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F26

4/0
100

Forty only

Physical Chemistry 2nd YUGS_EV_ST



11-12-2025
Abdo Jabbar

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) $J mol^{-1} ^\circ C^{-1}$
- (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) $nRT \ln V_f/V_i$
- (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 $67^\circ C$ to T_f of $450 K$. Calculate

- (a) work was performed?
- (b) ΔU ,
- (c) q and
- (d) ΔH .

(25 Marks)

Q2 | $M = 4g$, $P = 1 \text{ atm}$, $V = 22.4 \text{ L}$, $R = 0.0821$, $T = 273$

$$PM = dRT \Rightarrow d = \frac{PM}{RT} \Rightarrow d = \frac{(1 \text{ atm})(4 \text{ g/mol})}{(0.0821)(273)}$$

$$d = \frac{40}{22.417} \Rightarrow \boxed{d = 1.784 \text{ kg/m}^3}$$

Q2/25

Q3 | $T_i = 67^\circ \text{C} \Rightarrow T_i = 67^\circ \text{C} + 273 \Rightarrow \boxed{T_i = 340 \text{ K}}$

$T_f = 450 \text{ K}$, $\Delta T = T_f - T_i \Rightarrow \Delta T = 450 \text{ K} - 340 \text{ K}$

$$\boxed{\Delta T = 110 \text{ K}}$$

wrong eq!

① $\Delta U = -q + w \Rightarrow 110 = -165 + w \Rightarrow w = 275$

② $\Delta H = \Delta U + \Delta nT \Rightarrow \Delta H = \Delta U + (1)(110) \Rightarrow \Delta H = \Delta U + 110$

diatomic

③ $q = nC\Delta T \Rightarrow q = (1)\left(\frac{3}{2}\right)(110) \Rightarrow q = 165 \text{ kJ/mol}$

↓ adiabatic

Q3/25