# COMMON QUARTERLY EXAMINATION - 2024

**Standard XI**    Reg.No. ☐☐☐☐☐☐

## CHEMISTRY

Time : 3.00 hrs      Part - I      Marks : 70

### I. Choose the correct answer:      15 x 1 = 15

1. The equivalent mass of a trivalent metal element is 9 g eq$^{-1}$ the molar mass of its anhydrous oxide is

   a) 102 g      b) 27 g      c) 270 g      d) 78 g

2. Two electrons occupying the same orbital are distinguished by

   a) azimuthal quantum number      b) spin quantum number

   c) magnetic quantum number      d) orbital quantum number

3. Identify the wrong statement

   a) amongst the isoelectronic species, smaller the positive charge on the cation smaller is the ionic radius

   b) amongst isoelectric species greater the negative charge on the axion, larger is the ionic radius

   c) atomic radius of the elements increases as one moves down the first group of the periodic table.

   d) atomic radius of the elements decreases as one moves across from the left to right in the 2$^{nd}$ period of the periodic table.

4. Water gas is

   a) $H_2O_{(g)}$      b) $CO + H_2O$      c) $CO + H_2$      d) $CO + N_2$

5. Tritium nucleus contains

   a) 1 p + 0 n      b) 2 p + 1 n      c) 1 p + 2 n      d) none of these

6. The value of the gas constant R is

   a) 0.082 dm$^3$.atm      b) 0.987 cal mol$^{-1}$ k$^{-1}$

   c) 8.3 J mol$^{-1}$ k$^{-1}$      d) 8 erg mol$^{-1}$ k$^{-1}$

7. Maximum deviation from ideal gas is expected from

   a) $CH_4(g)$      b) $NH_3(g)$      c) $H_2(g)$      d) $N_2(g)$

8. Heat of combustion is always

   a) positive                          b) negative

   c) zero                              d) either positive or negative

9. In an adiabatic process, which of the following is true?

   a) $q = W$        b) $q = 0$        c) $\Delta E = q$      d) $P\Delta V = 0$

10. Solubility of carbon dioxide gas in cold water can be increased by

    a) increase in pressure              b) decrease in pressure

    c) increase in volume                d) none of these

11. The general formula for alkadiene is

    a) $C_nH_{2n}$        b) $C_nH_{2n-1}$        c) $C_nH_{2n-2}$        d) $C_nH_{n-2}$

12. The IUPAC name of the compound $\begin{array}{c}CH_3 - CH - COOH \\ | \\ OH\end{array}$

    a) 2 - hydroxy propionic acid        b) 2 hydroxy propanoic acid

    c) propane - 2 - ol - 1 oic acid     d) 1 - carboxy ethanol

13. How many cyclic and acyclic isomers are possible for the molecular formula $C_3H_6O$?

    a) 4                b) 5                c) 9              d) 10

14. What is the hybridisation state of benzyl carbonium ion?

    a) $sp^2$          b) $spd^2$          c) $sp^3$          d) $sp^2d$

15. The geometrical shape of carbocation

    a) linear          b) tetrahedral      c) planar          d) pyramidal

## Part - II

II. **Answer any 6 questions. (Q.No.24 is compulsory)**                    6 x 2 = 12

16. Define Avogadro number.

17. What is exchange energy?

18. What is effective nuclear charge?

19. How is tritium prepared?

20. State Dalton's law of partial pressures.

21. State the third law of thermodynamics.

22. Define reaction quotient 'Q'

23. What is functional group? Give an example.

24. Give the structure for the following compound:

    i)  1,3 dimethyl cyclohexane        ii) 3-ethyl-2-methyl-1-pentene

## Part - III

**III. Answer any 6 questions. (Q.No.33 is compulsory)**     **6 x 3 = 18**

25. What are combination reactions and decomposition reaction? Give example.

26. Derive De-Broglie equation.

27. Define electronegativity.

28. What is compressibility factor Z?

29. What are spontaneous reactions? What are the conditions for the spontaneity of a process?

30. State law of mass action.

31. What is Lassaignes extract (or) Sodium fusion extract?

32. What is Hyperconjucation? Give example.

33. If an automobile engine burns petrol at a temperature of 816°C and if the surrounding temperature is 21°C, calculate its maximum possible efficiency.

## Part - IV

**IV. Answer all the questions.**     **5 x 5 = 25**

34. a) i)  Give the electronic configuration of $Mn^{2+}$ and $Cr^{3+}$. (2)

      ii)  Calculate the oxidation number of the element  (3)

        a) $H_2\underline{S}O_4$    b) $O\underline{F}_2$    c) $\underline{Cr}_2O_7$

                 **(OR)**

    b)  Write notes on assumption of Bohr's atom model. (5)

35. a) i)  A compound on analysis gave the following percentage composition

        C = 54.55%,  H = 9.09%,  O = 36.36%

        Determine the empirical formula of the compound.   (3)

      ii)  State Heisenberg's uncertainty principle. (2)

                 **(OR)**

    b) i)  Explain the Pauling method for the determination of ionic radius. (3)

      ii)  How do you convert para hydrogen into ortho hydrogen. (2)

36. a) i) Derive the relation between enthalpy and internal energy. (3)

    ii) Define Joule-Thomson effect. (2)

**(OR)**

b) Derive the relation between Kp and Kc. (5)

37. a) i) List the characteristics of Gibbs free energy. (3)

    ii) Calculate the entropy change during the melting of one mole of ice into water at 0°C and 1 atm pressure Enthalpy of fusion of ice is 6008 J mol$^{-1}$. (2)

**(OR)**

b) i) What is entropy? Write its unit. (2)

    ii) Deduce the Vant Hoff equation. (3)

38. a) i) Explain electromeric effect. (3)

    ii) What are homologous series. (2)

**(OR)**

b) Differentiate electrophiles and nucleophiles. (5)

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