



Physical Chemistry\_Chpt\_One\_Properties of Gases



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1<sup>st</sup> Exam-paper B

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

(50 points)

1: A vessel of 5000 mL capacity contains a certain amount of gas at 313 °C and 2 bar pressure. The gas is transferred to another vessel of volume 10000 mL at 40 °C. What should be its pressure?

Answer: a) 1.0 atm    b) 1.0 mmHg    c) 75 cmHg    d) 1.5 bar

2: If the particles of a gas are polar that means the difference between  $p_{ideal}$  and  $p_{real}$  is

Answer: a) low    b) equal    c) high

3: Calculate the temperature of 5000 mmol of a gas occupying 5.0 dm<sup>3</sup> at 3.3 · 10<sup>5</sup> Pa?

Answer: a) 40.2 °C    b) 40.2 K    c) 44.2 °C    d) 44.2 K

4: Calculate the weight of NH<sub>3</sub> (17 g·mol<sup>-1</sup>) in a 4 L cylinder at 8 atm and 300 K.

Answer: a) 22.11 kg    b) 22.11 g    c) 23 K    d) 23 °C

5: Calculate the  $p_c$  of a gas, if the  $p_r$  is 0.44 and  $p$  is 1 bar.

Answer: a) 2.27 K    b) 2.27 atm    c) 2.27 L    d) 2.27 mol

6: If the attraction forces are calculated, 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)  $\sum n$     b)  $\sum p_i$     c)  $\sum p_T$     d)  $\sum x$

8: What is the partial pressure of a gas in a mixture, if the  $X_i$  is 1, and the conditions are at STP?

Answer: a) 0.99 torr    b) 0.89 bar    c) 0.900 atm    d) 1.01 bar

9: At high pressure the  $Z > 1$  which means the dominated forces are?

Answer: a) Van der Waal's    b) equal    c) repulsions    d) attractions

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

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

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? (25 points)

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? (25 points)

$$Q2 / V_1 = 3.5L, P_1 = 115kPa, P_2 = 625torr, V_2 = ?$$

$$1atm = 760torr$$

$$625torr \times \frac{1atm}{760torr} = 0.82atm \quad (P_2)$$

$$115kPa \times \frac{1atm}{101.325kPa} = 1.135atm \quad (P_1) \quad 1.15atm$$

$$P_1 V_1 = P_2 V_2$$

$$1.135atm \times 3.5L = 0.82atm \times V_2$$

$$V_2 = \frac{1.135atm \times 3.5L}{0.82atm} = 4.84L$$

$$Q2 \frac{25}{25}$$

$$Q3 / V = 3dm^3, n = 0.5mol, T = 42^\circ C, P = ?$$

$$P = \frac{nRT}{V}$$

$$T = 42 + 273 = 315K$$

$$= \frac{0.5mol \times 0.082L \cdot atm/mol \cdot K \times 315K}{3? \text{ units}}$$

$$Q3 \frac{20}{25}$$