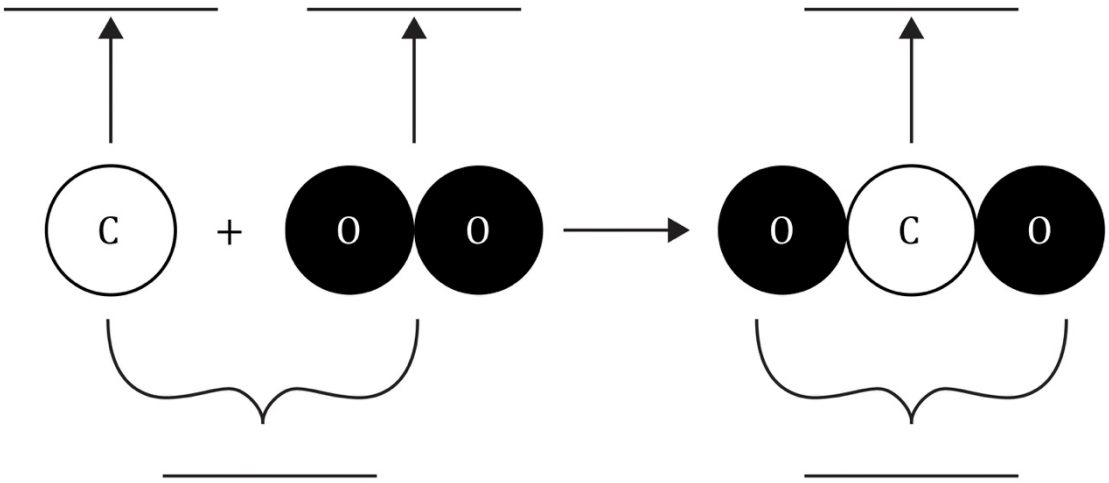
Quantitative chemistry: knowledge check

1.1 This diagram represents a chemical equation. Label the diagram using the words below.

compound **element** **molecule**

product **reactants**



1.2 Use the words to complete the sentences:

carbon **reaction** **oxygen**

products **reactants**

The diagram in question 1.1 shows an equation summarising a

_____. The _____ can be found on

the right-hand side of the arrow. The _____ can be found

on the left-hand side of the arrow. The reactants are

_____ and _____.

1.3 Use the words and symbols to complete the sentences:

compound **elements** **C** **CO_2** **O_2**

The formula of the carbon atom is _____.

The formula of the oxygen molecule is _____. The formula of the carbon dioxide molecule is _____. Both the reactants are _____ that contain one type of atom only. The product is a _____, which is a substance made up of two (or more) different atoms bonded together.

1.4 Use the words to complete the sentences:

atoms **conservation** **carbon** **mass**

oxygen **products** **reactants** **rearranged**

During a chemical reaction, _____ are neither created nor destroyed. Instead, the atoms are just _____ to form a new substance. This means that the total mass of the _____ will be the same as the total mass of the _____. In this example, there is one atom of _____ and two atoms of _____ on both sides of the arrow. The equation is balanced and shows that the mass is conserved. The total _____ stays the same during a chemical reaction. This is the law of _____ of mass.

Quantitative chemistry: test myself

Use the words to complete the sentences. You do not have to use all the words. You can use the words more than once.

2.1 What does the formula H_2O mean in terms of the number and type of atoms?

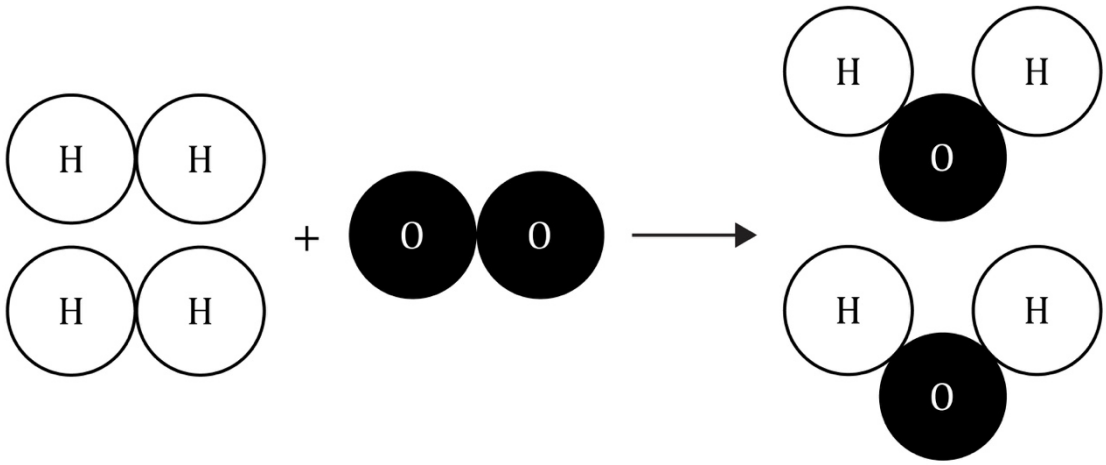
one **two** **hydrogen** **oxygen** **water**

There are _____ atoms of _____

and _____ atom of _____ in one

molecule of water.

2.2 Write a word equation for the chemical reaction shown in the diagram.



hydrogen **oxide** **oxygen** **water**

_____ + _____ → _____

2.3 What is the formula for one molecule of hydrogen? For, example, the formula for water is H_2O.

Circle the correct answer.

H2 H h_2 H_2 h2

2.4 What is the formula for one molecule of oxygen? For example, the formula for water is H_2O.

Circle the correct answer.

O_2 O o2 o o_2

2.5 Using your answers from questions 2.3 and 2.4, write a balanced symbol equation for the reaction shown in the diagram in question 2.2.

_____ + _____ → _____

2.6 Why does the number of hydrogen and oxygen atoms on the left-hand side of the arrow have to be equal to those on the right-hand side? Give your answer in terms of conservation of mass.

Use the words to complete the sentences. You do not have to use all the words.

atoms **destroyed** **elements**

produced **rearranged**

During a chemical reaction, _____ are only

_____; they cannot be _____, and

new ones are not made.

2.7 How much water would you expect to make from 4 g of hydrogen and 32 g of oxygen?

Circle the correct answer.

4 g **32 g** **36 g** **28 g**

Show your working.

2.8 How much water would expect to make from 20 kg of oxygen and 160 kg of hydrogen?

Circle the correct answer.

20 kg **160 kg** **180 g** **180 kg**

Show your working.

2.9 How much hydrogen would you need to react with 48 g of oxygen to make 54 g of water?

Circle the correct answer.

6 g **48 g** **54 g** **102 g**

Show your working.

2.10 This is the word equation for heating calcium carbonate:

calcium carbonate → calcium oxide + carbon dioxide

Calcium carbonate decomposes to form calcium oxide and carbon dioxide. How much calcium carbonate would you need to start with to produce 28 g of calcium oxide and 22 g carbon dioxide when it completely decomposes?

Circle the correct answer. Show your working.

22 g **28 g** **6 g** **50 g**

Quantitative chemistry: feeling confident?

3.1 Use the Periodic table and the values below to complete the relative atomic mass column.

1 **12** **14** **16** **23** **24**

32 **35.5** **56** **63.5**

Element	Symbol	Relative atomic mass
hydrogen	H	
oxygen	O	
chlorine	Cl	
carbon	C	
nitrogen	N	
iron	Fe	
sodium	Na	
magnesium	Mg	
copper	Cu	
sulfur	S	

3.2 Use the relative atomic masses from question 3.1 to complete the calculations and relative formula masses of the compounds in the table.

Compound name	Chemical formula	Calculation	Relative formula mass
water	H_2O	$(2 \times H) + (1 \times O)$ $= (2 \times 1) + (1 \times 16)$	18
sodium chloride (salt)	$NaCl$	$(1 \times Na) + (1 \times Cl)$ $= (1 \times 23) + (1 \times 35.5)$	
carbon dioxide	CO_2		44
methane	CH_4		16
ammonia	NH_3		
copper sulfate	$CuSO_4$		
glucose	$C_6H_{12}O_6$	$(6 \times C) + (12 \times H) + (6 \times O)$ $= (6 \times 12) + (12 \times 1) + (6 \times 16)$	
sodium carbonate	Na_2CO_3		106
magnesium hydroxide	$Mg(OH)_2$	$(1 \times Mg) + (2 \times O) + (2 \times H)$ $= (1 \times 24) + (2 \times 16) + (2 \times 1)$	
ammonium sulfate	$(NH_4)_2SO_4$		132

Quantitative chemistry: what do I understand?

Think about your answers and confidence level for each mini-topic. Decide whether you understand it well, are unsure or need more help. Tick the appropriate column.

Mini-topic	I understand this well	I think I understand this	I need more help
I understand that all substances are made up of atoms and molecules.			
I can identity elements and compounds.			
I can identify reactants and products in a chemical equation.			
I can write simple chemical formulas.			
I can understand and use the law of conservation of mass.			
I can write simple word equations.			
I can write simple balanced symbol equations.			
I can calculate the mass of a reactant or product in a chemical reaction given all other reacting masses.			
Feeling confident? topics	**I understand this well**	**I think I understand this**	**I need more help**
I can use the Periodic table to find the relative atomic masses of named elements.			
I can calculate relative formula mass.			