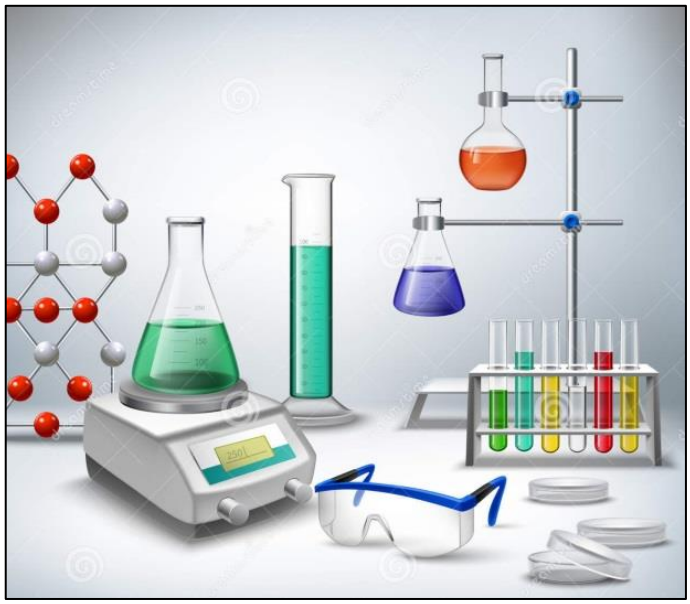
St. Ninian's High School

S2 Chemistry



Homework Booklet

Chemistry Department

Standards Expected of Homework

- All homework must be recorded in your homework diary.
- All homework must be **dated** and have a **heading** which is **underlined.**
- A **ruler** must be used for all underlining and for diagrams.
- Diagrams must be properly **labelled.**
- Graphs should be drawn on graph paper.
- You must **attempt every question,** using your notes to help you and ask for help if it is required.
- **Answer in sentences** when appropriate.
- **Care** and **attention** must be given to your written work at all times.
- In every report you receive, your teacher will give you a rating for your homework. This rating is based on the criteria outlined below. You should be aware of this when completing each piece of homework:

Homework grade

1	Excellent	2	Good	3	Needs improvement	4	Significant concern

Contents

1. **Topic 1:** Substances and Reactions: Homework sheets 1-10
2. **Topic 2:** Gases and Life: Homework sheets 11- 16
3. **Topic 3:** Acids and Metals: Homework sheets 17-26

Elements 1

1. What are the atomic numbers of the following elements?

(a) Hydrogen (b) Beryllium (c) Nitrogen

(d) Helium (e) Boron (f) Oxygen

2. Identify the elements which have the following symbols:

(a) Al (b) Ba (c) Cl

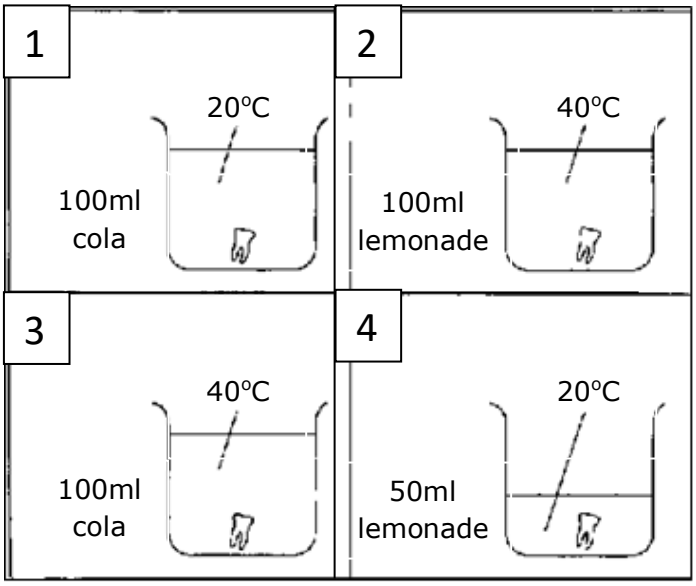
(d) As (e) Be (f) C

3. What are the chemical symbols for the following elements?

(a) Potassium (b) Phosphorus (c) Neon

4. John read that fizzy drinks can dissolve teeth.

He set up the following experiments.



(a) John wanted to find out if a tooth would dissolve more in cola or lemonade.
Which **two** boxes should he choose for a fair test?

(b) What was John trying to find out if he compared boxes 1 and 3?

Types of element 2

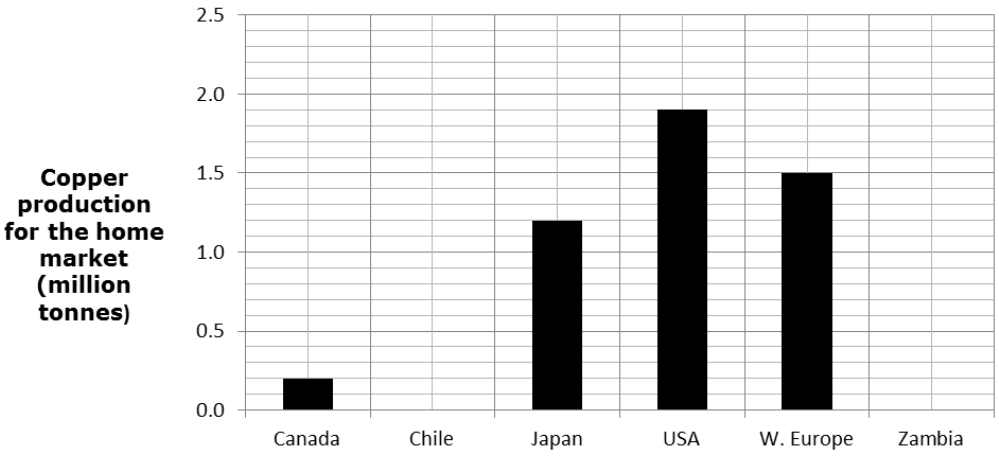
1. From the following list of elements:

Bromine	*Aluminium*	*Carbon*	*Magnesium*	*Helium*
Xenon	*Oxygen*	*Mercury*	*Krypton*	*Iodine*

Identify the elements which are:

(a) Solids at room temperature
(b) Liquids at room temperature
(c) Gases at room temperature
(d) Metals
(e) Non metals

2. Of the six main copper producing countries, only Canada, Chile, and Zambia export more copper than they use for their home market. Canada exports 0·3 million tonnes annually, whereas Chile (0·8 million tonnes) and Zambia (0·6 million tonnes) export all their copper. In contrast the other copper producers export hardly any copper. The USA exports 0·1 million tonnes of the 2 million tonnes it produces annually, but Western Europe and Japan use all their copper in the home market.



Use the passage above and the bar graph to **copy and complete** the following table.

Copper producer	Copper manufactured (million tonnes)		
	for export	for home market	total
Chile			0.8
	0	1.5	1.5
		1.9	
			0.6

Groups of Elements 3

1. All of the elements are arranged in the periodic table.

(a) Approximately how many elements exist?
(b) Are the majority of the elements metals or non-metals?
(c) What type of elements conduct electricity?

2. Look at the list of elements below.

Argon	*Sulfur*	*Sodium*	*Xenon*
Neon	*Calcium*	*Sulfur*	*Selenium*
Lithium	*Bromine*	*Barium*	*Iodine*

Identify the elements which have similar chemical properties to:

(a) Magnesium

(b) Oxygen

(c) Chlorine

3. Use information from the data booklet to **copy and complete** the table below.

Element	Symbol	Year of Discovery	Density
Aluminium			
Bromine			
Calcium			
Iodine			
Silicon			
Sodium			

Compounds (collect graph paper) 4

1. Name the elements which are present in the following compounds.

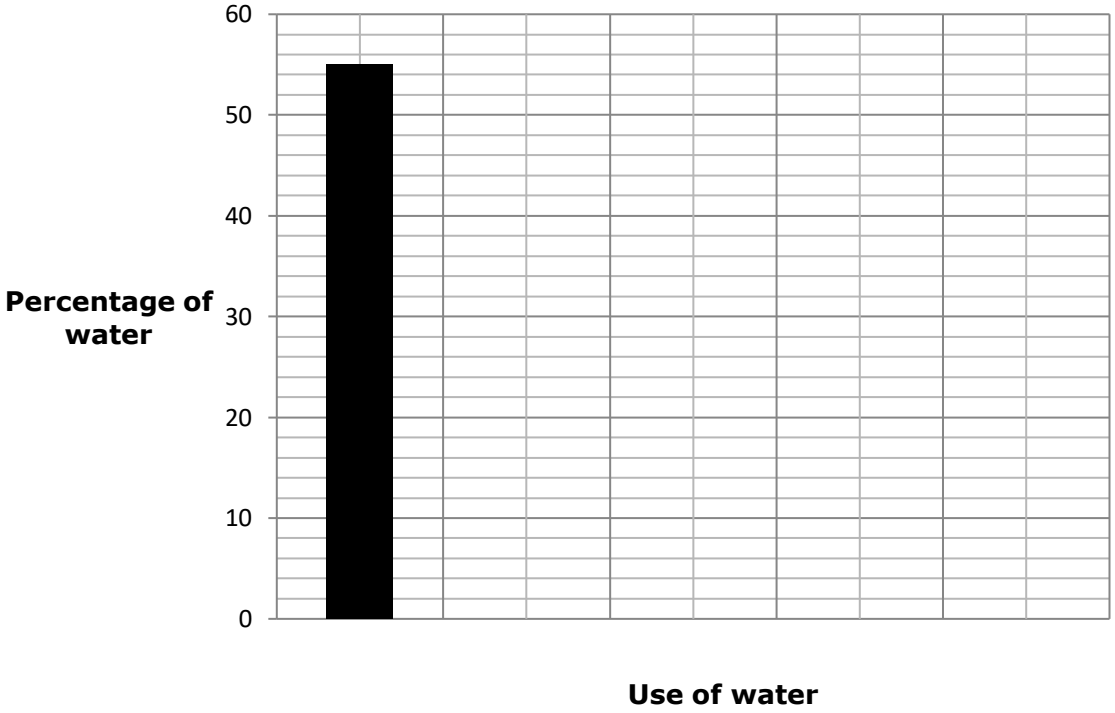
(a) hydrogen chloride
(b) sodium oxide
(c) potassium sulfide
(d) calcium oxide
(e) sodium bromide
(f) iron oxide
(g) sodium chloride
(h) calcium chloride
(i) potassium bromide
(j) hydrogen oxide

2. Name the elements which are present in the following compounds.

(a) aluminium nitrate
(b) potassium sulfate
(c) aluminium sulfate
(d) magnesium carbonate
(e) copper nitrate
(f) sodium carbonate
(g) iron sulfate
(h) silver nitrate
(i) magnesium hydroxide
(j) copper sulfate

3. Every day the waterworks supply us with huge amounts of clean water. 55% of this water is used for washing ourselves and our clothes. We flush 25% of our clean water down the toilet and use 6% on the car and garden. We use 10% of our water for cooking and 4% for drinking.

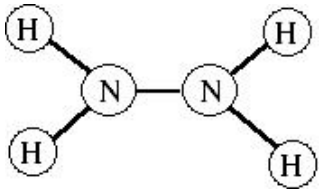
Use the information in the passage to copy and complete the bar graph below.



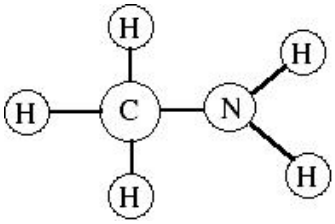
Formulae 1 (collect graph paper) 5

1. Below are models of the molecules of some substances. Give the molecular formula of each substance.

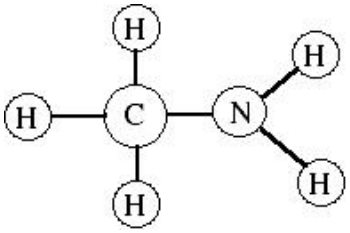
(a)



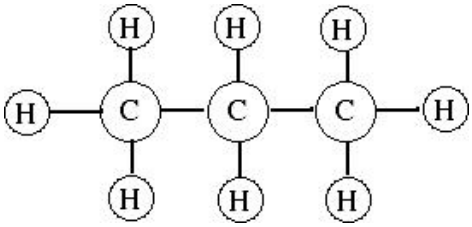
(b)



(c)

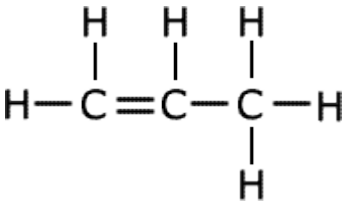


(d)

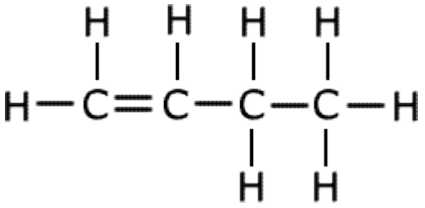


2. Below are models of the molecules of some substances. Give the molecular formula of each substance.

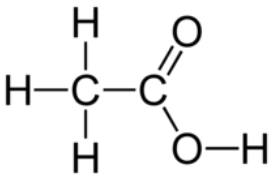
(a)



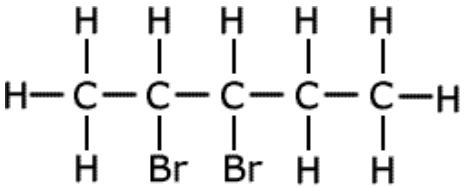
(b)



(c)



(d)



3. Table salt is mainly sodium chloride. Low salt is sold as a healthier alternative. It contains:

60% potassium chloride
35% sodium chloride
5% magnesium carbonate

(a) What elements are present in sodium chloride?
(b) What elements are present in magnesium carbonate?
(c) Draw a bar chart to show the composition of Low salt.

Formulae 2 (collect graph paper) 6

1. What is the formula of the following compounds?

(a) Carbon monoxide
(b) Carbon dioxide
(c) Phosphorous pentachloride
(d) Nitrogen dioxide
(e) Nitrogen monoxide
(d) Carbon tetrachloride
(f) Sulfur dioxide
(h) Sulfur trioxide

2. Joe analysed the waste produced from his house over one month. He found that 14% was glass. This was more than double the metal which only accounted for 6% of the rubbish. Plastic took up 21% which was lees that the figure for paper at 28%.
Surprisingly food waste took up 31% of all the rubbish.

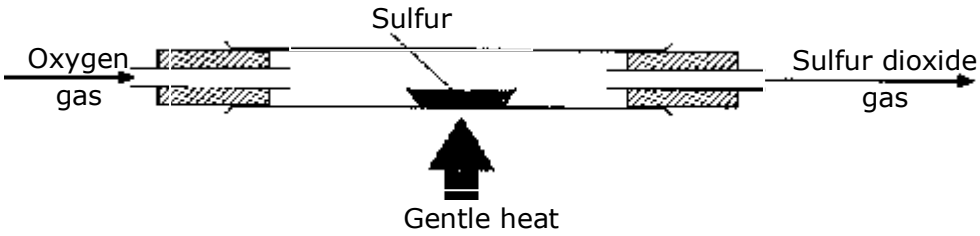
(a) Present this information in a table.
(b) Use this information to construct a bar chart.

3. Blood pressure measures how hard the heart is working to pump blood round the body. Blood pressure stays at a steady level while resting. During exercise, blood pressure increases. Anger, excitement, and stress cause the body to produce a chemical called adrenaline. This also raises blood pressure. Hypertension is when a person's resting blood pressure is higher than normal. This means that the heart is working harder than it should. This can lead to the person having a heart attack. Hypertension can also lead to a stroke. This is when a blood vessel in the brain bursts under pressure.

(a) Name the chemical released into the body when a person is angry.
(b) What is hypertension?
(c) What happens in the brain when a person has a stroke?

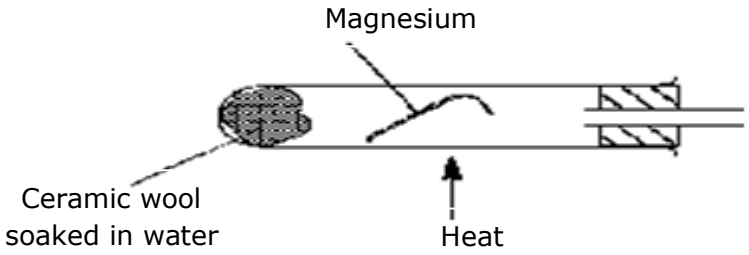
Word Equations 7

1. The non-metal sulfur reacts with oxygen to produce sulfur dioxide.



(a) Write a word equation for the reaction between sulfur and oxygen.
(b) What is the formula of sulfur dioxide?

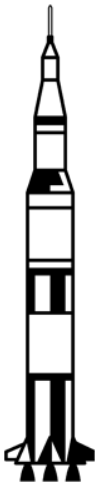
2. Magnesium reacts with steam to make magnesium oxide and hydrogen.



(a) Write a word equation for the reaction between magnesium and steam.
(b) What elements are present in magnesium oxide?

3. Natural gas in mainly methane. When it is burned in gas *fires it reacts with oxygen and produces steam and* carbon dioxide.

(a) Name the elements which are present in carbon dioxide.(b) Write a word equation for the reaction which occurs when methane burns.

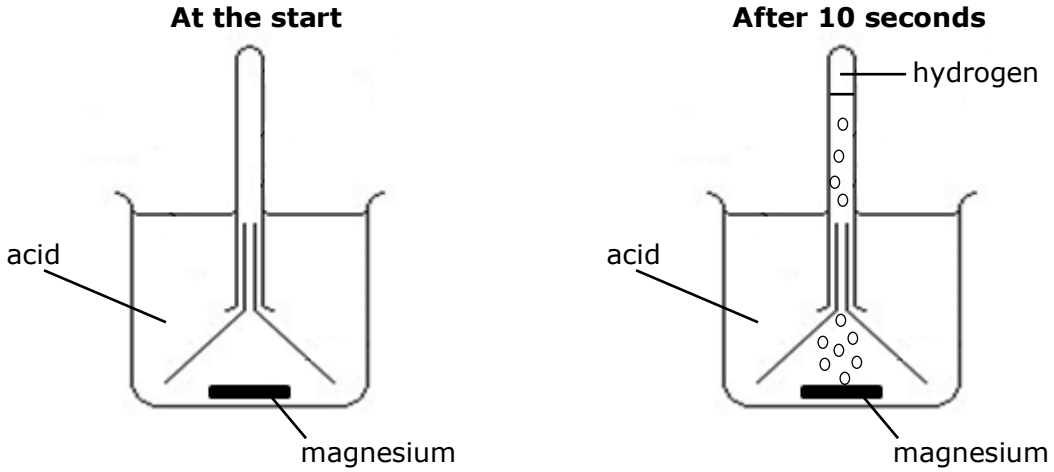


4. During the Apollo 13 space flight, the astronauts discovered that the level of carbon dioxide in the spacecraft was increasing. They used lithium hydroxide which reacts with carbon dioxide. The products of the reaction were lithium carbonate and water.

(a) What elements are present in lithium carbonate?
(b) Write a word equation for the reaction which occurs between lithium hydroxide and carbon dioxide.

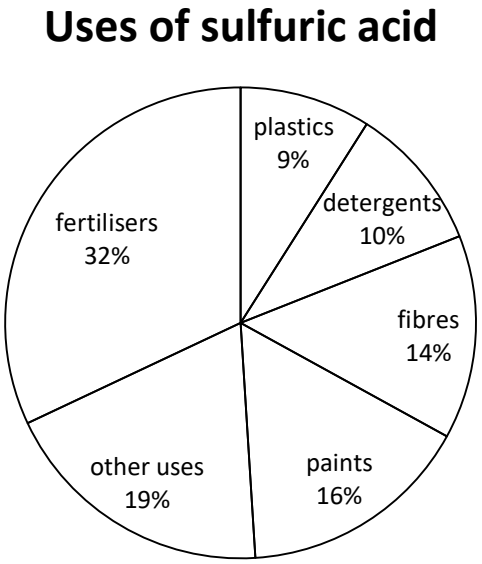
Reactions (collect graph paper) 8

1. Carol was studying the reaction between magnesium and acid. She used the apparatus shown below. After a few seconds bubbles of gas were seen to rise from the magnesium. This gas was hydrogen. The temperature of the acid increased.



Give two pieces of evidence which indicated that a reaction had occurred

2. The pie chart below shows the uses of sulfuric acid.

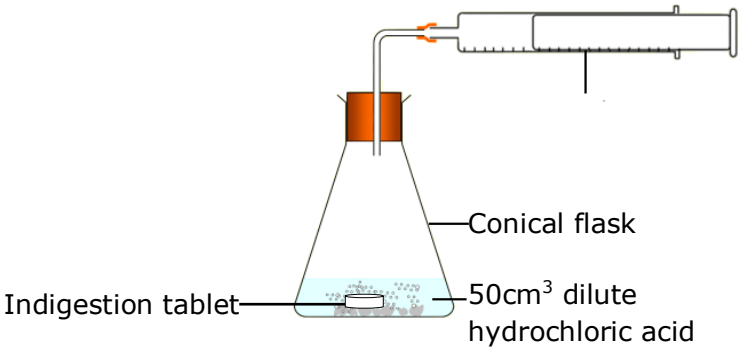


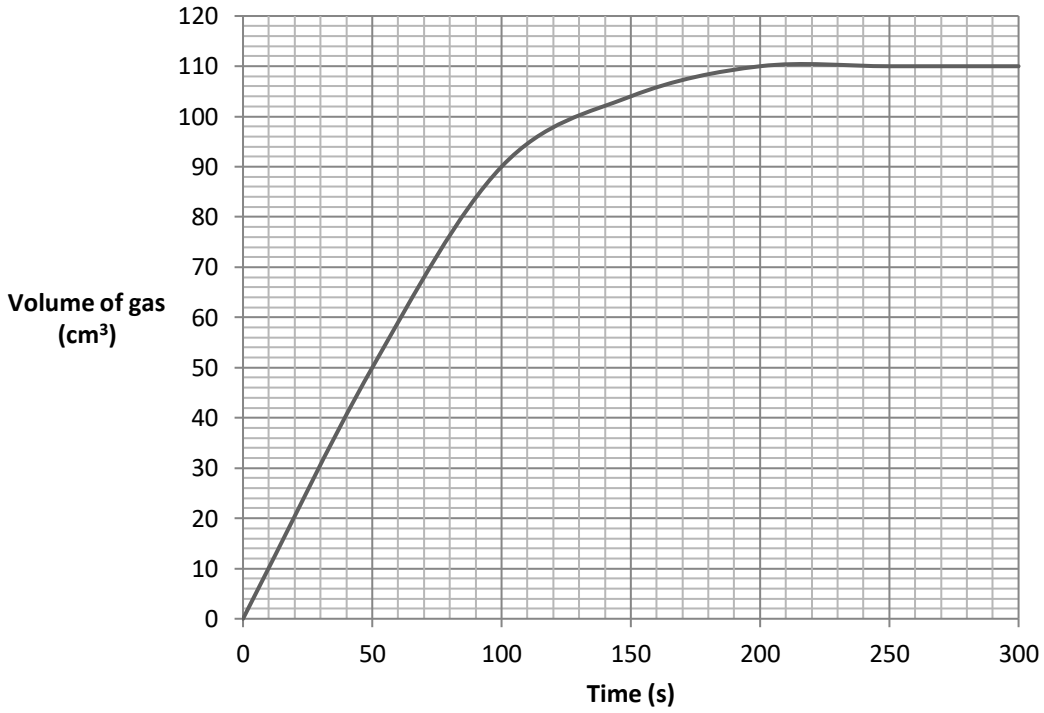
(a) Present this information in a bar chart.

(b) Present this information in a table with suitable headings.

Speed of reaction 1 9

1. Anna added an indigestion tablet to same acid and found that carbon dioxide gas was made. She carried out the experiment in the apparatus shown below.





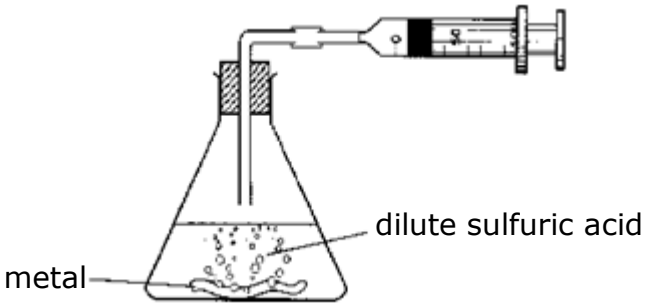
(a) How long did it take to produce 80cm^3 of gas?
(b) What volume of gas was produced after 50 seconds?
(c) What was the final volume of gas made in the experiment?
(d) Anna then repeated the experiment with a different tablet. Name **two** variables she would have to keep the same so that the experiment would be fair.

2. Steel for different uses can be made by adding different metals to iron. Titanium is added to make steel suitable for use in rockets. Magnets are made from a steel which contains cobalt. The steel for railway lines is made by adding manganese to the iron. Drill bits require very hard steel. This is made by adding tungsten to the iron.

Present this information in a table with suitable headings.

Speed of Reaction 2 (collect graph paper) 10

1. Fiona was investigating the reaction of two different metals with sulfuric acid.
She changed the concentration of the acid and timed how long it took for each metal to produce $10cm^3$ of hydrogen gas.



Concentration of acid (moles per litre)	Time taken to produce $10cm^3$ of gas (seconds)	
	Metal A	**Metal B**
1	62 secs	87 secs
2	27 secs	41 secs

(a) Which metal **A** or **B** is more reactive? Explain your answer.
(b) Name a variable which Fiona would have had to keep constant.
(c) Suggest how long metal **A** would take to react with 1.5 mole per litre

2. Chlorine is used to make a wide range of chemicals.
More chlorine (27%) is used to make PVC than for any other use.
Solvents for dry cleaning and paints require 16% of the chlorine produced.
17% of chlorine is used to make aerosol propellants.
Chemical reactions such as making bleach account for 14% of the chlorine made. Other uses, including the making of disinfectants, anaesthetics, and insecticides use 26%.

(a) Present this information in a table with **two** headings.
(b) Present this information in a bar chart.

3. Jemima tested the pH of some everyday chemical using universal indicator.
Here is her report. I tested lemon juice and it had a pH of 2. Mineral water had a pH of 5. Coca cola had a pH of 3 which was much lower that oven cleaner which has a pH of 14. Detergent had a pH of 4 and dish washing powder a pH of 12.
Draw a table to show Jemima's results.

Gases 11

1. A Scientist has 2 test tubes filled with gases marked A, and B. She tests the gases and finds the results shown below. Use her results to identify the gas in each test tube.

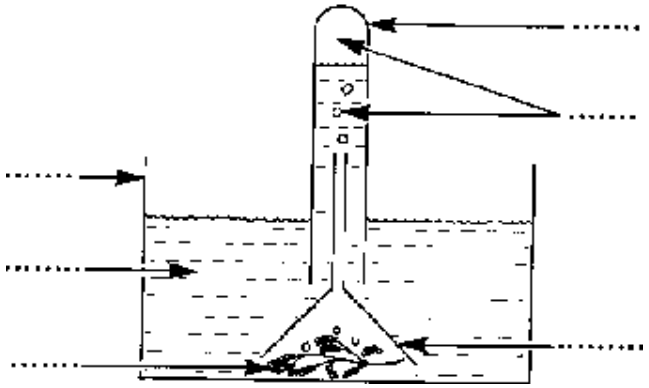
Tube A the gas in tube A puts out a burning splint and turns lime water milky.

Tube B the gas in tube C makes a burning splint burn brighter.

2. What are the formulae of the following gases?

(a) Oxygen (b) Carbon dioxide (c) Nitrogen (d) Argon

3. **Oxygen** gas can be collected from **pondweed.** This is done by putting pondweed in some **water** in a **beaker** and placing a **funnel** over it. A **test-tube** full of water is then placed over the funnel. As the oxygen collects in the test-tube, it pushes the water out.
Use the information **in the passage** to copy and label the diagram below.

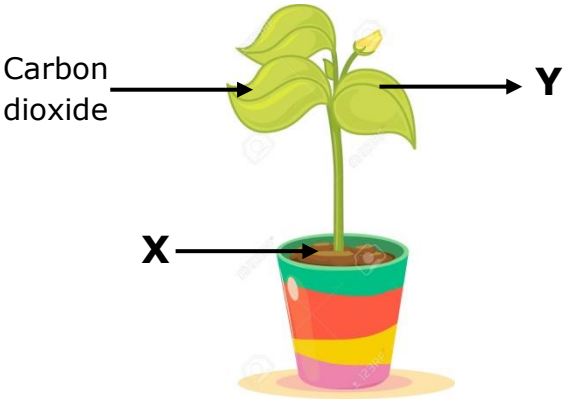


4. Nature turns plants into fossil fuels using heat and pressure in the absence of air. By turning cellulose from household and agricultural waste into oil, scientists can do in minutes what took nature millions of years. The result is a high quality oil. The process is not economical as a source of fuel, but it could be used to get rid of the increasingly large amounts of household waste which contain cellulose. Also, as the oil produced does not contain sulfur, it does not produce acid rain when burned. As well as household waste, the process can use the residue from sugar beet and grape harvesting. Recent experiments have shown that the oil can be processed to provide a substitute for petrol.

(a) What must not be present when plants are changed into fossil fuel?
(b) Give one disadvantage of the process for changing cellulose from waste into oil.

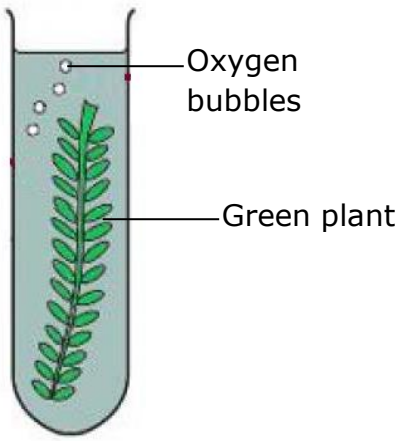
Photosynthesis 12

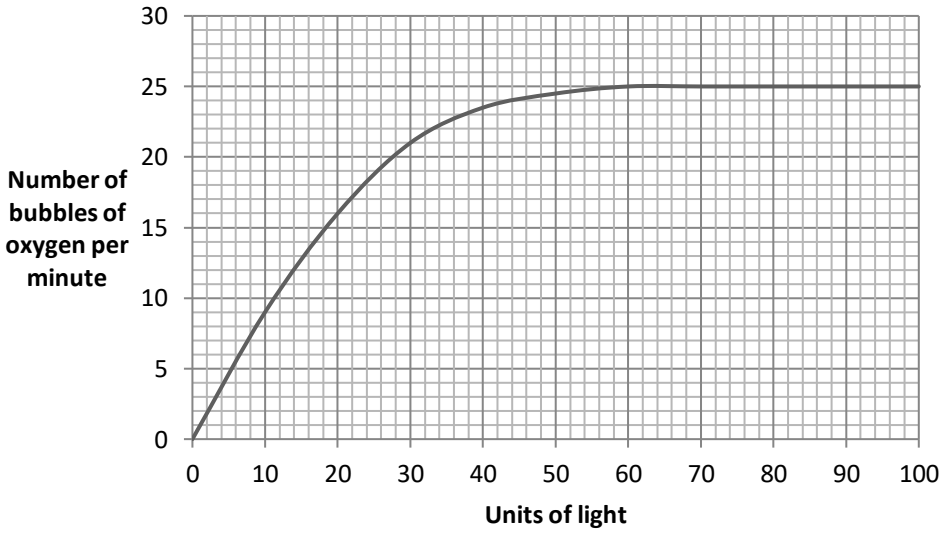
1. Here is a diagram showing an important process by which plants build up carbohydrates and produce a gas, **Y.**



(a) What is this process called?
(b) What type of energy is used up in this reaction?
(c) What are the substances X, and Y?
(d) What name is given to the green substance in this reaction?
(e) What is the purpose of the green substance in the above reaction?
(f) Write a word equation for the reaction.

2. The apparatus below was used to find out about the effect of light on oxygen production in green plants.
The number of bubbles of oxygen given off per minute by the green plant at different light intensities was recorded. The results are shown in the graph.





(a) How many bubbles of oxygen were released per minute when 25 units of light were shone on the plant?

(b) Describe fully what the graph tells us about the effect of light on oxygen production in green plants.

Respiration 13

1. We need food as a source of energy.

(a) Give **two** uses for the energy which we obtain from our food.
(b) Where does all the energy in our food come from?

2. Glucose is a source of energy. Inside the cells of our bodies glucose can react with oxygen to form carbon dioxide and water. The carbon dioxide is exhaled in our breath.

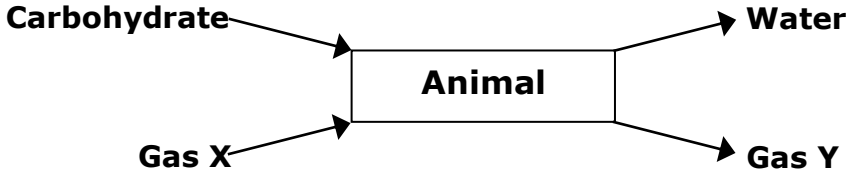
(a) Describe how you would show that our exhaled breath contains carbon dioxide.
(b) What name is given to the reaction between glucose and oxygen?
(c) Write a word equation for respiration.

3. Different foods were burned and the energy given off by each food was used to heat equal volumes of water.
The results of the experiment are shown below.

Food	Mass of food burned in grams	Temperature of water (°C)		Rise in temperature of water (°C) for 1 gram of food burned
		At start	At end	
Nuts	1	20	31	11
Cereal	2	21	30	4.5
Biscuit	3	20	26	2

(a) What was the rise in temperature from burning **one gram** of biscuit?
(b) Which food contains the most energy per gram?

4. Below is a flow scheme showing a vital process which happens in animals.



(a) What name is given to this process?
(b) Name and give a test for gas X
(c) Name and give a test for gas Y
(d) What is the purpose of this reaction in animals?

Gas Balance 14

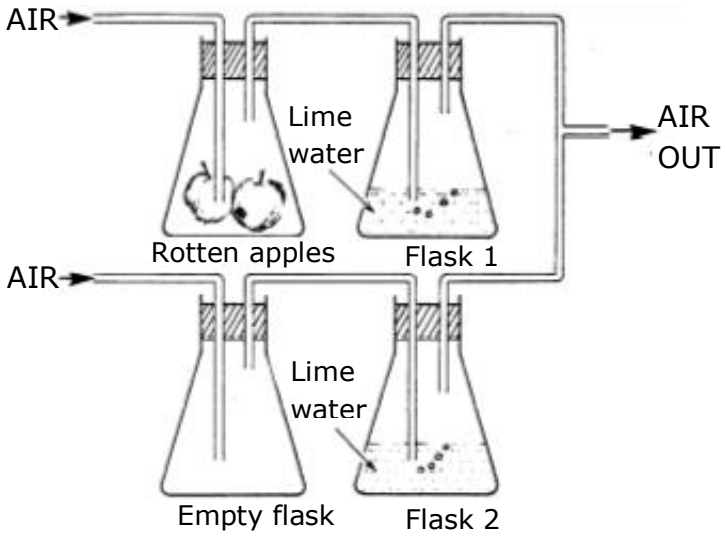
1 Photosynthesis and respiration are opposite processes which help maintain the balance of gases in the air.

(a) Name the gas which is used up in photosynthesis.
(b) Name the gas which is used up in respiration.
(c) Explain what would happen to the amount of carbon dioxide in the atmosphere if less photosynthesis occurred due to clearing of forests.

2. The percentage of carbon dioxide in the air is not constant. Over the last 100 years the amount of carbon dioxide in the air has changed. Some scientists think that this may lead to changes in the world's climate.

(a) What has happened to the amount of carbon dioxide in the air over the last 100 years?
(b) Carbon dioxide is said to be a greenhouse gas. What is meant by the words *greenhouse gas*?

3. John used a pump to suck air through a flask containing some rotting apples. He knew that carbon dioxide turns lime water chalky.



Results of the experiment

Flask 1	**Flask 2**
Limewater turned chalky	No change

(a) What does the experiment tell us about rotting apples?
(b) How did John know that it was not the air which turned the limewater chalky?

Carbohydrates 15

1. Lactose which is a sugar found in milk, was heated with Benedict's solution which then turned a brick red colour.

(a) What was the original colour of the Benedict's solution?
(b) Name a sugar which has no effect on Benedict's solution.
(c) Name another substance which turns Benedict's solution brick red.

2. (a) What is the name of the substance which makes plants green?
(b) What is the purpose of the green substance?
(c) What gas is produced by plants while they are producing carbohydrates?
(d) What is the purpose of carbohydrates in our diet?

3. (a) Which **three** elements are present in carbohydrates?
(b) Three mixtures of different carbohydrates were prepared.

Mixture A contained glucose and starch
Mixture B contained sucrose and starch
Mixture C contained fructose and sucrose

Copy and complete the table below which shows the results of Benedict's and iodine tests carried out on the mixtures.

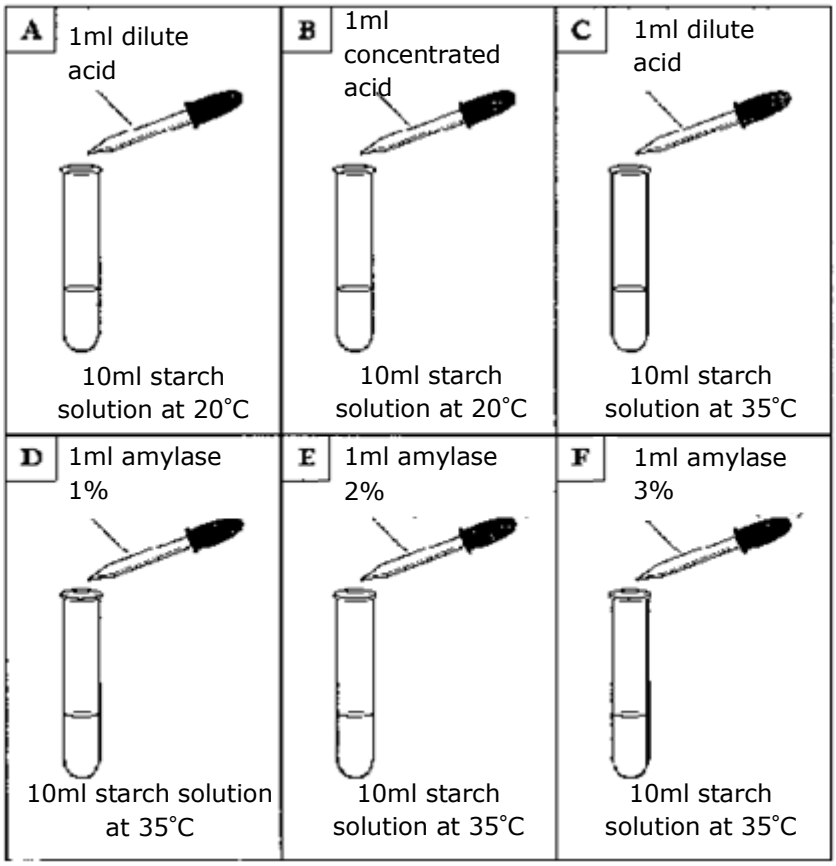
Mixture	Result of Benedict's test	Result of iodine test
A		
B		
C		

4. Food is made up of carbohydrate, protein and fat. The function of carbohydrate and fat is to provide energy for the body. This energy is measured in kilojoules (kJ). One gram of carbohydrate provides 16 kJ of energy while one gram of fat provides 37 kJ of energy.
Protein is required for growth and repair of body cells and one gram can produce 17 kJ of energy.

Present this information in a table with 3 suitable headings.

Digestion 16

1. Carol and Jim were investigating different substances which break down starch. They set up the following experiments.



(a) Which **two** experiments would they compare to find the effect of temperature on the breakdown of starch?

(b) Carol looked at the results of experiments D and F. What was she trying to find out?

2. Starch is a large molecule made of many sugar molecules joined together.
In our bodies a substance called amylase helps break down the starch into sugars.

(a) What name is given to substances like amylase which speed up reactions in our bodies?

(b) What is the best temperature for analyse to work at?

3. When a sample of starch is heated with hydrochloric acid for 30 minutes all of the starch is broken down into sugars. The same process happens in our bodies.

(a) How would you show that no starch remained in the mixture?

(b) Where in our bodies is acid used for digestion?

Hydrogen 17

1. Hydrogen was used in the past as a gas for airships.

(a) Why was hydrogen a good gas to use for this job?

(b) Why is hydrogen no longer used in airships?

(c) What gas is used now for filling airships?

(d) What is the chemical formula of hydrogen?

2. When hydrogen burns in air it turns into a clear liquid.

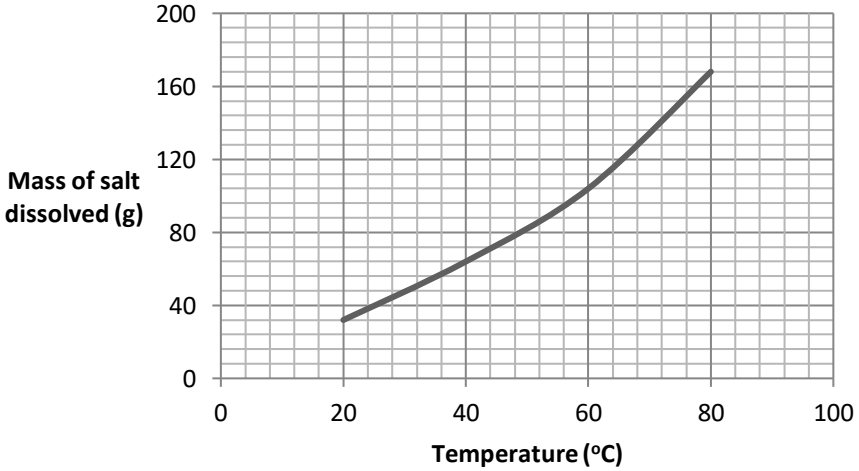
(a) What are the freezing and boiling points of this liquid?

(b) Give the common name and chemical name for this liquid.

(c) What is the chemical formula of this liquid?

(d) Write a word equation for the burning of hydrogen.

3. Naheed and Sonya measured the mass of salt which would dissolve in 100 cm^3 of water at 20^{o}C. They repeated the experiment at different temperatures. Here is a graph of their results.



(a) What conclusion can you draw from these results?
(b) What is the mass of salt which dissolves in 100cm^3 of water at 50^{o}C?
(c) What mass of salt would you expect to dissolve in 200cm^3 of water 50^{o}C?

pH of Acids (collect graph paper) 18

1. Jean measured the pH of lemon juice. She found that it had a pH of 4. She then diluted the lemon juice with some water.

(a) What does the pH tell us about the lemon juice?
(b) What would happen to the pH when the lemon juice was diluted?

2. Tap water has a pH of 5.6, toothpaste has a pH of 10.2 and pure water has a pH of 7.Orange juice has a pH of 3.9, whilst the pH of wine is 5.6. Indigestion tablets have a pH of 9.8, which is lower than the pH of oven cleaner which can be as high as 14.

(a) Use this information to present the information in a table with **two** headings.
(b) Draw a bar chart to represent this information.

3. Nimran measured the pH of three liquids, lemonade, beer and coffee. Her results are shown below.

lemonade pH 5.7

beer pH 4.9

coffee pH 4.1

(a) Which is the most acidic substance?
(b) Which is the least acidic substance?

4. The diagram below gives information about the lifetimes of wooden fence posts. Each fence post has been treated with a different preservative.

Propreserve	Paraffin	Copperkil	Creosote
lasts 16 years	lasts 7 years	lasts 15 years	lasts 10 years

Present this information in a table with **two** headings

pH of alkalis 19

1. Joe was investigating the pH solutions of different alkalis.

(a) Describe three things he could have used to measure the pH of each solution.
(b) What would he have been able to say about the pH of all of the alkalis?

2. Mary measured the pH of various substances. She added each substance to some water and measured the pH of the solution. Her results are shown below:

oven cleaner
pH 13.8

soap
pH 9.6

baking soda
pH 10.6

(a) Name **two** things Mary would have to keep the same to make her experiment fair.
(b) Which is the most alkaline substance?
(c) Which is the least alkaline substance?

3. Fred measured the pH of hand cleaner. He found that it had a pH of 10.6.

(a) What does the pH tell us about the hand cleaner?
(b) What would happen to the pH if the hand cleaner was diluted with water?

4. Here is some information about different types of batteries.

Alkaline batteries are used in CD players and have a storage life of five years. Both silver oxide and zinc chloride batteries have a storage life of two years. Silver oxide batteries are used in calculators and zinc chloride batteries are used in torches. Computers have lithium batteries which have a storage life of ten years.

Present the information as a table with three suitable headings.

Common acids 20

1. It is very important in chemistry to know the pH of a substance.

(a) Apart from pH paper name **two** other ways of measuring the pH of a solution.
(b) What colour does pH paper turn in alkaline solutions?
(c) What can you say about the pH of alkalis?
(d) What colour does pH paper turn in acidic solutions?
(e) What can you say about the pH of acidic solutions?
(f) What is the pH of neutral solutions?

2. A chemistry laboratory contains many different acids and alkalis.

(a) Name three acids present in a chemistry laboratory.
(b) Name three alkalis present in a chemistry laboratory.

3. Many common substances are acidic or alkaline.

Soap

Soda water

Vinegar

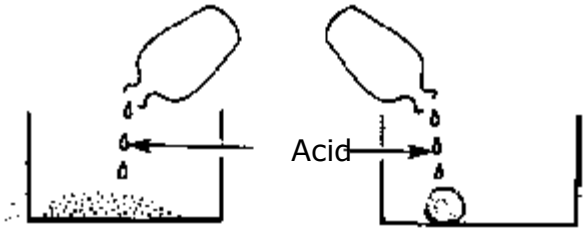
Oven cleaner

Coke

Bleach

(a) Which of the above substances are acidic?
(b) Which of the above substances are alkaline?

4. Jack thinks that chalk **powder** will react with acid faster than a **lump** of chalk. He decides to carry out an experiment to compare the two. In his experiment he will add acid to chalk powder in a beaker to see how fast it reacts. He will then repeat this using a lump of chalk.



Chalk powder Lump of chalk

State **two** things He would have to keep the same to make the experiment fair.

Neutralisation 21

1. Bob was stung by a bee. Bee stings have a pH of 2.1. Bee stings can be treated with alkalis.

(a) What does the pH tell us about a bee sting?
(b) What type of reaction occurs when an alkali is added to a bee sting?

2. Jean finds that the plant she is growing will grow best in a soil of pH 8. She measures the pH of the soil the plant is in and finds that it is 5.

(a) Does the plant grow best in acidic, neutral, or alkaline soil?
(b) What type of chemical should Jean add to the soil to help the plant to grow?

3. Toothpastes are all alkaline

(a) Suggest a possible value for the pH of toothpaste.
(b) Suggest why toothpastes are all alkaline.

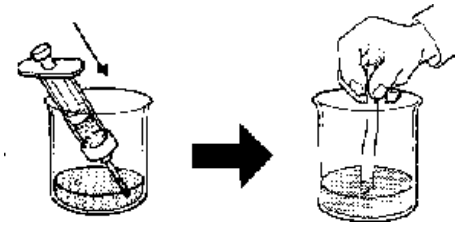
4. Name the **two** substances made in each of the following reactions.

(a) sodium hydroxide and sulfuric acid
(b) calcium hydroxide and hydrochloric acid
(c) potassium hydroxide and nitric acid

5. Write word equations for the following reactions

(a) sodium hydroxide and hydrochloric acid
(b) calcium hydroxide and nitric acid
(c) potassium hydroxide and sulfuric acid

6. Laura puts some hydrochloric acid into a beaker and measures its pH.



She then adds some alkali until she has neutralised the acid.

(a) Suggest a value for the pH of hydrochloric acid.
(b) Name an alkali which could be used to neutralise the acid.
(c) What happens to the pH value of the acid when it is neutralised?

Carbonates and acids 22

1. Copper sulfate can be made by adding a carbonate to an acid. This reaction also makes a gas and water.

(a) Name the type of reaction which takes place.
(b) Name the carbonate which would be used in the above reaction.
(c) Name the acid which would be used in the above reaction.
(d) Name the gas produced in the above reaction.

2. Name the **three** substances made in each of the following reactions.

(a) calcium carbonate and sulfuric acid
(b) sodium carbonate and hydrochloric acid
(c) potassium carbonate and nitric acid

3. Write word equations for each of the following reactions.

(a) calcium carbonate and hydrochloric acid
(b) sodium carbonate and nitric acid
(c) potassium carbonate and sulfuric acid

4. Neutralisation is very useful. Our stomachs contain acid. If we have too much acid we can suffer from acid indigestion.
Indigestion tablets contain substances which can neutralise the acid and so stop the indigestion.

(a) What type of substance do you think is present indigestion tablets?
(b) Suggest a likely pH for the liquid in our stomachs.
(c) What happens to the pH of the liquid in our stomachs when we take indigestion tablets?

Acid rain (collect graph paper) 23

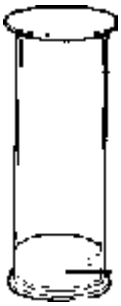
1. John carried out the experiment below.

Step one

He set some sulfur on fire

Step two

He put the burning sulfur into a jar with water and universal indicator



Step three

He removed the burning spoon, covered the jar and gave it a shake

(a) What was the original colour of the universal indicator?
(b) Which chemical was made when the sulfur was burned?
(c) What colour did the universal indicator turn?

2. The burning of fossil fuels in power stations produces two acidic gases which can lead to the formation of acid rain.

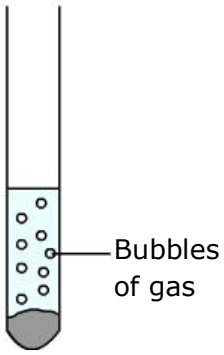
(a) Name the **two** acidic gases produced by the burning of fossil fuels.
(b) Name **two** effects of acid rain.

3. Tap water has a pH of 5.6, milk of magnesia has a pH of 10.2 and pure water has a pH of 7. Orange juice has a pH of 3.4, whilst the pH of vinegar is 2.8. Toothpaste has a pH of 9.8, which is lower than the pH of oven cleaner which can be as high as 14.

(a) Use this information to present the information in a table with **two** headings.
(b) Draw a bar chart to represent this information.

Metals and water 24

1. When a piece of sodium is put into water it reacts to make sodium hydroxide and hydrogen.

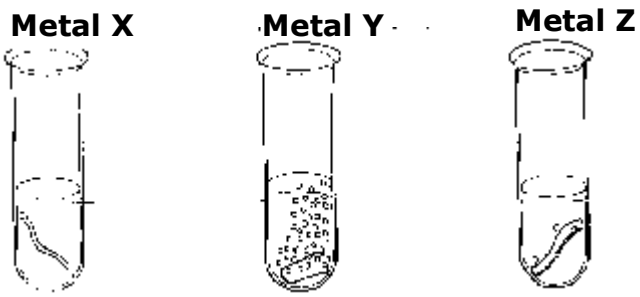


(a) Write a word equation for the reaction.
(b) How would you show that hydrogen is made in the reaction?

2. Write word equations for the following reactions.

(a) Sodium reacting with water
(b) Lithium reacting with water
(c) Potassium reacting with water

3. Look at the diagram below which shows three metals, **X, Y** and **Z** in water.



(a) Which metal gives the fastest reaction?

(b) Which metal gives the slowest reaction?

(c) Which metal does not react with water?

(d) Put the metals in order of reactivity, starting with the most reactive.

4. Hardness is the ability of an object to resist scratching. Scientists have arranged minerals in order of hardness in Mohs' scale. On this scale talc is the softest mineral with a hardness of 1.
Diamond is the hardest at 10. Glass is in the middle of the scale at 5 whilst quartz has a hardness of 7.
Present this information in a table.

Metals and acids 25

1. Lesley was given three metals: **A, B,** & **C**.
She did an experiment to investigate **how reactive** these metals were with acid.
To compare the reactivity of these metals she set up 3 beakers containing dilute sulfuric acid.

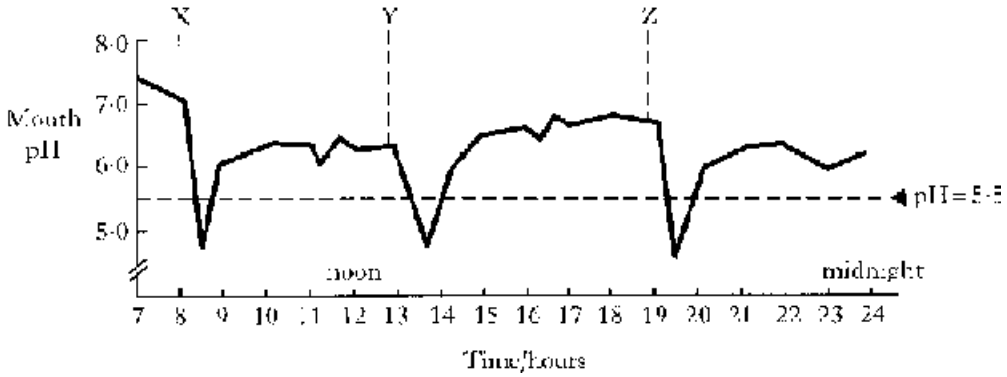
She added the 3 metals as shown in the diagram.

(a) Name, and give the test for the gas made in the experiment.
(b) Use the results of the experiment to put the three metals in order of reactivity, most reactive first.
(c) Name a metal which will not react with sulfuric acid.

2. Give word equations for the following reactions

(a) Magnesium and hydrochloric acid
(b) Calcium and sulfuric acid
(c) Zinc and nitric acid

3. Kirsty eats three meals a day.
The graph shows how her mouth's pH changes during the day. X, Y, and Z are meal times.



Tooth decay occurs if the pH of the mouth falls below 5.5.

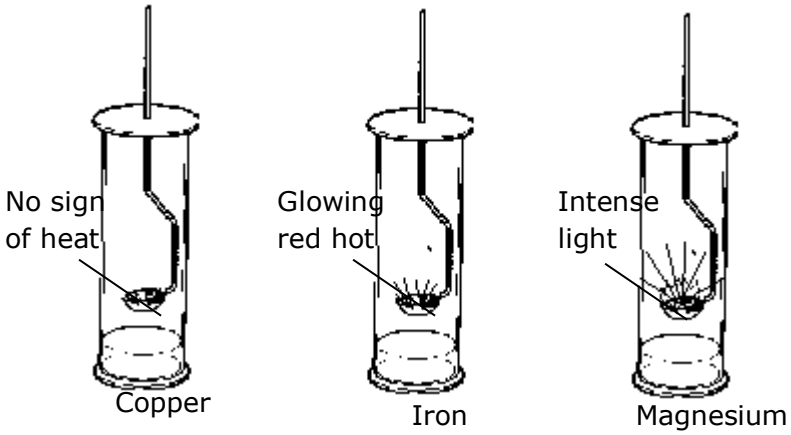
(a) What happens to the pH of the mouth after meals?
(b) Why are most toothpastes alkaline?

Metals and oxygen 26

1. When a piece of iron wool is placed in a Bunsen flame a chemical reaction occurs.
The iron reacts with the oxygen from the air to form iron oxide.
(a) Which elements are present in iron oxide?
(b) Write a word equation for the reaction which occurs when magnesium reacts with oxygen.

2. Silver coins slowly turn black as the silver changes into silver oxide.
(a) Which elements are present in silver oxide?
(b) Write a word equation for the reaction which occurs when silver oxide is made.

3. Jean was investigating the reaction between metals and oxygen. She heated pieces of metals and then put the metal into jars filled with oxygen.
Her results are shown below.



(a) Write a word equation for the reaction which occurs between oxygen and magnesium.
(b) Use the results above to put the three metals in order of reactivity, most reactive first.

4. Here is some information about four alloys.

Alloy A	**Alloy B**	**Alloy C**	**Alloy D**
90% aluminium 10% magnesium	80% aluminium 20% magnesium	70% aluminium 30% magnesium	90% aluminium 10% copper
Strength 340 MN/m^2	**Strength** 405 MN/m^2	**Strength** 420 MN/m^2	**Strength** 320 MN/m^2

(a) Which is more effective at increasing the strength of the alloy, magnesium or copper?
(b) Predict the strength of an alloy containing 85% aluminium and 15% magnesium.