



**INDIAN SCHOOL SOHAR**  
**UNIT TEST I (2024-2025)**  
**CHEMISTRY (043)**  
**SET-1**

**CLASS : XI**  
**DATE : 21/05/24**

**MAX. MARKS: 20**  
**TIME: 40 MINUTES**

**General Instructions:**

- (a) There are 10 questions in this question paper with internal choice.
- (b) Section A consists of 6 multiple-choice questions carrying 1 mark each.
- (c) Section B consists of 1 very short answer question carrying 2 marks.
- (d) Section C consists of 1 short answer question carrying 3 marks.
- (e) Section D consists of 1 case-based question carrying 4 marks.
- (f) Section E consists of 1 long answer question carrying 5 marks.
- (g) **All questions are compulsory.**
- (h) **Use of log tables and calculators is not allowed.**

**SECTION-A**

*The following are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.*

1. **The total number of electrons present in 3.2 g of methane is:**

(a) $2 \times 10 \times 6.022 \times 10^{22}$	(b) $10 \times 6.022 \times 10^{23}$	1
(c) $10 \times 6.022 \times 10^{22}$	(d) $6.022 \times 10^{23}$	
  2. **The first law of thermodynamics is represented by which of the following options?**

(a) $\Delta H = q + w$	(b) $\Delta U = \Delta H + p\Delta V$	1
(c) $q = \Delta U - w$	(d) $\Delta U = p\Delta V$	
  3. **The volume of 10.50 M solution required to prepare 1.0 L of 0.25 M solution of  $\text{HNO}_3$  is:**

(a) 250 mL	(b) 500 mL	1
(c) 230 mL	(d) 23.8 mL	
  4. **In an adiabatic process, no transfer of heat takes place between the system and surroundings. Choose the correct option for free expansion of an ideal gas under adiabatic conditions from the following:**

(a) $q=0, \Delta T \neq 0, w=0$	(b) $q=0, \Delta T = 0, w=0$	1
(c) $q \neq 0, \Delta T = 0, w=0$	(d) $q=0, \Delta T < 0, w \neq 0$	
- In the following questions (Q. No. 5 and 6) a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices:***
- (a) Both Assertion (A) and Reason(R) are true and Reason(R) is the correct explanation of the Assertion.
  - (b) Both Assertion (A) and Reason(R) are true, but reason(R) is not the correct explanation of the Assertion.
  - (c) Assertion (R) is true, but reason (R) is false.
  - (d) Assertion (A) is false, but reason (R) is true.
5. **Assertion(A):** The volume of a gas is inversely proportional to the number of moles of a gas.  
**Reason(R):** The ratio by volume of gaseous reactants and products is in agreement with their molar ratio. 1
  6. **Assertion(A):** Combustion of 16 g of methane gives 18 g of water.  
**Reason(R):** In the combustion of methane, water is one of the products. 1

### SECTION B

7. Calculate the molality and mole fraction of  $\text{NH}_3$  if it is in a solution composed of 30.6 g  $\text{NH}_3$  in 81.3 g of  $\text{H}_2\text{O}$ . The density of the solution is 0.982 g/mL, density of the water is 1.0 g/mL. (N = 14, H = 1, O = 16) 2

### SECTION C

8. 80 g of  $\text{H}_2$  is reacted with 80 g of  $\text{O}_2$  to form water. Find (i) the limiting reagent and (ii) the mass of water obtained. 3

### SECTION D

9. *The following is a case-based question. Read the passage carefully and answer the questions that follow.*

In thermodynamics, the energy changes may be measured in laboratories under two common conditions: one in which the volume of the system is kept constant and the other in which the pressure applied to the system is kept constant. The energy change at constant volume is called the internal energy change ( $\Delta U$ ), and the energy change at constant pressure is called the enthalpy change ( $\Delta H$ ). The two quantities are related to each other as:  $\Delta H = \Delta U + P\Delta V$ .

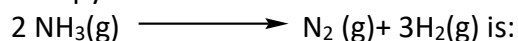
The heat changes are generally reported as enthalpy changes because most of the processes are carried out in open vessels, i.e., at constant pressure. The common enthalpy changes are enthalpy of formation, enthalpy of combustion, enthalpy of solution, enthalpy of neutralisation, enthalpy of hydration, etc.

**Answer the following questions:**

(a)  $\Delta H$  for the combustion of a compound is:

- (i) positive (ii) zero 1  
(iii) negative (iv) may be positive or negative

(b) Enthalpy of formation of ammonia is  $-46.0 \text{ kJ mol}^{-1}$ . The enthalpy change for the reaction



- (i)  $92.0 \text{ kJ mol}^{-1}$  (ii)  $-23.0 \text{ kJ mol}^{-1}$  1  
(iii)  $46.0 \text{ kJ mol}^{-1}$  (iv)  $-92.0 \text{ kJ mol}^{-1}$

(c) A gas expands isothermally from 10 L to 20 L at  $27^\circ \text{C}$  and the work obtained is 4.620 kJ. 1X2=2  
Calculate the number of moles of gas. ( Given  $R = 8.314 \text{ J K}^{-1}\text{mol}^{-1}$ ,  $\log 2 = 0.3010$ ,  $\log 4 = 0.6020$ )

### OR

A gas absorbs 120 J of heat and expands against an external pressure of 1.10 atm from a volume of 0.5 L to 2.0 L. What is the change in the internal energy? (1 L atm = 101.3 J)

### SECTION E

10. (a) Find the empirical and the molecular formulas of an organic compound from the following data:  $C=75.92\%$ ,  $H=6.32\%$  and  $N=17.76\%$ . The vapour density of the compound is 39.5. 3+2=5

(b)(i) Define molarity.

- (ii) Vitamin C is known to contain  $1.29 \times 10^{24}$  hydrogen atoms. Calculate the number of moles of hydrogen atoms.

### OR

(a) 2.0 g of a metal burnt in oxygen gave 3.2 g of its oxide. 1.42 g of the same metal heated in steam gave 2.27 g of its oxide. Which law can be verified by this data? State the law.

(b) How many grams of  $\text{KClO}_3$  must be decomposed to prepare 3.36 liters of oxygen at S.T.P.? (Atomic mass of K= 39, Cl= 35.5, O= 16 g)

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