



Physical Chemistry_Chpt_One_Properties of Gases

60/100 Sixty only
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1st 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 dm³ c) 204 L d) 204 dm³

3: Calculate the weight of CH₄ (16 g.mol⁻¹) in a 10 L cylinder at 15 x 10⁵ Pa and 307 K.

Answer: a) 95.33 g mol⁻¹ b) 95.33 g c) 95.33 mol d) 95.33 kg

4: Calculate the number of moles for CH₄ in a 10000 mL cylinder at 10⁶ 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) H₂O b) CH₄ c) NH₃ d) CO

6: A 20 L tank contains a certain amount of gas at 10⁵ Pa. The gas is transferred to another tank 40 dm³. What should be its pressure?

Answer: a) 0.50 atm b) 50 dm³ 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 dm³ 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)

Q21

$n = 28 \text{ mol}$, $m = 100000 \text{ mg}$, $V = 22 \text{ dm}^3$, $T = 76^\circ \text{C}$, $P = 641 \text{ Torr}$

Q:1 $641 \text{ Torr} \rightarrow \text{atm}$

$1 \text{ atm} = \frac{641 \text{ Torr}}{760 \text{ Torr}} = 0.843 \text{ atm}$

$T = 76^\circ + 273 = 349 \text{ K}$

Q2 $\frac{20}{25}$

$V = 22 \text{ dm}^3 \Rightarrow 22 \times 10^3 \text{ m}^3$

$M = \frac{100000 \text{ mg}}{1000} = 100 \text{ g}$
 $\frac{10}{\text{PM} \cdot \text{d} \cdot \text{R} \cdot \text{L}}$

Be careful next time
 $d = \frac{\text{PM}}{\text{RT}}$

$M = n \times M$
 28×100

$M = 2.8 \text{ mol/g}$

$d = \frac{0.843 \text{ atm} \times 2.8 \text{ mol/g}}{0.082 \text{ L} \cdot \text{atm} / \text{mol} \cdot \text{K} \times 349 \text{ K}}$

$d = 10.04 \text{ g/L}$

Q21

303 \rightarrow Be careful

273°C
 30°C

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

$P = 730 \text{ Torr} = 0.960 \text{ atm}$

Without calculator

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

Q3 $\frac{20}{25}$

$V = \frac{1 \text{ mol} \times 0.082 \text{ L} \cdot \text{atm} / \text{mol} \cdot \text{K} \times 303 \text{ K}}{0.960 \text{ atm}}$

$V = 2.41 \text{ L} \stackrel{\text{d}}{\approx} \text{mL}$

$V = 2.41 \times 1000 = 2410 \text{ mL}$

Small \rightarrow