



Physical Chemistry-Properties of Gases

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Department of Chemistry

1<sup>st</sup> 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 5/5

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

Answer: a)  $p = [nRT/(V-nb)] - n(a^2/V^2)$  b)  $P = [nRT/(V-nb)] - V(n^2/a^2)$  c)  $p = [nRT/(b-nV)] - a(n^2/V^2)$  d)  $P = [nRT/(V-nb)] - a(n^2/V^2)$  5/5

3: Calculate the temperature of 4.0 mol of a gas occupying 5.0 dm<sup>3</sup> at 3.3 bar?

Answer: a) 50.3 °C b) 48 K c) 51 °C d) 50.3 K 5/5

4: Calculate the weight of O<sub>2</sub> (32 g mol<sup>-1</sup>) in a 4 L cylinder at 9 atm and 281 K

Answer: a) 50 kg b) 50 g c) 50 K d) 50 °C 5/5

5: Calculate the p<sub>c</sub> of He gas, if the p<sub>r</sub> 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 5/5

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

Answer: a) real b) noble c) perfect d) compressed 5/5

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 5/5

8: What is the partial pressure of a gas in a mixture if the X<sub>i</sub> 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 5/5

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

Answer: a) Kelvin b) Celsius c) Fahrenheit d) no one of these 5/5

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 5/5

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 dm<sup>3</sup> container holds 0.5 moles of N<sub>2</sub> gas at 42 °C. What is the pressure inside the container?

Q2

$$P_1 = 115 \text{ kPa} = 0.115 \text{ torr}$$

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$$P_1 V_1 = P_2 V_2$$

$$0.115 \text{ torr} \times 3.5 \text{ L} = P_2 \times 625 \text{ L}$$

Q2 5/25

$$P_2 = \frac{0.4025}{625} = 51.4 \frac{\text{torr}}{\text{L}}$$

Q3

$$P = \frac{n}{V} = \frac{3 \text{ dm}^3}{5 \text{ mol} \times 42 \text{ C}} = \frac{3}{210} = 0.7 \frac{\text{dm}^3}{\text{mol} \cdot \text{C}}$$

Q3 5/25