# Relative Formula Mass

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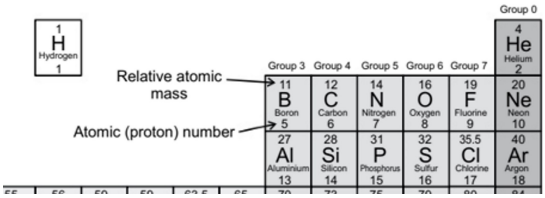


The relative atomic mass ($A_r$) is the number of protons and neutrons added together.

The relative formula mass ($M_r$) is the mass of each of the elements in a compound added up. So you will need the $A_r$ of each element present

So for

- $H_2O$ it is 1+1+18 = 20
- $CO_2$ it is 12+16+16

Working out percentage mass in a compound:

$$\text{Percentage mass of an element in a compound} = \frac{A_r \times \text{number of atoms of that element}}{M_r \text{ of the compound}} \times 100$$

Example:

What is the % of carbon in carbon dioxide?

$$\% = \frac{A_r \times N}{M_r} = \frac{12 \times 1}{48} \times 100 = 25\%$$

You might guess then that the % of oxygen would be 100-25=75%...

$$\% = \frac{A_r \times N}{M_r} = \frac{16 \times 2}{48} \times 100 = 75\%$$

So - not so bad then....

Try this:

You have 50g of a mixture. 20% of this mixture is Iron.

You decide that you will provide FeCl2 as the source of iron in your mixture. How much FeCl2 do you need?

- Mass of iron in the mixture: $50g \times 20\% = 10g$
- So we need 10g of iron from the $FeCl_2$
- % mass of iron in $FeCl_2$:

$$\% = \frac{A_r \times N}{M_r} = \frac{56 \times 1}{56 + 35.5 + 35.5} = 44.09\%$$

- So we know 44.9% of any mass of $FeCl_2$ is iron & we want that to be 10g

So: mass iron = mass of $FeCl_2 \times 44.09\%$

$$10 = x \times 0.4409$$

$$\therefore x = \frac{10}{0.4409} = 22.7\,g$$