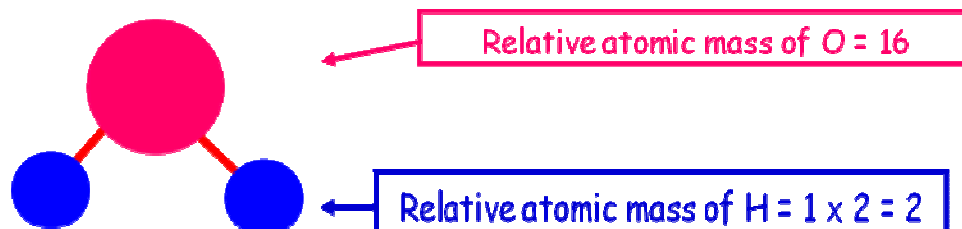


Mr, Conservation of Mass and Calculating Mass – Revision Pack (C3)

Mr or Relative Formula Mass:

The relative formula mass (M_r) of a compound is the relative atomic masses of all the elements in the compound added together.

H₂O:



Therefore, the M_r for water is $16 + (2 \times 1) = 18$

How to find the relative atomic mass of an element:

16
O
8

STEP 1: Find the element in the Periodic Table

STEP 2: Look for the larger of the two numbers

STEP 3: Refer to the given formulae and check how many of each element is being asked for; e.g. Carbon Dioxide has two Oxygen atoms so you need $2 \times 16 = 32$

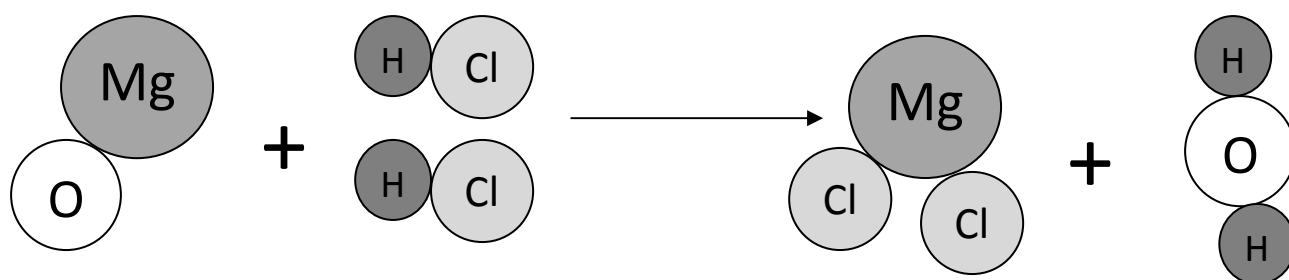
Conservation of Mass in a Reaction:

In any reaction the total mass of products is the same as the total mass of the reactants.

Total mass of REACTANTS = Total mass of PRODUCTS

A good example would be magnesium oxide and hydrochloric acid reacting:

Mr, Conservation of Mass and Calculating Mass – Revision Pack (C3)



Here (on **BOTH** sides) there are:

1x Magnesium

1x Oxygen

2x Hydrogen

2x Chlorine

This means that the mass will be the same on both sides.

Calculating Mass:

There are four simple steps to follow when asked to calculate the mass:

STEP 1: Identify what the question is asking you, which of the compounds do you need to work out the mass?

STEP 2: Put a cross through any compounds that you don't require in your calculation.

STEP 3: Work out the Mr of the given compounds (that you NEED)

STEP 4: Work out the ratios and apply this to the question

Example:

What mass of **magnesium oxide** is produced when 60g of **magnesium** is burned in air?



24	16
Mg	O
12	8

$$2\text{Mg} = 2 \times 24 = 48$$

$$2\text{MgO} = 2 \times (24 + 16) = 80$$

This means that 48g of 2Mg makes 80g of 2MgO

We want 60g of 2Mg so, we do $80/48 = 1.66\text{g} \times 60 = 100\text{g}$

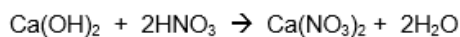
Therefore, 60g of 2Mg makes 100g of 2MgO

Mr, Conservation of Mass and Calculating Mass – Revision Pack (C3)

PPQ(1):

10 Clare prepares calcium nitrate.

She reacts calcium hydroxide with nitric acid.



(a) Calculate the mass of calcium nitrate that can be made from 3.15 g of pure nitric acid.

.....

.....

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.....

.....

answer g **[3]**

(b) Clare reacts double the amount of nitric acid in an excess of calcium hydroxide.

What effect will this have on the amount of calcium nitrate made?

.....

..... **[1]**

[Total: 4]

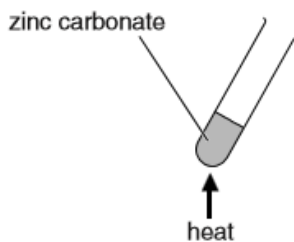
OCR Specimen Paper B3 C3 P3

PPQ(2):

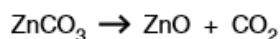
Mr, Conservation of Mass and Calculating Mass – Revision Pack (C3)

- 5 Michael investigates the decomposition of zinc carbonate, ZnCO_3 .

Look at the apparatus he uses.



- (a) The equation for the decomposition is



The relative atomic mass, A_r , of Zn = 65, C = 12 and O = 16.

Show, by calculation, that 0.90 g of zinc carbonate should make **0.58 g** of zinc oxide, ZnO.

.....
.....
..... [2]

- (b) Michael predicts that he should make 0.58 g of zinc oxide.

Michael actually makes 0.50 g of zinc oxide.

Calculate his **percentage yield**.

.....
.....
..... [2]

[Total: 4]

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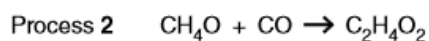
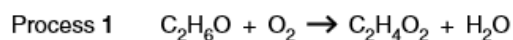
(Refer to *atom economy and percentage yield* revision pack for part b)

PPQ(3):

Mr, Conservation of Mass and Calculating Mass – Revision Pack (C3)

SECTION C – Module C3

- 10 Stowmarket Synthetics manufacture ethanoic acid, $\text{C}_2\text{H}_4\text{O}_2$, by two different processes.



Look at the table of relative formula masses.

Compound	Formula	Relative formula mass, M_r
ethanol	$\text{C}_2\text{H}_6\text{O}$	46
oxygen	O_2	32
ethanoic acid	$\text{C}_2\text{H}_4\text{O}_2$	60
water	H_2O	18
methanol	CH_4O	32
carbon monoxide	CO	28

The relative atomic mass of H = 1, of C = 12, and of O = 16.

- (a) In process 2, Stowmarket Synthetics use 320 g of methanol.

Calculate the maximum mass of ethanoic acid that can be made.

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.....
.....
..... [2]

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Mark Schemes:

Mr, Conservation of Mass and Calculating Mass – Revision Pack (C3)

PPQ1:

No Mark Scheme available.

PPQ2:

Question		Answer	Marks	Guidance
5	(a)	$\frac{0.90 \times 81}{125} = 0.58$ (2) but relative molecular mass of zinc carbonate 125 and of zinc oxide 81 (1)	2	
	(b)	86% (2) but $\frac{0.50}{0.58} \times 100$ or (actual yield / predicted yield) x 100 (1)	2	allow 86.2 (%) / 86.21 (%) 86.0 (%) or 86.206897(%) = (1)
		Total	4	

PPQ(3):

Question		Answer	Marks	Guidance
10	(a)	32 (g) of methanol makes 60 (g) of ethanoic acid / 10 moles of methanol is used / $32 \times 10 = 320$ (1) So 320 (g) makes 600 (g) of ethanoic acid (1)	2	allow two marks for the correct answer of 600g even if no working out