## Calculating the Mass of Products from a Reaction Equation

You can use the reaction equation and information about relative atomic mass to calculate the mass of **products** you would expect to get.

#### Example

 $N_2 + 3H_2 \rightarrow 2NH_3$ 

If we have 7g of  $N_2$ , how much  $NH_3$  can we make?

# <u>Step 1</u>

Write down the Mr or Ar underneath each chemical and multiply by any balancing number

$N_2$	+	$3H_2$	$\rightarrow$	$2NH_3$
28	-	$3x^2 = 6$		2x17 = 34

This means that for every 28g of N<sub>2</sub> we would expect to get 34g of NH<sub>3</sub>.

# Step 2

Decide what fraction or multiple of the  $M_r$  the reacting amount is: By examination 7 is 28/4

# Step 3

Work out how much product you would get



Excess means you have more than enough of that reactant so it won't affect your calculation Calculating the Mass of Reactants from a Reaction Equation

The previous method can also be used to work out the mass of **reactants** used in a chemical reaction.

# Example

The reaction between iron (Fe) and sulphur (S) to make iron (II) sulphide (FeS). Fe + S  $\rightarrow$  FeS

How much Fe is needed to make 176g of FeS?

# <u>Step 1</u>

Write down the Mr or Ar underneath each chemical and multiply by any balancing number

$$\begin{array}{rrrr} Fe + S \rightarrow FeS \\ 56 & 32 & 88 \end{array}$$

This means that for every 88g of FeS made, we need 56g of Fe and 32g of S

Step 2 Decide what fraction or multiple of the  $M_r$  the reacting amount is: By examination: 176 is 2 x 88

Step 3 Work out how much reactant you would need

56 x 2 = 112g

Q. How much S would be needed to make 176g of FeS?
Now try these questions yourself. First construct balanced chemical equations.
Remember to start by writing the M <sub>r</sub> or A <sub>r</sub> under each formula in the equation, and multiplying by
the balancing number.
5.6g of iron react with excess sulphur to make WHAT MASS of iron(II) sulphide?
Iron + Sulfur $\rightarrow$ Iron Sulfide
3.65g of HCl react with excess sodium hydroxide. What mass of water is formed?
Hydrochloric acid + sodium hydroxide $\rightarrow$ sodium chloride + water
Read hydrogen are evaluated in every every what make of water is formed?
by or invertogen are exploded in excess oxygen. What mass of water is formed?
Trydrogen + oxygen > water

If 3.2 g of oxygen is reacted with ex	cess hydrogen,	, what mass of water is for	med?
Hydrogen + oxygen $\rightarrow$ water			

What mass of hydrogen and ox	ygen are needed to make exactly	y 3.6g of water (2 answers needed)
Hydrogen + oxygen $\rightarrow$ water	-	

When sulphur (found in coal) burns it forms acid rain. What mass of sulphur dioxide is formed from 32 tonnes of sulphur and excess oxygen? Sulfur + oxygen  $\rightarrow$  sulfur dioxide

When a hydrocarbon burns in excess oxygen, 2 products are formed (water and carbon dioxide). What mass of the greenhouse gas (CO<sub>2</sub>) forms when 10g of heptane (C<sub>7</sub>H<sub>16</sub>), found in petrol, are burned in excess  $O_2$ ?

 $C_7H_{16}$  +  $11O_2$   $\rightarrow$   $7CO_2$  +  $8H_2O$ 

Try these questions
Try these questions
123g of sulphur are burned in excess oxygen. What mass of sulphur dioxide forms? Sulfur + oxygen $\rightarrow$ sulfur dioxide
29 tonnes of iron (III) oxide are reacted in the blast furnace with excess carbon monoxide. What
mass of iron is produced?
Iron (III) Oxide + carbon monoxide $\rightarrow$ iron + carbon dioxie
2.567g of pure sodium hydroxide are reacted with excess dilute sulphuric acid. What mass of
water is formed? Sodium hydroxide + sulfuric acid $\rightarrow$ sodium sulfate + water
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What mass of lead nitrate has to be thermally decomposed to give 50g of lead oxide?			
Lead (II) nitrate $\rightarrow$ lead (II) oxide + nitrogen dioxide + oxygen			
Will be an an a former of the stand of the s			
petrol) is burned in excess oxygen?			
$2 C_8 H_{18} + 25 O_2 \rightarrow 16 CO_2 + 18 H_2 O$			
What mass of carbon dioxide is formed on a typical 25 mile car journey? (Assume the petrol			
consists of 2kg {2000g} of pure heptane and that half a gallon of it [2.25 litres] reacts with excess			
$C_7H_{16}$ + 11 $O_2$ $\rightarrow$ 7 $CO_2$ + 8 $H_2O$			