# Physical Chemistry_Chpt_One_Properties of Gases

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**Department of Chemistry**

**1st Semester-2021**

**1st Exam-Repeat_1**

**Q1: Circle the right answer for all of the following:** **(50 points)**

1: Calculate the weight of $C_2H_4$ gas (26 g $mol^{-1}$) in a 10000 $Cm^3$ cylinder at 1520 mmHg and 90 $^oC$.
**Answer:** a) 17.47 $g^{-1}$ $mol^{-1}$ b) 17.47 $g^{-1}$ c) 17.47 mol d) 17.47 g e) 17.47 mg

2: When $V_{Real} > V_{Perfect}$, this means that the gas is:
**Answer:** a) perfect b) noble c) real d) heavy

3: The difference between real and ideal gas equation, that the ideal gas equation is not interested in?
**Answer:** a) $p_{gas}$ & $n_{gas}$ b) $V_{container}$ & $p_{attraction}$ c) $V_{gas}$ & $p_{attraction}$ d) $T_{gas}$ & $p_{gas}$

4: Calculate the density of $C_2H_4$ is placed in a 50000 $Cm^3$ container at 760 torr and 273 K.
**Answer:** a) 1.16 $g^{-1}$ $L^{-1}$ b) 1.16 $g^{-1}$ L c) 1.16 g $L^{-1}$ d) 1.16 mg $L^{-1}$

5: Graham's law studies the ---------- of the gas.
**Answer:** a) flow b) collision c) diffusion d) effusion

6: The right formula of the Dalton's law is?
**Answer:** a) $p_i = \chi_i \sum p_i$ b) $p_i = \chi_i \sum p_T$ c) $p_T = \chi_i \sum p_i$ d) $p_i = \chi_T p_T$

7: The law of Corresponding states is an evidence that the gas is?
**Answer:** a) real b) ideal c) expanded d) compressed e) heavy

8: The total mol fractions of atmospheric pressure of air is equal to?
**Answer:** a) zero b) one c) two d) three

9: A gas occupies 30 × $10^{-3}$ $m^3$ at 75 $^oC$ and 76 CmHg pressure. What would be its volume at STP?
**Answer:** a) 23.5 $dm^3$ b) 23.5 $m^2$ c) 23.5 $L^{-1}$ d) 23.5 $m^{-3}$

10: When the value of Z > 1 this means the dominated forces are:
**Answer:** a) attraction b) van der Waal c) repulsion d) compression

**Q2: The following data have been observed for 5000 mg of unknown gas at 0 $^oC$. Calculate the best value of the molar mass of this gas, and what is it?** **(25 points)**

| $p/10^5$ Pa | 0.75 | 0.60 | 0.25 |
|---|---|---|---|
| $V/dm^3$ | 9.33 | 11.60 | 27.50 |

**Q3: A perfect gas undergoes isothermal compression, which reduces its volume by 1.80 $dm^3$. The $p_f$ and $V_f$ of the gas are 197 atm and 2.14 $dm^3$, respectively. Calculate the $p_{original}$ of the gas in (a) bar, (b) torr. (25 points)**

**Sun_28/11/2021** **With best my wishes** **Dr Abduljabbar I. R. Rushdi**

$PV = nRT$ $= 0.75 \times 933 \times 10^{3} = 1 \times 0.082 \times 273$

$n = \frac{0.5}{1}$ $C = c + 273 = 273\,K$

? ≡ units

$PM = \delta RT$ $= 0.75 \times 0.5 =$

$\delta \times 0.082 \times 273\,K$

$mRT$

500 mg ≡ 5g $\delta = \frac{0.75 \times 0.5}{0.082 \times 273} = 165$

Q2

$\delta_2 = \frac{0.60 \times 0.05}{0.82 \times 237} =$

$\delta = \frac{0.25 \times 0.5}{0.82 \times 237} =$

Q 3 $\frac{P1}{P2} = \frac{V2}{V1}$ $= \frac{197}{P2} = \frac{1.8}{2.4} = 1$

$P2 \quad \frac{197\,atm}{1} = 197\,at$

Q3

$\frac{P1}{P2} = \frac{V1}{2}$ $= P2 = 197 \cdot 760\,tor$

$P_r = \frac{P_1}{V_d} = \frac{197}{1.8} = \frac{P_1}{1.8}$

$P_r \; 197\,atm \times 1.8 = 1.97\,atm$