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Physical Chemistry 2nd - YUGS_EV_ST



11-12-2025
7abb

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/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) $J \text{ mol}^{-1} \text{ K}^{-1}$
- (b) $J \text{ g}^{-1} \text{ K}^{-1}$
- (c) $J \text{ mol}^{-1} \text{ }^\circ\text{C}^{-1}$
- (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 $67 \text{ }^\circ\text{C}$ to T_f of 450 K . Calculate

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

(25 Marks)

$$Q_2 / d = \frac{PM}{RT} \Rightarrow d = \frac{1 \text{ atm} \times 40 \text{ g mol}^{-1}}{0.0821 \text{ L atm mol}^{-1} \text{ K}^{-1} \times 0.273 \text{ K}}$$

$$0^\circ\text{C} + 273 = 273\text{K}$$

$$d = 18.1 \text{ g/L}$$

Q_2
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225

No temp. like this!

$$Q_3 / W_{rev} = -P_{ext} \Delta T$$

$$W_{rev} = -P_{ext} (T_f - T_i)$$

$$W_{rev} = 1 \text{ atm} (450 \text{ K} - 340 \text{ K})$$

$$s = 1 \text{ atm} (110 \text{ K})$$

$$W_{rev} = 110 \text{ J} \Rightarrow W_{rev} = 11.0 \text{ kJ}$$

$$T_i = 67^\circ\text{C} + 273$$

$$T_i = 340 \text{ K}$$

$$b) \Delta U = 0$$

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$$c) q = -w$$

$$q = 11.0 \text{ kJ}$$

$$d) \Delta H = 0$$

20
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 Q_3

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 150 K. Calculate (a) work was performed? (b) ΔU, (c) p and (d) ΔH. (25 marks)