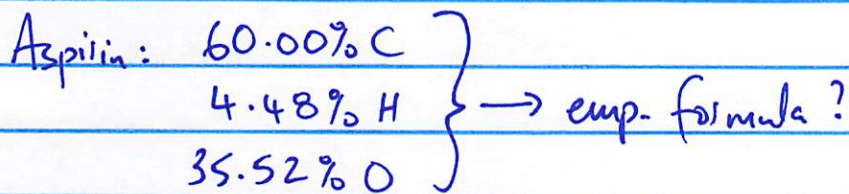


9/26/2018



Assume 100-g sample

$$\begin{array}{l} 60.00\text{g C} \times \frac{1\text{mol C}}{12.01\text{g C}} = 4.9958\text{mol C} \\ 4.48\text{g H} \times \frac{1\text{mol H}}{1.008\text{g H}} = 4.444\text{mol H} \\ 35.52\text{g O} \times \frac{1\text{mol O}}{16.00\text{g O}} = 2.220\text{mol O} \end{array} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \begin{array}{l} 2.2504 \text{ C} \\ \approx 2.25 \\ 2.0018 \text{ H} \\ \approx 2 \\ 1.000 \text{ 'O'} \\ \approx 1 \end{array}$$



"pseudoformula"

$\approx 9 \text{ C}, \approx 8 \text{ H}, \approx 4 \text{ 'O'}$

empirical formula of aspirin $\rightarrow \boxed{\text{C}_9\text{H}_8\text{O}_4}$

Sugars (carbohydrates) have an empirical formula of CH_2O
If fructose has a molar mass of $180.29/\text{mol}$
what is its molecular formula?

$n = \frac{\text{molar mass}}{\text{emp. form. mass}} \approx 6$

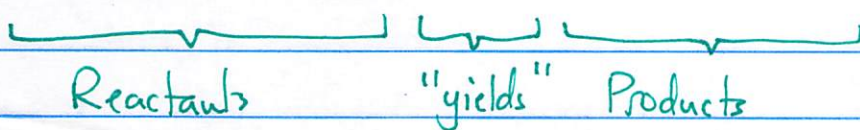
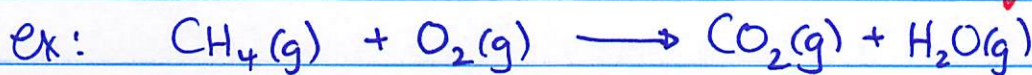
Molecular formula = Empirical formula $\times n$

$(1, 2, 3, 4, \dots)$

mol. form. = $(\text{CH}_2\text{O})_n = \text{C}_n\text{H}_{2n}\text{O}_n$
= $(\text{CH}_2\text{O})_6 = \boxed{\text{C}_6\text{H}_{12}\text{O}_6}$

$\begin{array}{l} \text{CH}_2\text{O} \\ 1 \times \text{C} = 12.01 \\ 2 \times \text{H} = 2.016 \\ 1 \times \text{O} = 16.00 \\ \hline 30.03 \text{ g/mol} \end{array}$

Writing + balancing chemical eqs



state symbols

(s) = solid

(l) = liquid

(g) = gas

(aq) = aqueous

- dissolved in H_2O

#atoms

C : 1

H : 4

O : 2

C : 1

H : 2

O : 3

not "balanced" \Rightarrow violates law of conservation of mass!

Need to balance this eqⁿ by adjusting coefficients.



C : 1

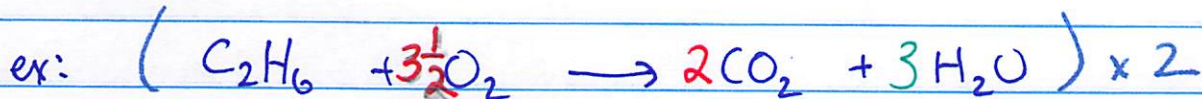
H : 4

O : ~~2~~ 4

C : 1

H : ~~2~~ 4

O : ~~3~~ 4



C : 2

H : 6

O : ~~3~~ 7

C : ~~1~~ 2

H : ~~3~~ 6

O : ~~3~~ 7



C : 4

H : 12

O : 14

C : 4

H : 12

O : 14



Balance: $(\text{KClO}_3 \rightarrow \text{KCl} + \frac{1}{2}\text{O}_2) \times 2$

K: 1

K: 1

Cl: 1

Cl: 1

O: 3

O: ~~2~~ 3

... practice!!!

Read: pages 122-126

Chapter 4: Chemical Quantities + Aqueous Rxns

consider: $2\text{C}_2\text{H}_6(\text{g}) + 7\text{O}_2(\text{g}) \rightarrow 4\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\text{g})$

can read this as, say, ...

2 molecules of C_2H_6 form 4 molecules of CO_2

OR more usefully...

2 mol C_2H_6 form 4 mol CO_2

Coefficients in bal. eq give us the MOLAR RATIOS!

2 mol $\text{C}_2\text{H}_6 = 4 \text{ mol } \text{CO}_2$

7 mol $\text{O}_2 = 6 \text{ mol } \text{H}_2\text{O}$

2 mol $\text{C}_2\text{H}_6 = 7 \text{ mol } \text{O}_2$

} conversion factors!

We use this info to help predict amounts used/formed.

STOICHIOMETRY