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



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Aljabbar

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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)  $n/n_T$

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  $67 \text{ }^\circ\text{C}$  to  $T_f$  of  $450 \text{ K}$ . Calculate

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

(25 Marks)

$Q_2 \text{ N } P_M = dRT$   
 $P = 1 \text{ atm} \quad t^{\circ}\text{C} = 25^{\circ}\text{C}$

$T_k = t^{\circ}\text{C} + 273 = 25^{\circ}\text{C} + 273$

$T = 298 \text{ K}$

$P_M = dRT \Rightarrow (1 \text{ atm})(40 \text{ g mol}^{-1}) = d (0.082 \text{ atm}\cdot\text{L mol}^{-1}\cdot\text{K})(298 \text{ K})$

$d = \frac{40 \text{ atm g mol}^{-1}}{24.436 \text{ atm}\cdot\text{L mol}^{-1}\cdot\text{K}}$

$d = 1.63 \text{ g/L}$

$\frac{20}{225}$

$Q_3 \text{ N } T_{i_k} = t^{\circ}\text{C} + 273 \Rightarrow 67^{\circ}\text{C} + 273$

$T_f = 450 \text{ K}$

$T_i = 340 \text{ K}$

$\Delta T = T_f - T_i = 450 \text{ K} - 340 \text{ K} = 110 \text{ K}$

$Q_3$