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23-11-2021  
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Physical Chemistry Chpt\_One\_Properties of Gases

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University of Mustansiriyah

1<sup>st</sup> Semester-2021

Department of Chemistry

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 °K 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

5/5

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

5/5

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

5/5

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

5/5

Q1 5/5

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

5/5

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

5/5

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

5/5

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

5/5

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

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? (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)

$$Q2 / V_1 = 3.5 L$$

$$V_2 = ?$$

$$P_1 = 115 \text{ kPa} \Rightarrow 1.011 \text{ atm}$$

$$P_2 = 625 \text{ Torr} \Rightarrow \frac{625}{760} = 0.82 \text{ atm}$$

$$P_1 V_1 = P_2 V_2$$

$$1.011 \text{ atm} \times 3.5 L = 0.82 \text{ atm} \times V_2$$

$$V_2 = \frac{1.011 \text{ atm} \times 3.5 L}{0.82 \text{ atm}}$$

$$V_2 = 4.304 L$$

check again

Q2  $\frac{25}{25}$

$$P_2 < P_1 \quad \text{and} \quad V_2 > V_1 \quad *$$

$$Q3 / V = 3 \text{ dm}^3 \Rightarrow 3 \times 10^3 L$$

$$n = 0.5 \text{ mol} \quad T = 42^\circ \text{C} \Rightarrow 42 + 273 = 315 \text{ K}$$

$$P = ?$$

$$R = 0.082 \frac{\text{atm} \cdot L}{\text{mol} \cdot K}$$

$$PV = nRT$$

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

$$P = \frac{0.5 \text{ mol} \times 0.082 \frac{\text{atm} \cdot L}{\text{mol} \cdot K} \times 315 \text{ K}}{3 \times 10^3 L}$$

$$P = 4.305 \times 10^{-3} \text{ atm}$$

Q3  $\frac{20}{25}$