2.75 P40/6 55/100 Fifty five

Physical_Chemistry_2nd_YUGS_EV_ST 11-12-2025

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

Mustansiriyah University
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)** 30/50

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 5

3: A real gas behaves like an ideal gas, when which of the following is true?
(a) $pV_m/RT = 1$ 5 (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) $\Delta p = 0$ 5 (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 5 (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) $C_p\Delta T$ 5 (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 5 (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)

$PV = nRT \rightarrow PV = \frac{m}{M}RT \rightarrow PM = \frac{m}{V}RT \rightarrow PM = DRT$

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)**

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

Q2\ $PM = DRT$

at STP conditions $\Rightarrow P = 1\ atm,\ T = 0C^\circ \Rightarrow 0C^\circ + 273^\circ$

$R = 0.374\ L\,atm\,mol^{-1}\,K^{-1}$ (wrong value) $\quad T = 273K^\circ$

$M = 40\ g\,mol^{-1}$

$PM = DRT$

$$D = \frac{PM}{RT} \Rightarrow D = \frac{1\,atm * 40\,g\,mol^{-1}}{0.374\,L\,atm\,mol^{-1}K^{-1} * 273K^\circ}$$ (wrong value)

$$D = \frac{1 * 40\,g}{0.374\,L * 273} \Rightarrow D = \frac{40\,g}{85.722\,L}$$

$D = 0.4666\,g/L$

Q2 20/25

Q3\

$W_{rev} = -nRT\ln\frac{P_i}{P_f}$ wrong eq^n

$W_{rev} = -\frac{1}{mol} * 3.74\,L\,atm\,mol^{-1}K^{-1} * 110K^\circ * 2\,atm$

$W_{rev} = -345.4$

$\Delta U = 0$ adiabatic

$\Delta H = C_p * \Delta T$

$\Delta H = 2 * 110K^\circ$

$\Delta H = 220$

$\Delta T = 450K^\circ - (67^\circ C + 273K)$

$\Delta T = 450K^\circ - 340K^\circ$

$\Delta T = 110K^\circ$

From Where this value?

Q3 5/25