Physical_Chemistry_2nd_YUGS_EV_ST

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

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

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

Q2 25/25

$Q_2 = d = \frac{P_m}{RT} = \frac{1\ atm \times 44.0\ g/mol}{0.082\ atm.L/mol.K \times 273\ K}$

You should explain!

$d = \frac{44.0\ g}{22.386\ L}$

$d = 1.786\ g/L$

Q3 | $P_V = \frac{5}{2}R$

$P_V = \frac{5}{2} \times 8.314\ J/K.mol$

$P_V = 20.785\ J/K.mol$

$T_i = 67°C + 273 = 340\ K$

$T_f = 450\ K$

$\Delta T = 110\ K$

$W_{ad} = -P \times \Delta T$ (adiabatically) ~)

$= 0$

$\Delta U = q + w$

$\Delta U = q_v = C_P \times \Delta T = 3.200\ kJ$

$\Delta H = C_P \Delta T$

$= 29.099 \times 110\ K$?

$J/K.mol$

→ From where this value!

$\Delta H = 3.200\ kJ$

Q3 10/25