



Step 1 Write and *BALANCE* the equation and write the *MOLE RATIO* underneath.



Step 2 Write under the equation what you are given and what you need to calculate: the *KNOWN* and the *UNKNOWN*. (Danger Will Robinson! If you have two *KNOWN* quantities, you must work out which is the *LIMITING REAGENT*.)



Step 3 If not given, calculate the *MOLES OF THE KNOWN*
Use: $\text{MOLES} = \text{mass} / \text{mass per mole}$ OR $\text{MOLES} = \text{Concentration} \times \text{volume (L)}$
OR $\text{MOLES} = \text{volume of gas at STP} / 22.4$



Step 4 Use the *KEY*:



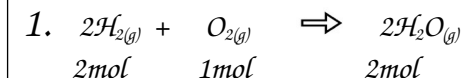
Step 5 Using the *MOLES* of the *UNKNOWN*, calculate what you are asked to find. For example:



Mass = $\text{MOLES} \times \text{Mass per mole of unknown}$
Volume of gas at STP = $\text{MOLES} \times 22.4$
Concentration of solution = $\text{MOLES} / \text{volume (L)}$

EXAMPLE:

Calculate the mass and volume of hydrogen gas burnt in air which will produce 1.8g of water



3. Moles of water produced;

$$n = m/M \quad (M \text{ H}_2\text{O} = 2+16)$$

$$= 1.8/18$$

$$= 0.10 \text{ mole}$$

4. From the equation,

2 moles of H_2 make 2 moles of H_2O
So, 0.10 mol H_2 make 0.10 mol of H_2O

5. Mass of $\text{H}_2 = n.M$

$$= 0.10 \times 2 \quad (M \text{ H}_2 = 2)$$

$$= 0.20g$$

Volume of H_2 at STP

$$= 0.10 \times 22.4$$

$$= 2.24L$$

