



F37

Physical Chemistry\_Chpt\_One\_Properties of Gases

40/100 Forty only

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Signature: Dr. Abduljabbar I. R. Rushdi

Name of a student: Sama Laith Maged

Signature

No. 15

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Department of Chemistry

1st Exam-paper E

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

(50 points)

1: If a gas has polar particles 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  $60 \times 10^3$  mL at  $150^\circ C$  and 760 mmHg pressure. What would be its volume at STP?

Answer: a) 38.7 mL b) 38.7 dm<sup>3</sup> c) 38.7 L<sup>-1</sup> d) 38.7 dm<sup>-3</sup>

3: Calculate the weight of H<sub>2</sub>O gas (18 g.mol<sup>-1</sup>) in a 5 L cylinder at  $10 \times 10^2$  kPa and 373 K.

Answer: a) 29.40 g mol<sup>-1</sup> b) 29.40 g c) 29.40 mol d) 29.40 kg

4: Calculate the density of H<sub>2</sub>O placed in a 22400 mL cylinder at  $10^5$  Pa and  $0^\circ C$ .

Answer: a) 0.804 kg L<sup>-1</sup> b) 0.804 g L<sup>-1</sup> c) 0.804 g d) 0.804 L<sup>-1</sup>

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) Cl<sub>2</sub>

6: A tank contains a certain amount of gas at  $10^5$  Pa. The gas is transferred to another tank 40 dm<sup>3</sup> with pressure  $p_2$  of  $200 \times 10^3$  Pa. What should be its volume?

Answer: a) 80 L b) 80 Pa L c) 80 Pa dm<sup>3</sup> d) 80 L<sup>-1</sup>

7: According to Boyle's law the pressure of a gas is inversely proportional with?

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

8: The difference between real and ideal gas, that the real gas interested in?

Answer: a) V & p b) V & T c) p & n d) T & p

9: It can follow the direct proportional between temperature and pressure through the law of

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

10: The behaviour of real gas is ideal when the value of Z is equal to

Answer: a)  $V_m < V_m^0$  b)  $V_m > V_m^0$  c)  $V_m = V_m^0$  d)  $V_m \neq V_m^0$

Q2: The following data have been observed for 800 mg of nitrogen gas at 273 K. Calculate the best value of the

molar mass of N <sub>2</sub> .	$p/10^5$ Pa	0.750	0.500	0.200	(25 points)
	V/dm <sup>3</sup>	3.0	4.5	7.0	

Q3: A perfect gas undergoes isothermal compression, which reduces its volume by 1.80 dm<sup>3</sup>. The  $p_f$  and  $V_f$  of the gas are  $2 \times 10^2$  kPa and 2.14 dm<sup>3</sup>, respectively. Calculate the  $p_{original}$  of the gas in (i) bar, (ii) torr. (25 points)

Thur\_11/11/2021

Best wishes

Dr Abduljabbar I. R. Rushdi

Q2/

$$PV = nRT$$

$$0.750 \times 3 = n \times 0.082 \times 273$$

$$2.25 = n \times 22.38$$

? = units

$$n = \frac{2.25}{22.38} = 0.1005$$

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$$PV = nRT$$

$$0.500 \times 4.5 = n \times 0.082 \times 273$$

$$n = 0.1005$$

$$0.2 \times 7 = n \times 0.082 \times 273$$

$$1.4 = n \times 22.38$$

$$n = \frac{1.4}{22.38} = 0.062$$

Q3

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$$P_1 =$$

$$V_1 = 1-80$$

$$P_2 =$$

$$V_2 =$$

Volume	7.0	4.5	2.0
Pressure	0.100	0.200	0.300