Physical_Chemistry_2nd_YUGS_EV_ST

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

Mustansiriyah University
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 ≠ 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/n (d) V/n

3: If a gas has polar particles, then the difference between the volume of this gas is:
(a) $V_{Real} > V_{Perfect}$ (b) $V_{Real} < V_{Perfect}$ (c) $V_{Real} = V_{Perfect}$ (d) $V_{Real} \neq V_{Perfect}$

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 ΔH = zero, the process is:
(a) isobaric (b) isochoric (c) isothermal (d) adiabatic

T = ? n = 5 V = 5

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

Thu_11-12-2025 Best wishes Dr Abduljabbar I. R. Rushdi

Q2/

$$V = nRT \ln \frac{a}{b}$$

$$5 = 5 \times 0.085 \times T \ln \frac{0.0341}{0.0237}$$

$$5 = 5 \times 0.085 \times T \ln 1.43$$

$$T = \frac{5}{0.35 \times 0.42}$$

$$T = \frac{5}{0.147} \Rightarrow T = 34\,K$$

$$P = UT$$

$$T = \frac{P}{U}$$

$$T = \frac{80}{5}$$

$$T = 16\,K$$

Q2 2nd 25

? ≡ Units

Q3/

$T_{1(K)} = 25 + 273 \Rightarrow T_1 = 298\,K$

$T_{2(K)} = 45 + 273 \Rightarrow T_2 = 318$

$\Delta T = T_2 - T_1$

$\Delta T = 318 - 298$

$\Delta T = 20\,K$

$$n = \frac{wt}{m.wt}$$

$$n = \frac{80}{27}$$

$$n = 1.85$$

$$q = m \times C_{p,m} \times \Delta T$$

$$1100 = 1.8 \times C_{p,m} \times 20$$

$$C_{p,m} = \frac{1100}{20 \times 1.8}$$

$$C_{p,m} = \frac{1100}{36}$$

$$C_{p,m} = 30.55$$

Q3 2nd 25