



2/5

F27

4/10  
100

Forty only

Physical Chemistry 2<sup>nd</sup> YUGS EX ST



Name of a student ----- Signature ----- No. 18

Mustansiriyah University  
Department of Chemistry

11-12-2025  
Abduljabbar

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)

80  
Q1/50

1: ~~Liquidation~~ 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  $\Delta H$  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  $40 g mol^{-1}$  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)  $\Delta U$ , (c) q and (d)  $\Delta H$ .

(25 Marks)

$T_i = 67^\circ C$   
 $T_f = 450 K$

$w = ?$   
 $\Delta U = ?$   
 $q = ?$

Q2/  $d = ?$   $M = 40 \text{ g mol}^{-1}$   $P = 1 \text{ atm}$   $R = 0.082$

Sol.

$T = 100^\circ\text{C}$  \* يجب ان يحول من  $^\circ\text{C}$  الى  $\text{K}$  درجة كزره  
 \* طرف قياسية STP  $\downarrow 0^\circ\text{C}$

$T = 100^\circ\text{C} + 273\text{K}$   
 $T = 373\text{K}$

$Q_2 \frac{15}{25}$

$d = \frac{P \cdot M}{R \cdot T}$

$d = \frac{1 \text{ atm} \cdot 40 \text{ g mol}^{-1}}{0.082 \cdot 373 \text{ K}} \Rightarrow d = \frac{40 \text{ g mol}^{-1}}{30.586 \text{ K}} \Rightarrow d = 1.3077 \text{ g mol}^{-1}$

Q3/  $T_i = 67^\circ\text{C}$

\* يجب تحويل درجة الكزره  
 الابدئية ( $T_i$ ) من  $^\circ\text{C}$  الى  $\text{K}$

$T_i = 67^\circ\text{C} + 273\text{K} = 340\text{K}$

$Q_3 \frac{5}{25}$

$T_i = 450\text{K}$

$T_f = 450\text{K}$

$w_{irr} = -nRT \ln \frac{T_f}{T_i}$

Wrong eq!

$w_{irr} = -(1)(0.082)(373) \ln \frac{450\text{K}}{340\text{K}}$

$w_{irr} = -30.58 \text{ J/K}$

\* العمله تكون Compressed

$\Delta U = q + w$

$\Delta U = \Delta H$

$q = 0$

why?