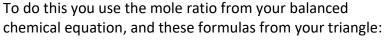


STOICHIOMETRY

Suppose that you are given a chemical equation where the mass of a reactant is provided.

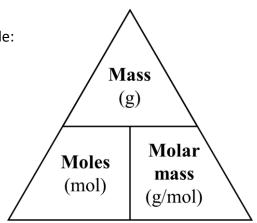
Your task is to find the mass of a product on the other side of the equation.



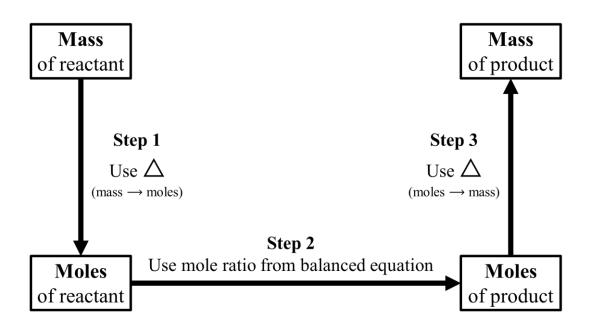
$$moles [mol] = \frac{mass [g]}{molar mass [g/mol]}$$

 $mass [g] = moles [mol] \times molar mass [g/mol]$

Remember, molar mass is found in the periodic table!



The Plan











Example

Consider the following decomposition reaction: $2KClO_3$ (s) $\rightarrow 2KCl$ (s) $+ 3O_2$ (g)

How many grams of oxygen gas are formed when 2 grams of KClO₃ decomposes?

Step 1:

Using the periodic table, we combine the molar mass of each element in the reactant to obtain

molar mass of
$$KClO_3 = (1 \times 39.1) + (1 \times 35.45) + (3 \times 16) = 122.55 \text{ g/mol.}$$

Using the triangle, we can calculate the number of moles in 2 grams of $KClO_3$ as follows:

moles of
$$KClO_3 = \frac{2 [g]}{122.55 [g/mol]} = 0.0163 mol.$$

Step 2:

The balanced chemical equation gives a conversion factor of $\frac{3 \text{ mol O}_2}{2 \text{ mol KClO}_3}$ from which we find

moles of
$$O_2 = 0.0163$$
 [mol KClO₃] $\times \frac{3 \text{ [mol O_2]}}{2 \text{ [mol KClO_3]}} = 0.0245 \text{ mol.}$

Step 3:

Using the periodic table, we combine the molar mass of each element in the product to obtain

molar mass of
$$O_2 = 2 \times 16 = 32$$
 g/mol.

Using the triangle, we can calculate the mass of 0.0245 moles of 0_2 as follows:

mass of
$$O_2 = 0.0245$$
 [mol] $\times 32$ [g/mol] = 0.7834 g.

We therefore conclude that 2 grams of $KClO_3$ decomposes to form 0.8 grams of O_2 (to 1 s.f.).



