



Physical_Chemistry_2nd_YUGS_EV_ST

$P = \frac{nRT}{V-nb} - \frac{an^2}{V^2}$
 F_7
1.25/5

25/100
Twenty five

11-12-2025
Abduljabbar

Name of a student بشار هادي هادي Signature Abduljabbar No. 10

Mustansiriyah University
Department of Chemistry

1st SEM-2025_Bologna_Process
Mid_Exam_Class_A_Paper_A

Q1: Circle the right answer for all of the following

(50 Marks)

1: liquefaction of the gas means which of the following?

- (a) $Z = 1$
- (b) $Z > 1$
- (c) $Z < 1$
- (d) $Z \neq 1$

2: In the van der Waals equation, what is the correct formula for the volume of the gas?

- (a) n_i/n_T
- (b) V
- (c) V/m
- (d) V/n

3: If a gas has polar particles, then the difference between the volume of this gas is:

- (a) $V_{Real} > V_{Perfect}$
- (b) $V_{Real} < V_{Perfect}$
- (c) $V_{Real} = V_{Perfect}$
- (d) $V_{Real} \neq V_{Perfect}$

4: It can classify the type of reaction within adiabatic process as:

- (a) reversible
- (b) isobaric
- (c) isothermal
- (d) free expansion

5: If it is required to measure the work done in an isochoric process, the value of work will be:

- (a) zero
- (b) one
- (c) two
- (d) three

6: In a completely insulated system, the work done is in contact with which of the following?

- (a) gas
- (b) system
- (c) surrounding
- (d) pressure

7: When the internal pressure of the system is equal to atmospheric pressure, the actual value will be:

- (a) zero
- (b) one
- (c) two
- (d) three

8: During an isothermal reversible process, the change in temperature of the system is?

- (a) variable
- (b) equal to zero
- (c) 25 °C
- (d) constant

9: Heat capacity is extensive property while molar heat capacity is extensive property:

- (a) proportional
- (b) intensive
- (c) extensive
- (d) direct

10: When $\Delta H = \text{zero}$, the process is:

- (a) isobaric
- (b) isochoric
- (c) isothermal
- (d) adiabatic

Q2: Using van der Waals equation, calculate the temperature of 5.0 mol of an unknown gas in a 5.0 L container at 80 bar. Compare this temperature with the value obtained from the ideal gas equation.

$a = 0.0341 \text{ L}^2 \text{ atm mol}^{-2}$; $b = 0.0237 \text{ L mol}^{-1}$.

(25 Marks)

Q3: 1100 J of heat energy was applied to (50 g, 27 g mol⁻¹) of aluminum metal. The temperature increased from 25 °C to 45 °C. Calculate $C_{p,m}$ of aluminum.

(25 Marks)

$C = \frac{DH}{DU}$

كل باستخدام قانون

استخدام معادلة فاندروالس

$R = 0.082$

درج الحرارة

الحرارة المولارية

$DH = C \cdot DU$

وقت معادله فاندرفالت

Q21

$$P = \frac{nRT}{V-nb} - \frac{an^2}{V^2}$$

$n = 5.0$ عدد موله؟

$V = 5.0$ L حجم

$P = 80$ نبره اسفول $\times 1000 \rightarrow 80000$

$a = 0.034$ ل² مول² نبره

$b = 0.0237$ ل³ مول⁻¹

$R = 0.082$ ل² مول⁻¹ ك⁻¹

$T = ?$ درجه سيلس

Q22

$$P = \frac{nRT}{V-nb} - \frac{an^2}{V^2}$$

$$80000 = \frac{5.0 \times 0.082 \times T}{5.0 - 5.0 \times 0.0237} - \frac{0.034 \times (5.0)^2}{(5.0)^2}$$

$$T = \frac{80000 \times (5.0 - 0.1185) + 0.034 \times (5.0)^2}{5.0 \times 0.082}$$

$$= \frac{0.41}{9.148} - \frac{0.25}{25} \Rightarrow 0.043 - 0.01 = 0.033 \text{ ك}$$

$$PV = nRT$$

$$T = \frac{PV}{nR} = \frac{80 \times 5.0}{5.0 \times 0.082} \Rightarrow \frac{400}{0.41} \Rightarrow 975.6 \text{ ك}$$

Q22

$$q = C \cdot \Delta T$$

$$C = \frac{q}{\Delta T}$$

$$= \frac{298 \text{ كج} \times 318 \text{ ك}}{1.1 \text{ كج}} = \frac{94764}{1.1} \Rightarrow 86149 \text{ كج/ك}$$

$$\Delta T = ? \text{ ك} \left[\begin{aligned} T_1 &= 25 + 273 = 298 \text{ ك} \\ T_2 &= 45 + 273 = 318 \text{ ك} \end{aligned} \right]$$

$$q = 1100 \text{ كج}$$

Q23

مرفه