

I Semester B.Sc. Examination, December 2018
(Semester Scheme)
(CBCS) (2018 – 19 Onwards)
CHEMISTRY – I

Time : 3 Hours

Max. Marks : 70

Instructions : i) The question paper has two Parts. Answer both the Parts.
ii) Draw diagrams and write chemical equations wherever necessary.

PART – A

Answer any eight of the following questions, each question carries two marks. (8×2 = 16)

1. $\log 5 = 0.6990$, calculate the value of $\log 125$.
2. State the law of corresponding states.
3. Calculate the root mean square velocity of oxygen molecule at 300 K. (Given $R = 8.314 \text{ J/K/mol}$, molecular mass of oxygen = $32 \times 10^{-3} \text{ kg}$)
4. What is phosphorescence ?
5. Calculate the molality of the solution containing 4g of NaOH in 250 ml of its solution
(Given : Density of water = 996 kgm^{-3} at 298 K, Molecular mass of NaOH = 40).
6. State Nernst distribution law.
7. Define the term electron affinity of an element.
8. Write the chemical formulae of hydrides of chalcogens.
9. Define the terms accuracy and precision in quantitative analysis.
10. What are carbanions ? Give an example.
11. State Markownikov rule.
12. What is Diel's-Alder reaction ? Give equation.



PART - B

Answer any nine of the following questions, each question carries six marks. (9×6= 54)

13. a) i) Integrate $\cos x$ dx.
- ii) Differentiate \sqrt{x} with respect to x .
- b) Write Maxwell-Boltzmann equation for molecular velocity and explain the terms. (4+2)
14. a) Describe the experimental determination of critical temperature and critical pressure of a gas.
- b) What is Joule-Thomson effect? (4+2)
15. a) Describe briefly Linde's process for the liquefaction of air.
- b) Calculate van der Waals constants for chlorine. Given critical pressure and critical volume are $23.5 \times 10^5 \text{ Nm}^{-2}$ and $1.397 \times 10^{-4} \text{ m}^3 \text{ mol}^{-1}$ respectively. (4+2)
16. a) Explain, why the quantum yield of the photochemical combination of H_2 and chlorine is high.
- b) What is meant by Chemiluminescence? (4+2)
17. a) Discuss the phenol-water system with the help of miscibility temperature-composition curve.
- b) Write the Sugden equation. Indicate the terms involved. (4+2)
18. a) Describe the Beckmann's method for the determination of molar mass of a non-volatile solute by depression in freezing point measurement.
- b) A solution containing $2.4 \times 10^{-3} \text{ kg}$ of a solute dissolved in $2.5 \times 10^{-3} \text{ m}^3$ of water gave the osmotic pressure of $2.431 \times 10^5 \text{ Nm}^{-2}$ at 300 K. Calculate molar mass of the solute. (4+2)



19. a) Define atomic radii. How does it vary across a period and down the group in the periodic table? Explain.
- b) Explain the properties of alkaline earth metals in the periodic table with respect to halides and oxides. (4+2)
20. a) Explain the factors that affect the values of ionisation energy of an element.
- b) How is electronegativity of an element determined by Pauling's method? (4+2)
21. a) What is equivalent mass of an acid? Calculate the equivalent mass of sulphuric acid (Atomic masses of H = 1.008, S = 32.00, O = 16.00)
- b) How do you prepare 0.1 N sodium carbonate solution (Atomic masses of Na = 23, C = 12 and O = 16)? (4+2)
22. a) i) Sodium metal is a good reducing agent. Give reasons.
- ii) Which is the most reactive element in Alkali metals and halogens?
- b) What are cycloalkanes? Give their general formula. (4+2)
23. a) Explain the different types of stereoisomerism with one example for each.
- b) What is an inductive effect? Give an example. (4+2)
24. a) Using Baeyer's strain theory explain the relative stabilities of cycloalkanes.
- b) What is Peroxide effect? (4+2)
25. a) Draw the Newmann's projection formulae of different conformations of n-butane. Mention which is the most stable form and why?
- b) Explain, why ethyne is acidic in nature. (4+2)