



P<sub>1</sub>

50/100 Fifty only

Physical Chemistry Chpt\_One\_Properties of Gases

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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>6</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)

Q2  $P_M = dRT$

~~1 torr = 1 atm~~

$\frac{1}{M}$

$d = \frac{PM}{RT}$

$n = \frac{wt}{M}$

$= \frac{641 \text{ atm} \cdot 35.71 \text{ kg/mol}}{0.0822 \text{ atm} \cdot \text{L/kg} \cdot \text{mol} \cdot 349 \text{ K}}$

$\frac{28}{1} = \frac{1000}{M}$

$M = \frac{1000}{28}$

$= 797.9 \text{ g/L}$

?  $\equiv$  units

~~$= 797.9$~~

Q2  $\frac{15}{25}$

$T = C^\circ + 273$   
 $= 76 + 273 = 349$

Q3

~~1 torr = 1 atm~~

$PV = nRT$

$T = C^\circ + 273$   
 $= 30 + 273$   
 $= 303 \text{ K}$

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

Q3  $\frac{15}{25}$

$V = \frac{1 \cdot 0.0822 \text{ atm} \cdot \text{L/kg} \cdot \text{mol} \cdot 303 \text{ K}}{730 \text{ g/L}}$

should be converted to atm

$V = 0.034 \rightarrow \frac{0.034}{1000} = 3.4 \times 10^{-5} \text{ mL}$