



Physical Chemistry\_Chpt\_One\_Properties of Gases

70 Seventy only  
100  
23-11-2021  
Abduljabbar I. R. Rushdi

Name of a student Maryam Raed Karyam Signature [Signature] No. \_\_\_\_\_

University of Mustansiriyah

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

Department of Chemistry

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

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

(50 points)

1: If a gas has a non-polar particle then the difference between the volume of this gas is:

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

2: A gas occupies 300000 mL at 130 °C and 760 mmHg pressure. What would be its volume at STP?

Answer: a) 203.22 mL b) 203.22 dm<sup>3</sup> c) 204 L d) 204 dm<sup>3</sup>

3: Calculate the weight of CH<sub>4</sub> (16 g.mol<sup>-1</sup>) in a 10 L cylinder at 15 x 10<sup>5</sup> Pa and 307 K.

Answer: a) 95.33 g mol<sup>-1</sup> b) 95.33 g c) 95.33 mol d) 95.33 kg

4: Calculate the number of moles for CH<sub>4</sub> in a 10000 mL cylinder at 10<sup>5</sup> Pa and 32 °C.

Answer: a) 4.5 mol b) 4.0 mol c) 4.0 mmol d) 4.5 mmol

5: According to Graham's law the heaviest gas is?

Answer: a) H<sub>2</sub>O b) CH<sub>4</sub> c) NH<sub>3</sub> d) CO

6: A 20 L tank contains a certain amount of gas at 10<sup>5</sup> Pa. The gas is transferred to another tank 40 dm<sup>3</sup>. What should be its pressure?

Answer: a) 0.50 atm b) 50 dm<sup>3</sup> c) 50 atm d) 0.50 mmHg

7: According to the Avogadro's law the amount of a substance is directly proportional with?

Answer: a) p b) T c) R d) V e) n

8: The difference between real and ideal gas is one of the following?

Answer: a) law p & high T b) high p & law T c) high p & high T d) law p & law T

9: It can know the density of a gas by applying one of the following?

Answer: a) Van der Waal's law b) Graham's law c) Charles's law d) Gay-Lussac's law

10: If  $V_m$  is bigger than  $V_m^0$  then this means the behaviour of a gas is?

Answer: a) Real b) Ideal c) Real & ideal d)  $Z < 1$

Q2: A (28 mol) gas sample has a mass of 10000 mg. The volume of a container is 22 dm<sup>3</sup> at a temperature of 76 °C and a pressure of 641 Torr. What is the density of the gas? (25 points)

Q3: An Ar gas is placed in a container at 30 °C at a pressure of 730 torr. What is the volume of the container in ml? (25 points)

09/11/2021

Best wishes

Dr Abduljabbar I. R. Rushdi

Q.2

? = mols

$$PM = dRT$$

$$(0.84)(0.35) = d(0.082)(349)$$

$$d = \frac{(0.84)(0.35)}{(0.082)(349)}$$

$$d = 1251.292 \text{ g/L}$$

Q.2  
15  
25

$$P_{atm} = 641 \text{ torr} \times \frac{1 \text{ atm}}{760 \text{ torr}}$$

$$n = 28 \text{ mol}$$

$$m = 10000 \text{ mg}$$

$$V = 22 \text{ dm}^3$$

$$T = 76 \text{ }^\circ\text{C}$$

$$P = 641 \text{ torr}$$

$$d = ?$$

$$P_{atm} = 0.84 \text{ atm}$$

$$m = 10000 \text{ mg} \times \frac{1 \text{ g}}{1000 \text{ mg}}$$

$$m = 10 \text{ g}$$

$$M = \frac{m}{n} = \frac{10}{28} = 0.35 \text{ g/mol}$$

$$T_K = t^\circ\text{C} + 273$$

$$T_K = 76 + 273 \Rightarrow T_K = 349 \text{ K}$$

$$T_K = 30 + 273$$

$$= 303 \text{ K}$$

$$t = 30^\circ\text{C}$$

$$P = 730 \text{ torr}$$

$$P_{atm} = 730 \text{ torr} \times \frac{1 \text{ atm}}{760 \text{ torr}}$$

$$P = 0.96 \text{ atm}$$

Q.3

$$PV = nRT$$

$$(0.96)V = 1(0.082)(303)$$

$$V = \frac{24.8}{0.96}$$

$$V = 25.8 \text{ L} \rightarrow \text{in mL}$$

Q.3  
20  
25

$$PV = nRT$$
$$PV = \frac{m}{M} RT$$
$$PM = \frac{m}{V} RT$$
$$= dRT$$