each question carries **1** mark.

1. The half-life of a given reaction is doubled if the initial concentration of the reactant is doubled. What is the order of the reaction?

2. Calculate the pH of a 0.02M HCl solution.

3. What is meant by buffer capacity?

4. Define critical solution temperature.

5. What is meant by hypsochromic shift?

6. Why TMS is used as reference compound in NMR spectroscopy?

7. What are isotonic solutions?

8. Define the term 'Tyndall effect'.

9. Benzene, Naphthalene and Anthracene among this, which molecules have the lowest electronic transitions. Why?

10. Write down the expression for pKa for acetic acid.

$(10 \times 1 = 10 \text{ Marks})$

SECTION – B

Answer **any eight** questions.

Short answer type. Each question carries **2** marks.

11. A first-order reaction was 75 percent complete in 25 minutes. What is the rate constant of the reaction?

12. Differentiate between order and molecularity of a chemical reaction.

13. What is molal elevation constant?

14. When sodium acetate is dissolved in water, the resulting solution is basic. Why?

15. What are azeotropes?

16. Explain the term distribution coefficient.

17. What are the conditions of validity for Nernst distribution law?

18. What are chromophores and auxochromes with an example?

19. What are the conditions for a nucleus to be NMR active?

20. What is vant-Hoff equation for dilute solutions?

21. Distinguish between ideal and non-ideal solutions.

22. Discuss the Bredig arc method for the preparation of colloids.

$(8 \times 2 = 16$ **Marks**$)$

SECTION – C

Answer **any six** questions.

Short essay type, Each question carries 4 marks.

23. Derive integrated rate equation for first order reaction.

24. What is heterogeneous catalysis? Discuss with examples.

25. The rate constants of a reaction at 500K and 700K are $0.02s^{-1}$ and $0.07s^{-1}$ respectively calculate the activation energy.

26. Prove that pKw = 14. Derive relationship between pKa, pKb and pKw.

27. Derive Henderson equation for basic buffer.

28. Discuss the Bp-composition curves of phenol-water system.

29. Discuss the principle of steam distillation.

30. How does reverse osmosis work?

31. Briefly discuss about the electrical double layer and how it relates to zeta potential.

$(6 \times 4 = 24$ Marks)

SECTION – D

Answer **any two** questions.

Long essay type, Each question carries **15** marks.

32. What is meant by rate of reaction? How temperature affects the rate of reaction? How collision theory explains the effect of temperature?

33. (a) How does NMR Spectroscopy useful for distinguishing the following molecules CH_3CH_2OH, CH_3-O-CH_3?

    (b) Comment on Hyperchromic and Hypochromic effects.

34. What is meant by colligative property, discuss briefly about any two colligative properties?

35. (a) Discuss the Arrhenius and Bronsted Lowry concepts of acids and bases with example.

    (b) Differentiate between peptization and coagulation.

$(2 \times 15 = 30$ Marks)

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