

STOICHIOMETRY: GRAMS TO GRAMS NOTES

Vocabulary:

Stoichiometry- Greek, "stoiechion" meaning "element," and "metron" meaning "to measure." The process of calculating substance quantities in a reaction using the balanced equation.

Balanced Equation- An equation that upholds mass conservation and equal element counts on both sides of an equation.

Coefficient- a whole number put before a formula in a chemical equation to achieve equilibrium.

Conversion factor- a numeric ratio of equal measurements used to convert quantities between different units.

Moles(mol)- the quantity of an element or compound containing 6.02×10^{23} (Avagadro's number) particles (ex. atoms, ions, etc.) of that element/compound.

Molar (Molecular) Mass-the weight (in grams) of a single mole of particles (atoms, ions, or molecules) of an element/compound.

Steps:

1. Balance the equation.
2. Convert grams A given in the problem to moles of A by dividing by the molar(molecular) mass of A from the periodic table.
3. Determine the mole to mole ratio between A and B.
4. Convert moles of B to the mass of B by multiplying the molecular mass of B.
5. Multiply across, divide bottom.

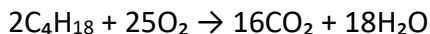
g A

<i># g A</i>	<i># mol A</i>	<i>Ratio from coefficient mol B</i>	<i>Molar mass from periodic table g B</i>	<i>= grams of B</i>
	<i>Molar mass from periodic table g A</i>	<i>Ratio from coefficient mol A</i>		

ketzbook's Stoichiometry Tricks Video:

Problem: How many grams of carbon dioxide are produced when 2800 grams of octane are burned in excess air?

1. Balance reaction:



2. Mass of A(C_4H_{18}) given: *2800 g C_4H_{18}*
3. Molar mass of A(C_4H_{18}): *114.2 g C_4H_{18}*
4. Mole to mole ratio of A and B: *2 mol of A to 16 mol of B (2:16)*
5. Molar Mass of B(CO_2): *44.01g*
6. Use the given information to solve the problem:

<i>2800 g C_4H_{18}</i>	<i>1 mol C_4H_{18}</i>	<i>16 mol CO_2</i>	<i>44.01 g</i>
	<i>114.2 g C_4H_{18}</i>	<i>2 mol C_4H_{18}</i>	<i>1 mol CO_2</i>

7. Answer: *8,632.43g CO_2*

Practice Problem:

Problem: If 14 grams of H_2 and excess O_2 react to produce water. How many grams of H_2O are produced?

1. Balance the equation:
$$2\text{H}_2 + 1\text{O}_2 \rightarrow 2\text{H}_2\text{O}$$
2. Mass A given: *14 g H_2*
3. Molar mass of A: *2.02 g H_2*
4. Mole to mole ratio of A and B: *2:2*
5. Molar Mass of B(H_2O): *18.02 g H_2O*
6. Using the given information to solve the problem:

<i>14 g H_2</i>	<i>1 mol H_2</i>	<i>2 mol H_2O</i>	<i>18.02 g H_2O</i>
	<i>2.02 g H_2</i>	<i>2 mol H_2</i>	<i>1 mol H_2O</i>

7. Answer: *124.89 g H_2O*

Adapted from: Foundation, C.-12. (n.d.). 12 foundation. CK. <https://flexbooks.ck12.org/cbook/ck-12-chemistry-flexbook-2.0/section/12.1/primary/lesson/everyday-stoichiometry-chem/>
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