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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 ^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

$PV = nRT \Rightarrow PV = \frac{wt}{M} RT$

$PM = \frac{wt}{V} RT \Rightarrow PM = \delta RT$

(1) (40) = δ (0,082) (273)

$\delta = \frac{40}{22,386} \Rightarrow \delta = 1,786$ g/L

STP: T = 0 °C

T = 0 + 273

T = 273 K

P = 1 atm

M = 40 g.mol⁻¹

R = 0,082

Q2 25

? = Units

Q3

$T_i = 67°C \Rightarrow T_i = 67 + 273$

$T_{i_K} = 340K$ $T_F = 450K$

$\Delta T = T_F - T_i \Rightarrow \Delta T = 450 - 340$

$\Delta T = 110$ K

$\Delta H = nR\Delta T \ln \frac{T_F}{T_i} \Rightarrow \Delta H = (0,082)(110)$

$\Delta H = 9,02$

$T_i = 67°C$

$T_F = 450K$

work = ?

ΔH = ?

Q = ?

ΔU = ?

Q3 5/25

$\Delta U = nRT \ln \frac{V_i}{V_F} \Rightarrow$

$\Delta U = nRT(0) \Rightarrow \Delta U = 0$

$\Delta H = \Delta U + W \Rightarrow 9,02 = 0 + W$

$W = 9,02$

$\Delta U = Q + W$

$0 = Q + 9,02$

$-Q = 9,02$ kJ/K

Adiabatic Q = Zero