



Calculating Relative Formula Mass

Topic Summary

- The masses listed beside each element in the periodic table are *relative atomic masses* (A_r) and they are the mass of an atom of the element when compared with an atom of carbon-12 rather than measuring their actual masses.
- Relative atomic masses for elements are not whole numbers because the element is usually a combination of isotopes, electron masses contribute to the mass as well and there are tiny variations in proton and neutron masses too.
- The relative formula mass (M_r) of compounds can be calculated by adding together the relative atomic masses of all the atoms in their formula.
- To calculate an M_r first, correctly count the number of atoms of each element in the molecular/condensed structural/ionic formulae, being especially careful with brackets, then multiply each total by the element's relative atomic mass.
- Remember that, at GCSE, relative atomic masses are rounded values with only copper and chlorine being listed with even one decimal place in their values.
- Relative formula mass calculations are a vital first step in preparation for calculating moles and solving quantitative chemistry problems - so make sure you build your confidence with them before going further.



Some straight-forward ones to get you started

Here are a few simple compounds to start with. For each one, write out the names of the elements present and the number of each of them. The first one has been done for you.

CO_2 (1 $\times$ C) + (2 $\times$ O), (1 $\times$ 12) + (2 $\times$ 16) = 44

NO_2 46.....

H_2O_2 34.....

HF 20.....



Now a bit trickier

These next few contain a mixture of one and two letter symbols, watch out.

CH_3F 34.....

CaBr_2 200.....

CH_3OH 32.....

Al_2O_3 102.....



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Extra tough ones, with brackets!

These next few contain a mixture of one and two letter symbols, watch out.

$\text{Mg}(\text{OH})_2$ 58.....

$\text{Sr}(\text{NO}_3)_2$ 212.....

$\text{Fe}(\text{OH})_3$ 107.....

$\text{Al}_2(\text{CO}_3)_3$ 234.....



Longer Answers

State the definition of a 'relative **atomic** mass'

.....The (weighted) average mass of an atom of the element, (1 mark)
taking into account all naturally occurring, stable, isotopes of that element, (1 mark)
relative to 1/12th of the mass of an atom of carbon-12 (1 mark).....



Do this later...

Give your brain a break and come back to these questions later. Cover the rest of the sheet while you have a go. By doing this 24-48 hours after watching the video you will boost your chances of remembering the key points in an exam. If you struggle with these questions, re-watch the video and then try again.

Give the relative formula mass of each compound

LiCl 42.5.....

CuSO_4 159.5.....

Na_2SO_4 142.....

$\text{Al}(\text{NO}_3)_3$ 213.....

