

BOARD OF INTERMEDIATE EDUCATION, KARACHI

INTERMEDIATE EXAMINATION

MODEL PAPER 2026

CHEMISTRY PAPER – I

Max. Marks: 68

(Science Pre-Engineering & Pre-Medical Groups)

Time: 2 hours 40 minutes

Atomic Masses:

$$\left(\begin{array}{l} C = 12 \text{ amu}, \text{ Al} = 27 \text{ amu}, \\ O = 16 \text{ amu}, \text{ N} = 14 \text{ amu} \end{array} \right)$$

INSTRUCTIONS: i) SECTION 'B' and SECTION 'C' must be solved on provided E-Sheet (Examination Copy).
ii) Student are instructed to write their answers on page allocated for the respective question number.

According to New Book

SECTION 'B' (SHORT-ANSWER QUESTIONS)

Marks : 36

Note: Answer any **Nine** part questions. All part questions carry equal marks.

2. i) Define any **Four** of the following:
- | | | | | | |
|---|--------------|---|---------------------|---|----------------------------|
| * | Molar Volume | * | Stoichiometry | * | Molar heat of Vaporization |
| * | Viscosity | * | Electrode Potential | | |
- OR**
- Differentiate any two of the following
- | | | | |
|---|--|---|---|
| * | Crystalline solid and amorphous solid | * | Positive Catalyst and Negative Catalyst |
| * | Electrolytic cell and Electrochemical cell | | |
- ii) When aluminum is heated with nitrogen gas at 700°C, it gives aluminum nitride (AlN).
- $$2Al_{(s)} + N_{2(g)} \longrightarrow 2AlN_{(s)}$$
- If 67.5 g of aluminium and 140 g of nitrogen gas are allowing to react,
- | | | | |
|---|---|---|---------------------------------|
| * | Calculate moles of each reactant. | * | Identify the limiting reactant. |
| * | Calculate the mass of aluminium nitride formed. | | |
- iii) State Pauli's exclusion principle and Hunds rule write electronic configuration of the following:
- | | | | |
|---|-------------------------|---|--------------------------|
| * | Br ⁻ (Z= 35) | * | Ca ⁺² (Z= 20) |
|---|-------------------------|---|--------------------------|
- iv) Draw a molecular orbital diagram of O₂ molecule and write down molecular orbital electronic configuration of O₂:
- v) Define surface tension? Give its unit and describe the two factors that affect the surface tension of liquid.
- OR**
- Define unit cell. How can you determine the number of Na⁺ and Cl⁻ ions in one-unit cell of sodium chloride (NaCl)?
- vi) The pH of a urine sample is 5.3. Calculate the concentration of H⁺ ions and OH⁻ ions in urine sample.
- OR**
- Define molality of solution. Calculate the molality of 25% (W/W) aqueous solution of glucose (molar mass of glucose is 180g/mol).
- vii) Define rate law. Enlist five factors which influence the rate of chemical reaction and describe the effect temperature on reaction rate.
- viii) A solution is prepared by mixing 600 cm³ of 7.5 x 10⁻⁴ M BaCl₂ into 300cm³ of 2.4 x 10⁻³M and Na₂SO₄ solutions. Will precipitate of BaSO₄ form when equilibrium is reached? (K_{sp} of BaSO₄= 1.1 × 10⁻¹⁰ mol² /dm⁶)
- OR**
- The rate constant (k) for the decomposition of NO₂ is 1.8 × 10⁻³ dm³ mol⁻¹ s⁻¹.
- $$2NO_2 \longrightarrow 2NO + O_2$$
- | | |
|---|--|
| * | Write the rate expression. |
| * | Find the initial rate when the initial concentration of NO ₂ is 0.75 mol dm ⁻³ . |
| * | Find the value of the rate constant when the initial concentration of NO ₂ is doubled. |
- ix) 40 dm³ of hydrogen gas was collected over water at 831 torr Hg pressure and 23°C. What would be the volume of dry hydrogen gas at standard conditions? (Vapour pressure of water at 23°C = 21 torr).
- OR**
- State Graham's law of diffusion. The rate of diffusion of an unknown gas is 70.3 cm³/s whereas CO₂ is 60 cm³ /s under similar conditions. What is the molecular mass and identity of the unknown gas?
- x) Calculate the heat of formation of ethane at 25 °C from the following data:
- | | | |
|---|--|--------------------------------------|
| * | $2C + 3H_2 \longrightarrow C_2H_6$ | $\Delta H_f^\circ = ?$ |
| * | $C + O_2 \longrightarrow CO_2$ | $\Delta H = -394 \text{ KJ / mole}$ |
| * | $H_2 + \frac{1}{2} O_2 \longrightarrow H_2O$ | $\Delta H = -286 \text{ KJ / mole}$ |
| * | $C_2H_6 + \frac{7}{2} O_2 \longrightarrow 2CO_2 + 3H_2O$ | $\Delta H = -1561 \text{ KJ / mole}$ |

Continued on page 2

SECTION 'C'
(DETAILED-ANSWER QUESTIONS)

Marks : 32

Note: Answer any **Four** questions from this section. All questions carry equal marks.

3. Write four defects of Bohr's atomic model. Derive expression for frequency of radiation and wave number of photon. Given

$$\text{that } E = -k \left(\frac{1}{n^2} \right)$$

4. Write postulates of VSEPR theory. Explain the shapes of molecules containing the following electron pair on their central atom:
 * Three bond pairs and one lone pair * Two bond pairs and two lone pairs

5. State law of mass action. Derive equilibrium constant (K_c) expression of general reversible reaction. Following reaction was studied at 25°C , $2\text{NO}_{(g)} + \text{Cl}_{2(g)} \rightleftharpoons 2\text{NOCl}_{(g)}$, At equilibrium, the partial pressure was $P_{\text{NOCl}} = 1.2 \text{ atm}$, $P_{\text{NO}} = 5 \times 10^{-2} \text{ atm}$ and $P_{\text{Cl}_2} = 3 \times 10^{-1} \text{ atm}$. Calculate the value of K_p and K_c .

OR

What is an ideal gas? Why real gases deviate from ideal behavior? Derive vander Waals equation for the Correction of volume and pressure.

6. Define osmosis and semipermeable membrane. Explain that osmotic pressure is a colligative property of Solution. Give four daily life examples of osmosis.

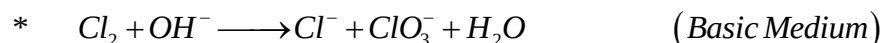
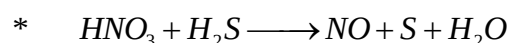
OR

State and explain first law of thermodynamics. Prove that $W = -P\Delta V$ and $q_p = \Delta H$ (Draw diagram where necessary)

7. Define primary and secondary batteries. Describe construction of lead storage battery with the help of labelled Diagram. Explain discharging and recharging of lead storage battery with the help of relevant chemical equation.

OR

Define a redox reaction. Balance any ONE of the following equations using the ion-electron method:



-----XXXXXXXXXX-----

BOARD OF INTERMEDIATE EDUCATION, KARACHI

INTERMEDIATE EXAMINATION

MODEL PAPER 2026

CHEMISTRY PAPER – I

Max. Marks: 17

(Science Pre-Engineering & Pre-Medical Groups)

Time: 20 minutes

SECTION 'A'

According to New Book

(MULTIPLE CHOICE QUESTIONS) – (M.C.Qs.)

(Marks : 17)

NOTE:

- This section consists of 17 part questions and all are to be answered. Each part question carries one mark.
- This Section 'A' of Multiple Choice Question (MCQs) must be solved on the **MCQs/OMR sheet** enclosed on the last page of provided **E-Sheet & OMR** (Examination Copy).
- The correct answer bubble must be filled on MCQs / OMR sheet 1) ☐ A ☐ B ☐ C ☐ D
- Use only blue / black ball point on MCQs / OMR sheet.
- Avoid pencil / White-o pen / correction pen / ink remover and gel pen to solve the question on MCQs / OMR sheet.
- The use of Scientific Calculator is allowed.

1. Choose the correct answer for each from the given options:

- Quantum number value for 3d orbitals are:
A) $n = 2, l = 1$ B) $n = 3, l = 2$ C) $n = 3, l = 3$ D) $n = 2, l = 3$
- The range of wavelength of x-rays lies between:
A) $0.1 \text{ \AA}$ to $10 \text{ \AA}$ B) $10 \text{ \AA}$ to $100 \text{ \AA}$ C) $100 \text{ \AA}$ to $500 \text{ \AA}$ D) $4000 \text{ \AA}$ to $7000 \text{ \AA}$
- The hybridization of carbon in C_2H_2 molecule is:
A) sp^3 B) sp^2 C) sp D) dsp^2
- This molecule has zero dipole moment:
A) CS_2 B) NH_3 C) H_2S D) H_2O
- The outer body of dry cell serves as anode, it is made of:
A) Copper B) Zinc C) Lead D) Iron
- Cooling appliances like air conditioners and refrigerators are working on the principle of:
A) Common ion effect B) Joule-Thomson effect
C) Pauli's exclusion principle D) Le-Chatelier's principle
- The average distance travelled by a gas molecule between two successive collisions is called:
A) Path length B) Mean free path C) Root path D) Collision diameter
- This pair of compounds may represents isomorphism:
A) $NaCl$ and KNO_3 B) MgO and NaF
C) $NaNO_3$ and ZnS D) NaF and $CaCO_3$
- Cooking time is reduced in a pressure cooker because:
A) Boiling point of water decreases B) Boiling point of water increases
C) Vapour pressure of liquid is reduced D) Heat is uniformly distributed
- The unit of rate constant for the first order reaction is:
A) Ms^{-1} B) s^{-1} C) $M^{-1}s^{-1}$ D) $M^{-2}s^{-1}$
- Oxidation number of Mn in $KMnO_4$:
A) +1 B) +3 C) +5 D) +7
- Parts per trillion means:
A) 10^3 B) 10^6 C) 10^9 D) 10^{12}
- The oxide which is amphoteric in nature:
A) Na_2O B) SO_2 C) ZnO D) CO
- If theoretical yield of a compound is 20 g, its actual yield= 16 g, then % yield of compound is:
A) 80% B) 60% C) 100% D) 16%
- NH_3 is prepared by the reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ ($\Delta H = -ve$), the maximum yield of NH_3 obtained is:
A) At low temperature and high pressure B) At high temperature and low pressure
C) At high temperature and high pressure D) At low temperature and low pressure
- After rounding off 7.845 to 2 significant figures, the number becomes:
A) 7.8 B) 7.9 C) 8.0 D) 7.5
- This is not a state function:
A) Internal energy B) Enthalpy C) Temperature D) Work

-----XXXXXXXXXX-----