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_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 / الحل

Q2 zero / 25

NO ANSWER, Why?

Q3 $w_{irr}=?$, $\Delta u=?$, $q=?$, $\Delta H=?$, $T_f=450$, $T_i=87^\circ C$ / الحل

$T_i = 87^\circ + 273 \Rightarrow T_i = 340K$

① $w_{irr} = -nRT\ln\left(\frac{T_i}{T_f}\right)$

$w_{irr} = -(1)(8.314)\ln\left(\frac{340}{450}\right)$

$w_{irr} = 2.327\ kJ$

Q3 5/25

② $\Delta u = w_{irr}$

$\Delta u = 2.327\ J$

③ $q = 0$ لأنه نظام معزول ?

④ $\Delta H = \Delta u + \Delta n RT$

$\Delta H = 2.327 + (1)(8.314)(110)$

$\Delta H = 916$