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Reg. No. : .....

Name : .....

Fourth Semester B.Sc. Degree Examination, May 2021

First Degree Programme Under CBCSS

Chemistry

Complementary Course for Zoology

CH 1431.4 – PHYSICAL CHEMISTRY

(2017-2018 Admission)

Time : 3 Hours Max. Marks : 80

SECTION – A

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

1. Define Colloidal state.
2. The reaction, $A + B + C \rightarrow P$, is found to obey the rate law; $r = k[A]^2[B]^{3/2}[C]^{-1/2}$, What is the overall order of the reaction?
3. Write an example of a liquid -liquid system which is completely immiscible.
4. Complete the equation : $p^H + p^{OH} = ...$
5. How does λ_{max} changes with conjugation?
6. Write any two examples of auxochromes.
7. What is a buffer solution?

P.T.O.

8. Write Arrhenius equation.

9. Define coagulation.

10. Which is the flame commonly used for atomization in atomic absorption spectroscopy?

(10 × 1 = 10 Marks)

SECTION – B

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

11. What *is* Hardy-Schulze rule?

12. Why do non-ideal Solutions deviate from Raoult's law?

13. What is differential thermal analysis?

14. What are the factors that influence rate of reactions?

15. Calculate the pH of 0.1 M NaOH solution.

16. What are chromophores? Give examples.

17. The vapor pressure of pure benzene and toluene at 40°C are 184.0 torr and 59.0 torr, respectively. Calculate the partial pressures of benzene and toluene and total vapour pressure of solution that has 0.4 mole fraction of benzene. Assume that solution is ideal.

18. Define Chemical shift. What are the scales used to represent chemical shift?

19. Derive the expression for K_b of weak base (BOH) in aqueous medium.

20. What are the postulates of collision theory?

21. What are the applications of atomic absorption spectroscopy?

22. Define Tyndall effect.

(8 × 2 = 16 Marks)

SECTION – C

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

23. What process are involved in steam distillation?

24. A first order reaction is 20% completed in 10 minutes. Calculate the rate constant and the half-life of the reaction.

25. Derive the Henderson equation for acidic buffer solutions.

26. Why does TMS act as a reference standard in NMR?

27. Write any two methods to purify colloids.

28. Discuss the hydrolysis of CH_3COONa.

29. What are the possible electronic transitions in organic molecules?

30. Discuss different types of catalysis.

31. Write a note on zone electrophoresis.

($6 \times 4 = 24$ Marks)

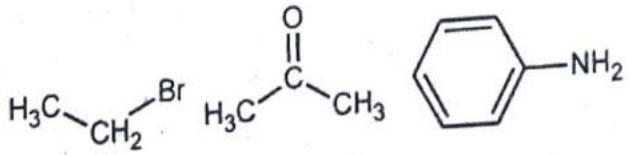
SECTION – D

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

32. Explain the principle, instrumentation and applications of gas chromatography.

33. (a) Discuss the Lewis concept of acids and bases. What are its advantages?

(b) Draw the NMR spectrum of following molecules:



34. (a) Discuss the variation of mutual solubility of phenol-water, triethylamine-water and nicotine-water systems with variation of temperature.

(b) Derive the integrated rate law for first order reaction of type $A \rightarrow P$.

35. (a) Discuss the buffer action of NH_4OH/NH_4Cl buffer solution.

(b) Discuss the applications of colloids with respect to Cottrell precipitator, purification of water and delta formation.

(2 × 15 = 30 Marks)
