

Note: Section I is compulsory. Attempt any THREE (3) questions from Section II.

(SECTION – I)

2. Write short answers to any EIGHT questions.

(2 x 8 = 16)

- i - What is molecular ion? Write down formulas of any two of these ions.
- ii - Differentiate between empirical and molecular formula.
- iii - Mg (Magnesium) atom is twice heavier than C (Carbon) atom. Justify.
- iv - How crystals are dried in vacuum desiccator?
- v - What is R_f value? Why does it has no units?
- vi - What is partition chromatography?
- vii - Convert -40°C into Fahrenheit scale.
- viii - Define absolute zero temperature.
- ix - "Water vapours do not behave ideally at 273 K". Explain it.
- x - What is Le-chatelier's principle?
- xi - Define solubility product.
- xii - Prove that $K_a = \frac{[\text{H}_3\text{O}^+][\text{A}^-]}{[\text{HA}]}$.

3. Write short answers to any EIGHT questions.

(2 x 8 = 16)

- i - Boiling needs a constant supply of heat. Give reason.
- ii - The vapour pressures of solids are far less than those of liquids. Why?
- iii - Define symmetry. Give its elements.
- iv - What are ionic solids? Give two examples.
- v - Whichever gas is used in the discharge tube, the nature of cathode rays remains the same. Why?
- vi - What is the origin of line spectrum?
- vii - State Pauli's exclusion principle.
- viii - Write down names of two spectral series alongwith their regions.
- ix - The concentration in terms of molality is independent of temperature but molarity depends upon temperature. Why?
- x - Define hydrolysis. Give an example.
- xi - What is activated complex?
- xii - What is half-life period? Give an example.

4. Write short answers to any SIX questions.

(2 x 6 = 12)

- i - Write Lewis structures of i) CCl_4 ii) HCN
- ii - Why Noble gases don't form chemical bonds?
- iii - O_2 shows paramagnetic behavior; why?
- iv - Why CH_4 does not form co-ordinate covalent bond but H_2O can form?
- v - Is it true that non spontaneous process never happens in the universe?
- vi - What does the symbol ΔH_n° denote? Define this quantity.
- vii - Burning of candle is spontaneous process; brief it.
- viii - What is difference between primary and secondary cell?
- ix - SHE acts as cathode when connected with zinc; why?

(Turn Over)

(SECTION – II)

Note: Attempt any THREE (3) questions from Section II..

5. (a) Define yield. How theoretical and practical yield can be calculated? (1+3)
(b) Define quantum numbers. Explain azimuthal quantum number in detail. (1+3)
6. (a) Calculate the density of CH_4 (g) at 0°C and 1 atm pressure. What happens to the density if the pressure is increased to 2 atm at 0°C ? (4)
(b) Explain the construction of lead accumulator. Give its discharging process. (4)
7. (a) Draw the molecular orbital diagram for O_2 and explain its paramagnetic behaviour. (2+2)
(b) How the enthalpy of a reaction can be measured by using glass calorimeter? (3+1)
8. (a) What are London forces? Write down factors affecting them. (1+3)
(b) Calculate the pH of a buffer solution in which 0.11 molar CH_3COONa and 0.09 molar acetic acid solution are present. K_a for CH_3COOH is 1.85×10^{-5} . (1+1+1+1)
9. (a) Differentiate between (2+2)
 i) Ideal and non-ideal solutions.
 ii) Hydration and hydrolysis
(b) Define catalysis. Explain its types with suitable examples. (1+3)

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