



Physical Chemistry-Properties of Gases

55 Fifty Five
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University of Mustansiriyah

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Department of Chemistry

1st Exam-paper A

Q1: Circle the right answer for all of the following:

1: A vessel of 50 mL capacity contains a certain amount of gas at 40 °C and 2 bar pressure. The gas is transferred to another vessel of volume 100 mL at 40 °C. What should be its pressure?

Answer: a) 1.0 atm b) 0.85 mmHg c) 0.9 cmHg d) 1 bar

2: What is the right formula of the Van der Waals equation?

Answer: a) $p = \frac{nRT}{V-nb} - \frac{a(n^2/V^2)}$ b) $P = \frac{nRT}{(V-nb)} - \frac{V(n^2/a^2)}$ c) $p = \frac{nRT}{(b-nV)} - \frac{a(n^2/V^2)}$ d) $P = \frac{nRT}{(V-nb)} - \frac{a(n^2/V^2)}$

3: Calculate the temperature of 4.0 mol of a gas occupying 5.0 dm³ at 3.3 bar?

Answer: a) 50.3 °C b) 48 K c) 51 °C d) 50.3 K

4: Calculate the weight of O₂ (32 g.mol⁻¹) in a 4 L cylinder at 9 atm and 281 K.

Answer: a) 50 kg b) 50 g c) 50 K d) 50 °C

5: Calculate the p_c of He gas, if the p_r and p is 0.44 and 1 atm respectively

Answer: a) 2.26 K b) 2.26 atm c) 2.26 L d) 2.26 mol

6: If the repulsion forces are negligible, that means the gas is?

Answer: a) real b) noble c) perfect d) compressed

7: According to the Dalton's law total mole fraction is equal to?

Answer: a) 0.10 mol b) 1.0 mol c) 0.10 d) 1.0

8: What is the partial pressure of a gas in a mixture if the X_i is 0.5, and the conditions are at STP?

Answer: a) 1.5 Pa b) 0.49 bar c) 0.5 atm d) 0.5 bar

9: If the value of is 0.082 then the unit of temperature is?

Answer: a) Kelvin b) Celsius c) Fahrenheit d) no one of these

10: According to the Avogadro's law the amount of a gas at STP is?

Answer: a) 1.00 mol b) 2.00 mol c) 1.00 L d) 2.00 mol

Q2: The air inside a flexible 3.5 L container has a pressure of 115 kPa. What should the volume of the container be increased to in order to decrease the pressure to 625 torr?

Q3: A 3 dm³ container holds 0.5 moles of N₂ gas at 42 °C. What is the pressure inside the container?

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Best wishes

Dr Abduljabbar I. R. Rushdi

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

$$N = 14$$

$$O = 16$$

Q2

$$V = 3.5 \text{ L}$$

$$V_2 = ?$$

$$P = 115 \text{ kPa}$$

$$P_2 = 625 \text{ torr}$$

$$\frac{\text{atm } 1.01325}{1}$$

$$\frac{\text{atm } 1.01325}{1}$$

$$= 616.82$$

~~P.E~~

$$\frac{P_1}{P_2} = \frac{V_2}{V_1}$$

$$Q_2 \frac{5}{25}$$

$$\frac{616.82}{1.33} = \frac{3.5}{V_2}$$

$$V_2 = 5.4 \text{ L}$$

Q3

$$V = \frac{3}{1000} = 0.003 \text{ L}$$

$$V_2 = 3 \text{ dm}^3$$

$$n = 0.5$$

? \equiv units

$$Q_2 \frac{15}{25}$$

$$PV = nRT$$

$$P(0.003) = 0.5 \text{ mol} \times 0.82 \text{ atm} \cdot \text{L} \cdot \text{mol}^{-1} \cdot \text{K}^{-1} \times (42^\circ + 273) \text{ K}$$

$$0.003 \text{ L}$$

$$P = 5258.6 \text{ atm}$$