

(7 pages)

Reg. No. :

Code No. : 20617 E Sub. Code : EMCH 31

B.Sc. (CBCS) DEGREE EXAMINATION,
APRIL 2025.

Third Semester

Chemistry — Core

GENERAL CHEMISTRY — III

(For those who joined in July 2023 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Which of the following factors affects the viscosity of a gas?
- Molecular weight of the gas
 - Temperature of the gas
 - Intermolecular forces
 - All of the above

2. Boyle temperature is the temperature at which _____.
- A real gas behaves as an ideal gas over a wide range of pressures
 - A gas liquefies under pressure
 - A gas reaches its critical point
 - The volume of a gas is inversely proportional to its pressure
3. Bragg's equation is given by $n\lambda = 2d\sin\theta$. What does the variable d represent in this equation?
- The wavelength of X-rays
 - The distance between the atoms in the crystal
 - The interplanar distance between crystal planes
 - The angle of incidence
4. In which type of defect are both a vacancy and an interstitial created?
- Schottky defect
 - Frenkel defect
 - Metal excess defect
 - Anion deficiency defect

5. An isotone of ${}_{32}\text{Ge}^{76}$ is _____.
- (a) ${}_{32}\text{Ge}^{77}$ (b) ${}_{33}\text{As}^{77}$
(c) ${}_{34}\text{Se}^{77}$ (d) ${}_{36}\text{Se}^{78}$
6. The mass defect of a nucleus is directly related to
- (a) The atomic number of the element
(b) The number of neutrons in the nucleus
(c) The binding energy of the nucleus
(d) The nuclear charge
7. Which alkyl halide is preferentially hydrolysed by SN^1 mechanism
- (a) CH_3Cl (b) $\text{CH}_3\text{CH}_2\text{Cl}$
(c) $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$ (d) $(\text{CH}_3)_3\text{C-Cl}$
8. Benzyl chloride reacts with aqueous sodium hydroxide to form
- (a) Benzyl alcohol
(b) Benzaldehyde
(c) Benzoic acid
(d) Benzene
9. Phenol is less acidic than _____.
- (a) Ethanol (b) o-nitro phenol
(c) o-methyl phenol (d) o-methoxy phenol
10. Which of the following is the most commonly used reagent in the Cannizzaro reaction?
- (a) Sodium hydroxide
(b) Sulfuric acid
(c) Potassium permanganate
(d) Bromine water

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Describe the various velocities of gas molecules as described by the Maxwell-Boltzmann distribution.
- Or
- (b) Explain the Law of Corresponding States and liquefaction of gases.

12. (a) Explain the difference between crystalline and amorphous solids.

Or

- (b) Explain the structure and properties of diamond.

13. (a) Discuss about Fajans-Soddy Group Displacement Law.

Or

- (b) Explain Isotopes, Isobars and Magic numbers with suitable examples.

14. (a) Describe the S_N^2 mechanism with suitable example.

Or

- (b) Explain about the tests used to detect the presence of hydroxyl groups in organic compounds.

15. (a) Explain Reimer-Teimann reaction.

Or

- (b) Write the preparation of benzyl alcohol from hydrolysis and reduction of benzaldehyde.

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PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe the concepts of collision frequency, collision diameter and meanfree path based on the kinetic theory of gases.

Or

- (b) Explain the concept of the compressibility factor Z and discuss how it varies with pressure for different gases.

17. (a) Draw the diagram of NaCl and ZnS and discuss its crystal structure.

Or

- (b) Explain the classification and applications of liquid crystals.

18. (a) Write a note on
(i) Binding Energy
(ii) Uses of radio isotopes.

Or

- (b) Write briefly about Nuclear fusion reactions and Mass defect.

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19. (a) Discuss the methods and uses for the preparation of dihalogen and trihalogen derivatives.

Or

- (b) Explain the preparation of benzyl chloride from benzyl alcohol and toluene. Also, discuss their uses.
20. (a) (i) Describe preparation of phenol from diazonium salts.
(ii) Explain the Grignard synthesis.

Or

- (b) (i) Explain the preparation and uses of Resorcinol.
(ii) Explain Cannizaro reaction.
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