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P<sub>8</sub><sup>42</sup>

60/100 Sixty only

Physical\_Chemistry\_2<sup>nd</sup>\_YUGS\_EV\_ST\_2025



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1<sup>st</sup> 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)  $n_i/n_T$
- (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)  $25^\circ\text{C}$
- (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,  $27 \text{ g mol}^{-1}$ ) of aluminum metal. The temperature increased from  $25^\circ\text{C}$  to  $45^\circ\text{C}$ . Calculate  $C_{p,m}$  of aluminum. (25 Marks)

Q2

? = Units

$T = ?$ ,  $n = 5 \text{ mol}$ ,  $P = 80 \text{ bar}$ ,  $V = 5 \text{ L}$ ,  $a = 0.0341 \text{ L}^2 \text{ mol}^{-1}$

$b = 0.0237 \text{ L mol}^{-1}$

~~$PV = nRT$~~

~~$T = \frac{PV}{nR}$~~

Q2  $\frac{20}{25}$

~~$T = \frac{80 \text{ bar} \times 5 \text{ L}}{5 \text{ mol} \times 0.082} \Rightarrow T = 975.6 ?$~~

~~$T = \frac{Pn}{V-nb} \cdot \frac{nR}{V^2-an^2}$~~

Result ?

~~$T = \frac{80 \text{ bar}}{(5 \text{ L}) - (5 \text{ mol} \times 0.0237 \text{ L mol}^{-1})} \cdot \frac{5 \text{ mol} \times 0.082}{(5 \text{ L})^2 - (0.0341)(5 \text{ mol})^2}$~~

Q3 =  $25^\circ\text{C}$ ,  $45^\circ\text{C}$ ,  $q = 1100 \text{ J}$ ,  $50 \text{ g}$ ,  $27 \text{ g mol}^{-1}$

~~$\Delta T = 45 - 25 = 20 \text{ K}$~~

~~$q = n C_{sp} \Delta T$~~

Q3  $\frac{5}{25}$