Water of Crystallisation

Many ionic compounds have associated with them water molecules

e.g. Copper sulfate crystals have a formula $CuSO_4.5H_2O$

For every 1 mol of $CuSO_4$, there are 5 moles of water

This water can be removed by heating

Terminology:

- **Hydrated Salt:** a compound containing water of crystallisation
- **Anhydrous:** Without water
- **Dehydrate:** to remove water

Calculating water of crystallisation

1. Find molecular mass of the anhydrous salt and water
2. Calculate the number of moles of each
3. Calculate the simplest ratio of anhydrous salt to water (divide by smallest)
4. Convert this to whole numbers (like working out Empirical Formula)
5. Write the formula of the hydrated compound

Example

4.96g of hydrated sodium thiosulfate ($Na_2S_2O_3.xH_2O$) was dehydrated and formed 3.16g of anhydrous salt. Find x.

(Na=23, S=32, O=16, H_2O = 18 g mol^{-1})

	$Na_2S_2O_3$	**H_2O**
m	3.16g	4.96 – 3.16 = 1.80g
M	158 g mol^{-1}	18 g mol^{-1}
n	0.0200 mol	0.100 mol
Simplest ratio	1	5
Formula	$Na_2S_2O_3$. **5** H_2O	