



# Introducing the mole



The mole is simply a number. Just as 'a dozen' refers to the number 12, a mole refers to the number  $6 \times 10^{23}$  or 600,000,000,000,000,000,000,000. This huge number is also called Avogadro's number.

Where does this huge number come from? Well, as it turns out, 12 grams of carbon contains  $6 \times 10^{23}$  carbon atoms. Put another way: a mole of carbon atoms has a mass of 12 grams.

A mole is defined as the number of atoms in exactly 12 grams of  $^{12}\text{C}$  (carbon twelve).

This turns out to be Avogadro's number or  $6 \times 10^{23}$

element	RAM
hydrogen	1
helium	4
carbon	12
oxygen	16
magnesium	24

Carbon has a relative atomic mass (RAM) of 12, and we know that a mole of carbon atoms has a mass of 12 grams. It follows that:

A mole of hydrogen atoms has a mass of 1 gram.

A mole of helium atoms has a mass of 4 grams.

A mole of oxygen atoms has a mass of 16 grams.

A mole of magnesium atoms has a mass of 24 grams.

This is dead useful. We can not measure the mass of an individual atom because they are so tiny, but using the mole we can relate the relative atomic mass to a mass in grams.

If I want one mole of magnesium all I have to do is weigh out 24 grams of magnesium.

If I want two moles of magnesium all I have to do is weigh out 48 grams of magnesium.

Complete the following table (the first line has been completed for you)...

element	symbol	relative mass	no. of moles	mass (g)
hydrogen	H	1	2	2
	He	4	4	
carbon		12		12
	O		3	48
magnesium		24		12
	Al	27	1	
sulphur		32	1.5	
	Ca	40		100
titanium		48	3.5	
	Fe	56	1.4	
copper		64		140.8
	Ag	108	2	216
gold		197	1.5	



# Introducing the mole (Answers)



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carbon	C	12	1	12
oxygen	O	16	3	48
magnesium	Mg	24	0.5	12
aluminium	Al	27	1	27
sulphur	Su	32	1.5	48
calcium	Ca	40	2.5	100
titanium	Ti	48	3.5	168
iron	Fe	56	1.4	78.4
copper	Cu	64	2.2	140.8
silver	Ag	108	2	216
gold	Au	197	1.5	295.5