



F17

Physical Chemistry\_Chpt\_One\_Properties of Gases

30 thirty only  
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Department of Chemistry

1<sup>st</sup> 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  $150^\circ\text{C}$  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 ( $18 \text{ g.mol}^{-1}$ ) in a 5 L cylinder at  $10 \times 10^2$  kPa and  $373 \text{ K}$ .

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  $0^\circ\text{C}$ .

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  $40 \text{ dm}^3$  with pressure 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>. (25 points)

p/10 <sup>5</sup> Pa	0.750	0.500	0.200
V/dm <sup>3</sup>	3.0	4.5	7.0

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

Thur\_11/11/2021

Best wishes

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Q2: weight = 800 mg, T = 273K, n = 0.1005 mol

① P = 0.750 x 10<sup>5</sup> Pa, V = 3.0 dm<sup>3</sup>

PV = nRT

(0.750 x 10<sup>5</sup>) (3.0) = n (0.082) (273)

n =  $\frac{(0.750 \times 10^5)(3.0)}{(0.082)(273)}$  = 10050.92 mol

n =  $\frac{\text{weight}}{\text{m-weight}}$

10050.92 =  $\frac{800}{\text{m-weight}}$

M. weight = 0.0795 M

② P = 0.500 x 10<sup>5</sup> Pa  
V = 4.5 dm<sup>3</sup>

PV = nRT

0.500 x 10<sup>5</sup> x 4.5 = n x 0.082 x 273

n = 0.1005 mol

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

0.1005 =  $\frac{800}{M}$

M = 0.79 M

③ P = 0.200 x 10<sup>5</sup> Pa, V = 7.0 dm<sup>3</sup>

n = 6253.4 mol

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

6253.4 =  $\frac{800}{M}$

M = 0.1279 M

717

$\frac{10}{25}$   
 $\frac{2}{2}$

Q3  $\frac{5}{20}$

Q3: V = 1.80 dm<sup>3</sup>

P<sub>2</sub> = 2 x 10<sup>2</sup> pKa

V<sub>2</sub> = 2.14 dm<sup>3</sup>

P<sub>1</sub> = torr, bar

P<sub>1</sub> V<sub>1</sub> = P<sub>2</sub> V<sub>2</sub>

P<sub>1</sub> (1.80) = (2 x 10<sup>2</sup>) (2.14)

P<sub>1</sub> =  $\frac{2 \times 10^2 \times 2.14}{1.80}$  = 2.3 x 10<sup>2</sup> pKa