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Physical Chemistry 2nd - YUGS EV ST

11-12-2025
Abduljabbar



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1st SEM-2025 Bologna Process
Mid_Exam_Class_A_Paper_B

Q1: Circle the right answer for all of the following

(50 Marks)

1: Liquification of the gas means which of the following?

- (a) $pV_m = nRT$ (b) $pV_m < nRT$ (c) $pV_m > nRT$ (d) $pV_m \neq nRT$

2: What is the right formula that can be used for calculating the mole fraction of the gas in a mixture?

- (a) V/n (b) n/V (c) V/m (d) n_i/n_T

3: A real gas behaves like an ideal gas, when which of the following is true?

- (a) $pV_m/RT = 1$ (b) $pV_m/RT \neq 1$ (c) $pV_m/RT < 1$ (d) $pV_m/RT > 1$

4: Heat energy transfer can be measured by which of the following?

- (a) thermometer (b) closed system (c) heat capacity (d) calorimeter

5: An isobaric process means which of the following?

- (a) $\Delta T = 0$ (b) $\Delta p = 0$ (c) $C_v \Delta T = 0$ (d) $C_p \Delta T = 0$

6: The unit of C_p/C_v is:

- (a) $J mol^{-1} K^{-1}$ (b) $J g^{-1} K^{-1}$ (c) $J mol^{-1} ^\circ C^{-1}$ (d) none of these

7: When the process cannot compensate the loss of q, then we can call it:

- (a) isothermal (b) adiabatic (c) isobaric (d) isochoric

8: When the system is completely isolated, then ΔH can be calculated by which of the following?

- (a) $p_{ex} \Delta V$ (b) $nRT \ln V_f/V_i$ (c) $C_p \Delta T$ (d) ΔVU

9: $C_p > C_v$ due to which of the following?

- (a) ΔU (b) Q (c) ΔH (d) R

10: When the process is reversible and $p_{in} > p_{ex}$, the process is called:

- (a) isochoric (b) isothermal (c) isobaric (d) exothermic

Q2: Calculate the density of an unknown gas with a molar mass of $40 g mol^{-1}$ at STP conditions. (25 points)

Q3: A diatomic ideal gas is compressed reversibly and adiabatically at T_i of $67^\circ C$ to T_f of $450 K$. Calculate

- (a) work was performed? (b) ΔU , (c) q and (d) ΔH .

(25 Marks)

$$C_v = \frac{5}{2}$$

$$20.74$$

$$Q2 / d = \frac{PM}{RT}$$

$$= \frac{1 \text{ atm} (40 \text{ g/mol})}{(0.082 \text{ atm L/mol K}) (273 \text{ K})}$$

$$= \frac{40 \text{ g}}{22.386 \text{ L}} \Rightarrow d = 0.55 \text{ g/L}$$

STP
 $P = 1 \text{ atm}$
 $T = 0^\circ\text{C} + 273 = 273 \text{ K}$
 $V = 22.4 \text{ L}$

Q2 $\frac{25}{25}$

Q3 / $W_{ad} = C_V \Delta T$

$$= 20.78 \times 110 \text{ K}$$

$$W_{ad} = 2285.8 \text{ J}$$

$$\Delta U = W_{ad}$$

$$\Delta U = 2285.8 \text{ J}$$

adiabatically $\Rightarrow q = 0$

$$T_i = 67^\circ\text{C} + 273 = 340 \text{ K}$$

$$T_f = 450 \text{ K}$$

$$\Delta T = 450 \text{ K} - 340 \text{ K}$$

$$= 110 \text{ K}$$

$$C_V = \frac{5}{2} R = 20.78 \text{ J/mol K}$$

Units
 value
 value

$q = 0 \rightarrow$ adiabatically

wrong value

$$\Delta H = C_p \Delta T$$

$$= 20.78 \times 110 \text{ K}$$

$$= 2285.8 \text{ J}$$

$$\Delta U = \Delta H$$

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Q3 $\frac{20}{25}$