



Physical_Chemistry_2nd_YUGS_EV_ST



Name of a student ----- Signature ----- No. -----

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Department of Chemistry

1st SEM-2025_Bologna_Process
Mid_Exam_Class_A_Paper_A

Q1: Circle the right answer for all of the following

(50 Marks)

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

- (a) $Z = 1$ (b) $Z > 1$ (c) $Z < 1$ (d) $Z \neq 1$

2: In the van der Waals equation, what is the correct formula for the volume of the gas?

- (a) n_1/n_2 (b) V (c) V/m (d) V/n

3: If a gas has polar particles, then the difference between the volume of this gas is:

- (a) $V_{\text{Real}} > V_{\text{Perfect}}$ (b) $V_{\text{Real}} < V_{\text{Perfect}}$ (c) $V_{\text{Real}} = V_{\text{Perfect}}$ (d) $V_{\text{Real}} \neq V_{\text{Perfect}}$

4: It can classify the type of reaction within adiabatic process as:

- (a) reversible (b) isobaric (c) isothermal (d) free expansion

5: If it is required to measure the work done in an isochoric process, the value of work will be:

- (a) zero (b) one (c) two (d) three

6: In a completely insulated system, the work done is in contact with which of the following?

- (a) gas (b) system (c) surrounding (d) pressure

7: When the internal pressure of the system is equal to atmospheric pressure, the actual value will be:

- (a) zero (b) one (c) two (d) three

8: During an isothermal reversible process, the change in temperature of the system is?

- (a) variable (b) equal to zero (c) 25°C (d) constant

9: Heat capacity is extensive property while molar heat capacity is ----- property:

- (a) proportional (b) intensive (c) extensive (d) direct

10: When $\Delta H = \text{zero}$, the process is:

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

Q2: Using van der Waals equation, calculate the temperature of 5.0 mol of an unknown gas in a 5.0 L container at 80 bar. Compare this temperature with the value obtained from the ideal gas equation.

$a = 0.0341 \text{ L}^2 \text{ atm mol}^{-2}$; $b = 0.0237 \text{ L mol}^{-1}$.

(25 Marks)

Q3: 1100 J of heat energy was applied to (50 g, 27 g mol^{-1}) of aluminum metal. The temperature increased from 25°C to 45°C . Calculate $C_{p,m}$ of aluminum.

(25 Marks)

Q2 / $T = ?$ $n = 0.5 \text{ mol}$ $V = 5.0 \text{ L}$ $p = 80 \text{ bar}$
 $b = 0.0237$ $a = 0.0341$ $R = 0.082$

~~$PV = nRT$~~
 $80 \cdot 5.0 = 0.5 \cdot 0.082 \cdot T \Rightarrow T = \frac{80 \cdot 5.0}{0.5 \cdot 0.082}$
Units?

~~$T = \frac{400}{0.041}$~~
 $T = 9756.09$

~~$T = \frac{P(V-b)}{(n-a)R}$~~

$Q_2 \frac{10}{25}$

$T = \frac{80(5 - 0.0237)}{(0.5 - 0.0341) \cdot 0.082}$

$T = \frac{397.6}{0.03817} \Rightarrow T = 10416.55$

Q3 / $q = 1100 \text{ J}$ $w_b = 50 \text{ g}$ $M.wt = 27 \text{ g mol}^{-1}$

$T_1 = 25^\circ \text{C}$ $T_2 = 45^\circ \text{C}$ $C_{p,m} = ?$

$T_{1K} = 25 + 273 \Rightarrow T_{1K} = 298 \text{ K}$

$T_{2K} = 45 + 273 \Rightarrow T_{2K} = 318 \text{ K}$

$\Delta T = T_2 - T_1 \Rightarrow 318 - 298 \Rightarrow \Delta T = 20 \text{ K}$

$C_{p,m} = -1 \Delta T$
 $C_{p,m} = - \times 20$

Where is the eq?

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$Q_3 \frac{5}{25}$