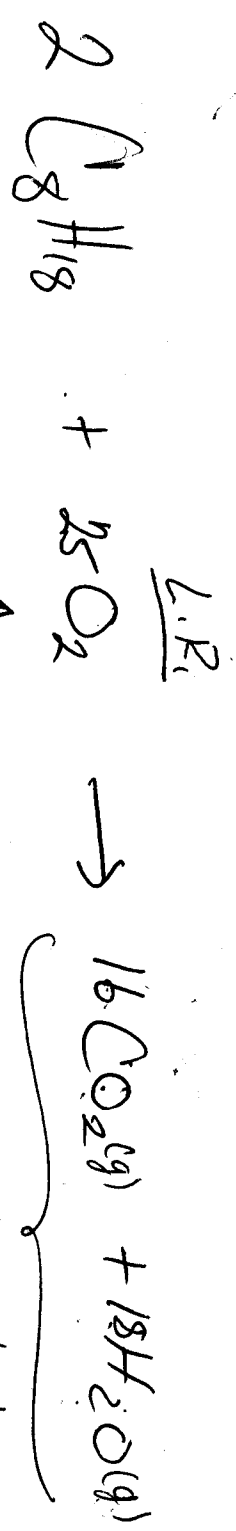


- The following reaction takes place. You react 2.19 L of oxygen gas at 1.5 atm and 25 °C, which weighs 0.896 g with 1.35×10^{22} molecules of $C_8H_{18}(g)$. If you collect the $CO_2(g)$ and $H_2O(g)$ in a 45 mL vessel at 25 °C, what is the total pressure of the gasses in the vessel?
- You react 250 mL of 0.0105 M $H_2SO_4(aq)$ with 250 mL of 0.0105 M $NaOH(aq)$. What is the pH of the resulting solution?
- The following reaction occurs. If you have 1.5 L of a 0.15 M solution of MnO_4^- reacting with 25.34 g of $C_2O_4^{2-}$, what mass of CO_2 will be produced?
$$MnO_4^-(aq) + C_2O_4^{2-}(aq) \rightarrow CO_2(g) + Mn^{2+}(aq)$$

(Not Balanced)
- Let us say you did not know the identity of gas 1. In order to determine the molecular weight of gas 1 you reacted magnesium sulfite with hydrochloric acid and collected the gas that was given off in a vessel labeled gas 2. You then determined the rate at which it takes for gas 2 to pass through a porous barrier. You determined that it took 5.34 mL/min for gas 2. If it takes 6.44 mL/min for gas 1 to pass through the same barrier, what is the molecular weight of gas ?
- In most of its ionic compounds, cobalt is either Co(II) or Co(III). One such compound, containing chloride ion and waters of hydration, was analyzed, and the following results were obtained.
A 0.256 g sample of the compound was dissolved in water, and excess silver nitrate was added. The silver chloride was filter, dried, and weighed, and it had a mass of 0.308 g.
A second sample of 0.416 g of the compound was dissolved in water, and an excess of sodium hydroxide was added. The hydroxide salt was filtered and heated in a flame, forming cobalt(III) oxide. The mass of cobalt(III) oxide formed was 0.145 g.
How many water molecules can be extracted from 6.584×10^{-23} g of the cobalt containing compound?
- Determine the molecular formula of the unknown compound from the following information.
 - a. The compound is 92.3 % carbon and 7.7% hydrogen
 - b. When comparing the rate of effusion of this compound to methane (CH_4), methane effuses at a rate of 4.35 mL/min and the unknown compound at a rate of 1.97 mL/min.
-

#1



↑
↑

Since treating like all ideal we can say

1.35 x 10²² molec.
0.0224 mols

2.19 L
1.5 atm
25°C

34. ~~g~~ Gases.

0.134 mols

$$0.134 \text{ mols O}_2 \times \frac{34 \text{ mols Gas}}{25 \text{ mols O}_2} = 0.18224 \text{ mols Gas}$$

$$PV = nRT$$

$$P(0.045 \text{ L}) = 0.18224 (0.082057) (298)$$

$$P = 99 \text{ atm}$$

#3

Balance Feeds



↑

1.5L

0.15M

~~0.0~~
0.225 mols

↑

25.34g

0.288 mols

$$0.288 \text{ mols } C_2O_4^{2-} \times \frac{10 \text{ mols } CO_2}{5 \text{ mols } C_2O_4^{2-}} \times \frac{44 \text{ g } CO_2}{1 \text{ mol } CO_2} = 25.3 \text{ g } CO_2$$

#44

Gas 1

um

MW?

6.44 mL/min

Gas 2



$\therefore = \text{SO}_2$

MW = 64 g/mol

5.34 mL/min

$$\frac{6.44}{5.34} = \sqrt{\frac{64}{X}}$$

$$1.4544 = \frac{64}{X}$$

$$X = 44 \text{ g/mol}$$



[A]

0.256g

~~Net~~ Sample

0.308g

$\text{AgCl} = 0.00215 \text{ mols}$

$\therefore 0.0762 \text{ g Cl}^-$

$$\frac{0.0762 \text{ g Cl}^-}{0.256 \text{ g}} \times 100 = 29.8\% \text{ Cl}^-$$

[B]

0.416g Sample

0.145g

~~Net~~ $\text{Co}_2\text{O}_3 = 8.735 \times 10^{-4} \text{ mols}$

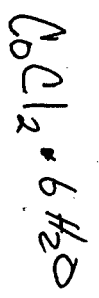
$\therefore 0.00175 \text{ mols Co} = 0.103 \text{ g Co}$

$$\frac{0.103 \text{ g Co}}{0.416 \text{ g}} \times 100 = 24.8\% \text{ Co}$$

6.416g

$\therefore 45.4\% \text{ H}_2\text{O}$

mols	
0.839	Cl
0.420	Co
2.5	H ₂ O



$$6.584 \times 10^{-23} \text{ g} = 2.766 \times 10^{-25} \text{ mols}$$

$$\therefore 1.66 \times 10^{-24} \text{ mols H}_2\text{O}$$

$\hookrightarrow \therefore 1 \text{ molec. H}_2\text{O}$

~~#6~~

	$\frac{\%}{\%}$	$\frac{\text{mols}}{\text{mols}}$
C	92.3	7.692
H	7.7	7.7

\therefore CH = EF
13 = EW

$$\frac{C_{H_4}}{C_{H_2}} = \frac{u_{H_4}}{u_{H_2}}$$

4.35 mL/min 1.97 mL/min
16 g/mol MW = ?

$$\frac{4.35}{1.97} = \sqrt{\frac{x}{16}}$$

$$4.88 = \frac{x}{16}$$

$$x = 78 \text{ g/mol}$$