Name:

Calculations 1

The theory behind calculations in chemistry can be a little confusing. The ideas are quite straightforward.

We want to be able to know how many atoms or molecules of each type are involved in reactions.

Individual atoms are far too small to count and far too tiny to weigh individually.

In order to count the ludicrously high numbers of atoms involved in reactions we use moles.

A mole is simply 6.02×10^{23} examples of something.

To weigh a substance we say that the mass of 1 mole of a substance is the relative formula mass in grams.

Relative atomic mass (RAM)
There are no units for RAM.
You may be asked to work out the RAM of an element given the abundances of its isotopes.

There are 2 isotopes of hydrogen: $^{1}_{1}H$ and $^{2}_{1}H$ (known as deuterium). Their relative abundances are 99.985%, 0.015% respectively. What is the RAM of hydrogen? What is the mass of a mole of hydrogen atoms (remember there **are** units for this!)

Relative formula mass (RFM)
There are no units for RFM.
The RFM is the sum of the RAMs of the compound.

Use your answer to the first question above to work out the RFM of a hydrogen **molecule** (H_2). What is the mass of a mole of hydrogen molecules?

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Moles

When doing a calculation with moles it is really important to include the formulae of the things you're talking about!

Assume that oxygen has a relative atomic mass of 16.
How many oxygen **atoms** (O) are there in 16g of oxygen gas?

How many oxygen **atoms** (O) are there in 8g of oxygen gas?

How many oxygen **molecules** (O_2) are there in 16g of oxygen gas?

How many oxygen **molecules** (O_2) are there in 8g of oxygen gas?

What is the mass of a mole of oxygen **molecules** (O_2)?

What is the mass of half a mole of copper (II) sulphate crystals, $CuSO_4.5H_2O$?
(RAMs are: Cu = 64, S = 32, O = 16, H = 1)

RFM of the crystals =

Mass of 1 mole =

Mass of ½ a mole =