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Reg. No. : .....

Name : .....

Third Semester B.Sc. Degree Examination, March 2022

First Degree Programme under CBCSS

Chemistry

Complementary Course for Physics

CH 1331.1 : PHYSICAL CHEMISTRY

(2020 Admission)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** question in a word or **one** or **two** sentences. Each question carries **1** mark.

1. What is Joule-Thomson effect?
2. Write the van der Waals equation for *n* moles of a gas ————————
3. Name the crystallographic system with $\alpha \neq \beta \neq \gamma = 90^\circ$ and $a \neq b \neq c$.
4. Give Bragg equation and explain the terms.
5. What is SHE?
6. What is meant by EMF of a cell?
7. What is the unit of rate constant of zero-order reaction?

8. Explain centre of symmetry.

9. Name an industrially important catalyst and its application.

10. Explain the term auto catalysis.

(10 × 1 = 10 Marks)

SECTION – B

Answer **any eight** questions. Each question carries **2** marks.

11. Calculate the RMS velocity of O_2 at 27°C?

12. What is the physical significance of constants *a* and *b* in van der Waals equation?

13. Distinguish between most probable and average velocities.

14. Explain isotropy and anisotropy in solids.

15. Calculate the Miller indices of the crystal plane which cut through the crystal axes at $(2a, 3b, c)$ and $(-a, b, \infty)$.

16. What are the functions of a salt bridge?

17. What are the applications of conductometric titrations?

18. Write the principle of potentionietric titration.

19. State and explain Kohlrausch's law.

20. Give a brief account of the enzyme catalysis.

21. Define the law of photochemical equivalence.

22. What is photosensitization? Illustrate with an example.

23. What are the factors influencing the rate of a chemical reaction?

24. What are pseudo ordered reactions? Give one example.

25. Give any two examples for D_3h point group.

26. Write a note on inversion centre and axis of rotation?

(8 × 2 = 16 Marks)

SECTION – C

Answer **any six** questions. Each question carries **4** marks.

27. What is the law of corresponding states? How is it derived from the van der Waals equation?

28. Discuss Claude's methods for the liquefaction of gases?

29. Explain the structure of KCl crystal.

30. Discuss the seven crystal systems in solids with suitable examples.

31. Describe a method for the determination of transport number of silver ions.

32. Explain conductometric titration of acids and bases.

33. Explain the kinetics of hydrogen-bromine reaction.

34. Discuss the causes of higher and lower quantum yield of certain reactions.

35. Derive Michaelis-Menton equation for enzyme catalysed reactions.

36. A first order reaction is completes in 15 minutes at 40°C and in 3 minutes at 60°C. Calculate the energy of activation for the reaction.

37. Describe the point group of NH_3 molecule.

38. Differentiate between order and molecularity of a reaction with suitable examples.

(6 × 4 = 24 Marks)

SECTION – D

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

39. Derive van der Waal's equation for a real gas and discuss how it can be applied to low temperature and high pressure.

40. Discuss the single crystal and powder x-ray diffraction studies of crystals.

41. (a) Briefly explain the laws of photochemistry.

    (b) Explain the kinetics of H_2-Cl_2 reaction.

42. (a) Give a brief description on reversible electrode with respect to anions and cations.

    (b) What is meant by the term standard electrode potential? Outline a method for its determination.

43. (a) Construct the group multiplication table for water molecule. **8**

    (b) What are proper and improper axis of symmetry? Explain with examples. **7**

44. (a) What are the different characteristics of catalytic reactions?

    (b) Explain the theories of catalysis with suitable examples.

(2 × 15 = 30 Marks)