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

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Department of Chemistry

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) $J\ mol^{-1}\ ^oC^{-1}$ (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) $nRTLnV_f/V_i$ (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 °C to T_f of 450 K. Calculate
(a) work was performed? (b) ΔU, (c) q and (d) ΔH. **(25 Marks)**

Q2/

? = Units

$d = \frac{pM}{RT}$

P = 1

M = 40 g mol^{-1}

R = 0.082

T = 0 + 273 = 273 K

$d = \frac{1\,atm \times 40\,g\,mol^{-1}}{0.082 \times 273\,K}$

23.38

= 1.78 ?

20/25

Q3/

$\Delta T = 450 - 340 = 110\,K$

$T_i = 67 + 273 = 340\,K$

$T_f = 450\,K$

Di

Mono

$C_V = \left(\frac{2}{3}\right) \times 1.5 \times RT$

$\frac{2}{3} \times 1.5 \times 3.814 \times 110 = 377.58$

a) a) = w_{ad} = ?

$W_{ad} = n C_{v,m} \Delta T$

$W_{ad} = 377.58 \times 110$?

$w_{ad} = 41533.8\,J$

15/25

b) $\Delta U = w_{ad}$

ΔH

c) $q_p = C_{v,m} \Delta T$

$= 377.58 \times 110 \Rightarrow 41533.8$

d)