



3.25  
5

P<sub>47</sub>  
P<sub>13</sub>

75  
100

Seventy  
Five

Physical Chemistry 2<sup>nd</sup> YUGS\_EV\_ST



Name of a student Mustansiriyah University Signature [Signature] No. 15

Mustansiriyah University  
Department of Chemistry

1<sup>st</sup> 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)  $J \text{ mol}^{-1} \text{ K}^{-1}$
- (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  $\Delta H$  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)  $\Delta VU$

9:  $C_p > C_v$  due to which of the following?

- (a)  $\Delta U$
- (b)  $Q$
- (c)  $\Delta H$
- (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  $40 \text{ g mol}^{-1}$  at STP conditions. (25 points)

Q3: A diatomic ideal gas is compressed reversibly and adiabatically at  $T_i$  of  $67^\circ\text{C}$  to  $T_f$  of  $450 \text{ K}$ . Calculate

(a) work was performed? (b)  $\Delta U$ , (c)  $q$  and (d)  $\Delta H$ . (25 Marks)

$$Q2/D = \frac{PM}{RT}$$

$$D = \frac{1 \text{ atm} * 409 \text{ mol} * 273 \text{ K}}{0.0821 \text{ L} * 273 \text{ K}}$$

$$D = 1.785 \text{ g/L}$$

Q2 <sup>25</sup>/<sub>25</sub>

$$Q3/C_v = \frac{5}{2} (8.314 \text{ J/K} * 9) \text{ mol}$$

$$C_v = 20.7 \text{ J/K mol}$$

$$W_{rev} = C_v \Delta T$$

$$W_{rev} = 20.7 \text{ J/K} (450 \text{ K} - 340 \text{ K})$$

$$W_{rev} = 20.7 \text{ J/K} (110 \text{ K})$$

$$* W_{rev} = 2277 \text{ J} = 2.277 \text{ kJ}$$

$$* \Delta U = W \Rightarrow \Delta U = 2.277 \text{ kJ}$$

$$* q = 0$$

why?

$$* \Delta H = \Delta U \Rightarrow \Delta H = 2.277 \text{ kJ}$$

Adiabatic process!

Q3 <sup>10</sup>/<sub>25</sub>

Work in kJ