Week 6: Acids and Metals

Lesson 2: Acids Skills Lesson

Complete Starter (in back of class jotter)

Starter

1) Which of the following metals reacts more vigorously with Oxygen: Zinc or Magnesium?
2) Name the compound produced in the following two reactions:
   a) Copper and oxygen
   b) Sodium and oxygen

Learning Outcomes

By the end of this lesson you should be able to:

- Solve problems using knowledge from Chemistry so far
- Draw conclusions from data using information given

Success Criteria

You will have been successful in this lesson if you:

1. Complete questions provided
2. Self-assessed your work so far with the solutions (posted on Wednesdays on the S2 Team)

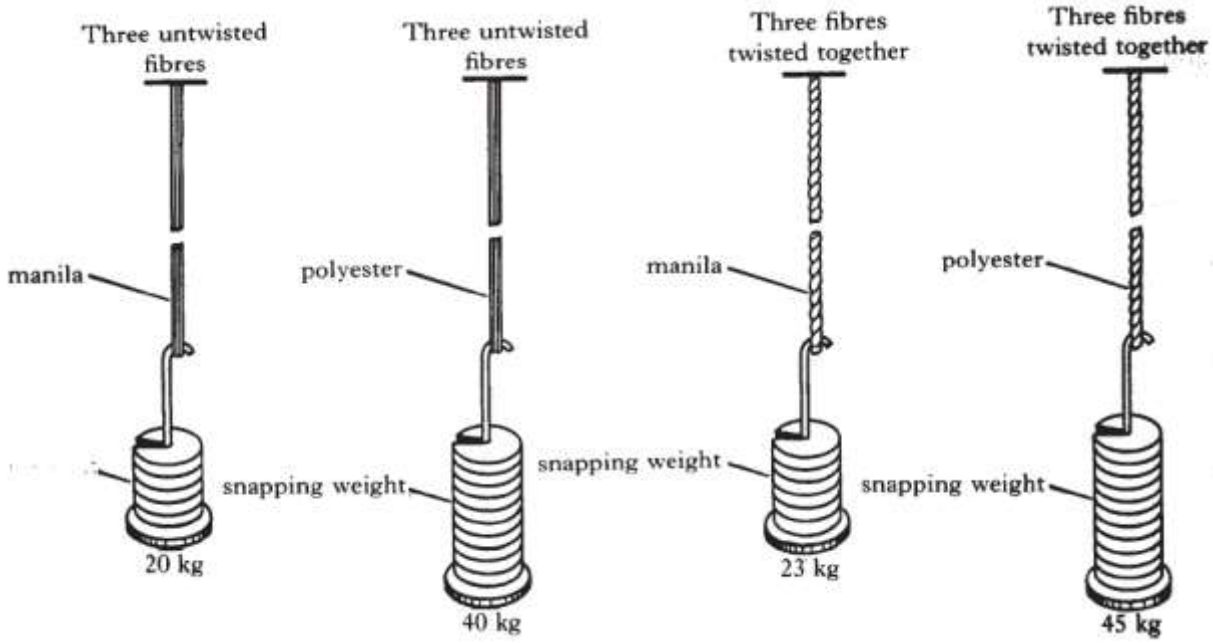
If you have any questions about the content of this lesson, you should ask your **class teacher either through your class MS team or via email**.

What to do

Complete tasks 1-4 – This involves answering questions in your class jotter on Problem Solving, Drawing Conclusions and Reading for Information.
Once completed, Extension activities and the answers to today's starter can be found at the end of the document.

Task 1: Questions to try – Drawing conclusions

1) Charlotte wanted to find out about the strengths of different fibres. She added weights to them until they snapped. All the fibres she used were of the same length and thickness. The snapping weights are shown in the diagram.

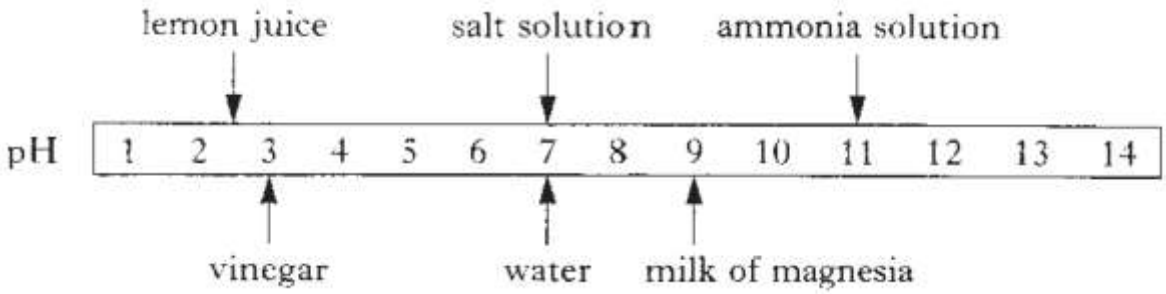


Draw two conclusions from this experiment.

2) The chart below shows the pH values of different substances.

a) Identify the two substances which are acidic.

b) Identify the two substances whose pH will fall when they are diluted with water.



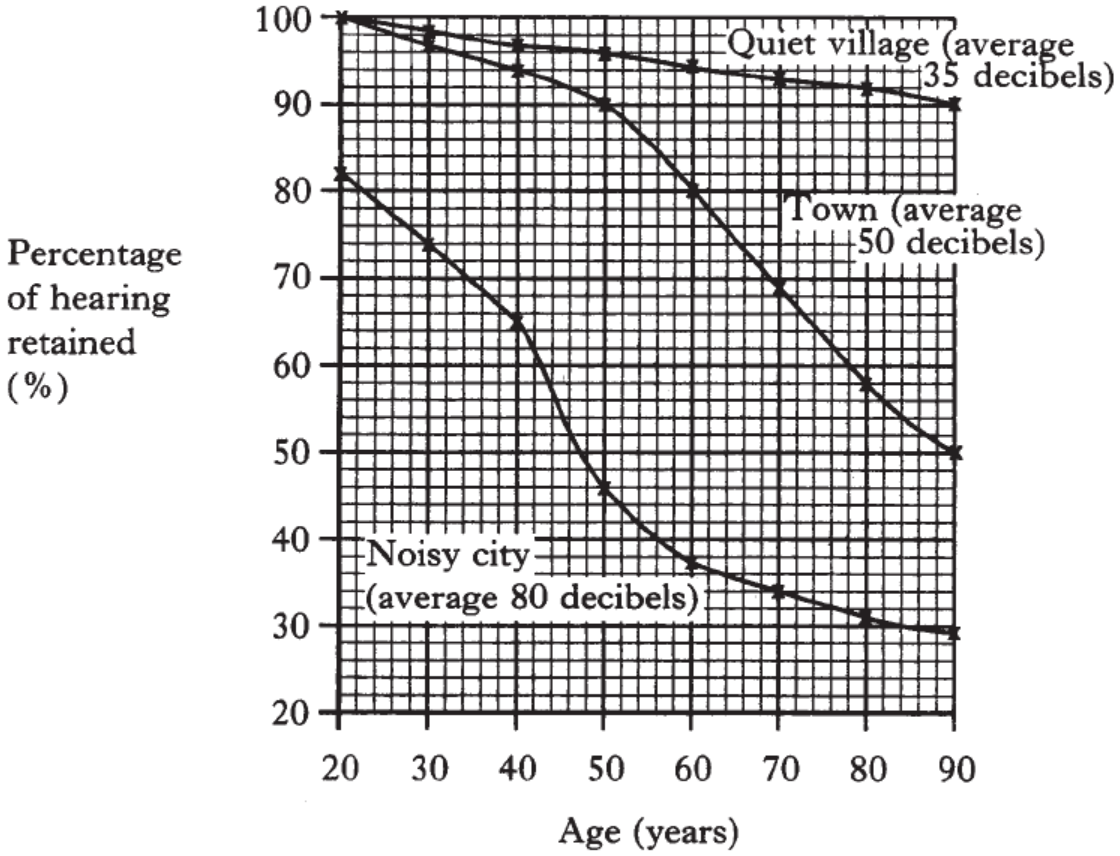
3) Natural dyes from plants can be used to colour cloth. Sometimes a substance is added to help the dye stick to the cloth. This is called a mordant. When a piece of white cotton cloth is added to hot water containing onion skins, the cotton cloth is dyed yellow. Gemma investigated factors which affected the percentage of onion skin dye absorbed by a piece of cotton cloth.

Temperature of water (°C)	**Percentage of dye absorbed by cotton cloth (%)**	
	Onion skins only	**Onion skins and salt**
20	4	5
40	6	10
60	8	15
80	10	20
100	12	25

a) Draw two conclusions from these results.

b) A piece of cotton cloth was dyed using onion skins and salt at 60°C. What would be the percentage of dye left in the water?

4) The graph below shows the effect of noise on the hearing of people of different ages who live in different places.

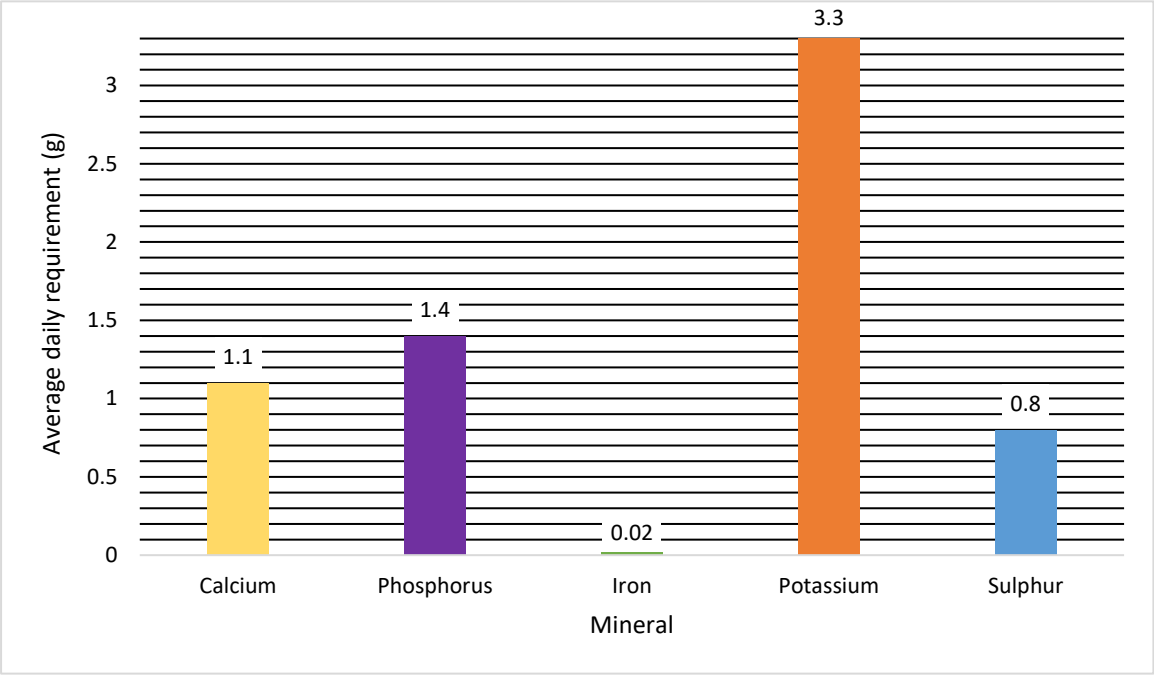


a) What does the graph tell you about the relationship between age and hearing?

b) Draw one other conclusion from this graph.

c) Predict the percentage of hearing retained for a 40 year old person living in surroundings where the average noise level is 60 decibels.

5) Minerals are essential for good health. The bar graph shows the average daily mineral requirements of an adult male. Use the information from the graph and table to answer the questions.



Mineral	Function in body	Main food sources
calcium	healthy bones and teeth	dairy products
phosphorus	energy release in cells	most foods
iron	healthy blood	meat, spinach
potassium	helps nerves to work	meat, fish, eggs

a) Which mineral is needed for energy release in cells?

b) The average daily requirement for one of the minerals is 0.02g.

c) What are the main food sources of this mineral?

d) What is the average daily requirement for the mineral used in making healthy bones and teeth?

Task 2: Questions to try – Reading for Information

1) A healthy, balanced diet should include some fat. Our body uses fat as a source of energy, and stores fat as an insulating layer under the skin. Fat builds up around the major organs, such as the heart and kidneys, to give protection. Fats are also necessary in small quantities for healthy growth and to supply cholesterol. Cholesterol is needed to make many important hormones. In Britain, people get about 42% of their daily energy intake from fat.

   Excess fat in the diet can lead to health problems. Eating too much fat can lead to a fatty layer developing on the inside wall of the arteries. This layer, called an atheroma, builds up over a number of years. It narrows the artery so that blood flow slows down. The heart has to pump harder, leading to high blood pressure which can damage the heart. If a small blood clot forms, it can get stuck in the narrowed arteries. Such blockages are very dangerous, especially when they occur in the blood flow to the brain or the heart.

   This fatty layer contains cholesterol. Many health experts believe that by eating too much animal fat, the cholesterol level in the blood is raised. This increases the risk of heart disease. Foods containing poly-unsaturated fats such as margarine, oily fish and sunflower seed oil, may reduce the level of cholesterol in the body.

   a) Stored fat can be used by the body to supply energy. Give two other uses of stored fats.

   b) Explain why a high-fat diet can lead to high blood pressure.

2) Childhood diseases have no compassion. Diphtheria, Measles, Mumps, Rubella, Tetanus, Polio, and Whooping Cough can attack any child at any time. The effects can be very serious. The invading pathogens, such as bacteria, enter the body and the bloodstream. From where they cause disease. Children can be protected from these diseases.

   The protective treatment helps the body to develop defences against the bacteria or viruses which cause diseases. Special blood cells called lymphocytes produce antibodies which prevent an infection developing. Children should start this programme of protection when they are two months old. The treatment is usually completed by the age of fourteen.

   Name two pathogens mentioned in the passage.

3) Advanced plastic technology is ready to displace wood in a device that has been in use for centuries-the bagpipe reed. Bagpipe reeds, traditionally made from Spanish cane, now face competition from reeds moulded from a plastic called polycarbonate.

   When the piper plays the reed vibrates, setting the pitch. However the wooden reed takes in water and eventually decomposes. It is unstable from day one, as even a small change in temperature will make a wooden reed go off-pitch.

   A researcher started looking for a stable alternative to wood, He experimented for two years, designing moulds, and changing shapes. Now he has invented something that holds its pitch, and has a long life expectancy.

   The plastic reed gives a natural sound in the frequency range 30-10,000Hz. It costs £24, compared with £4 for a wooden reed. A piper might need to buy a dozen wooden reeds, throw some away as unusable, and quickly use up the others. One polycarbonate reed would last for the same length of time.

   List one advantage and one disadvantage of the polycarbonate reed.

4) Read the following passage:

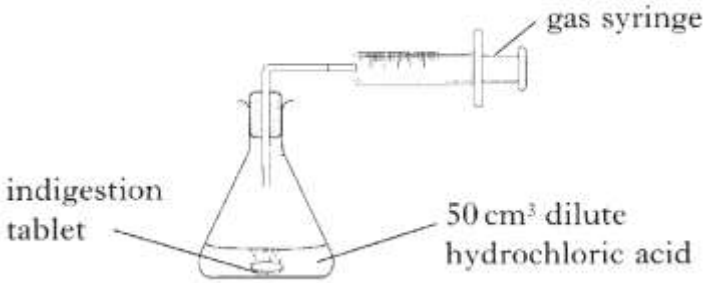
Farmers have always fought a battle against weeds, which compete with the crop plants. Instead of weeding by hand, most farmers now use weed killing chemicals called herbicides.

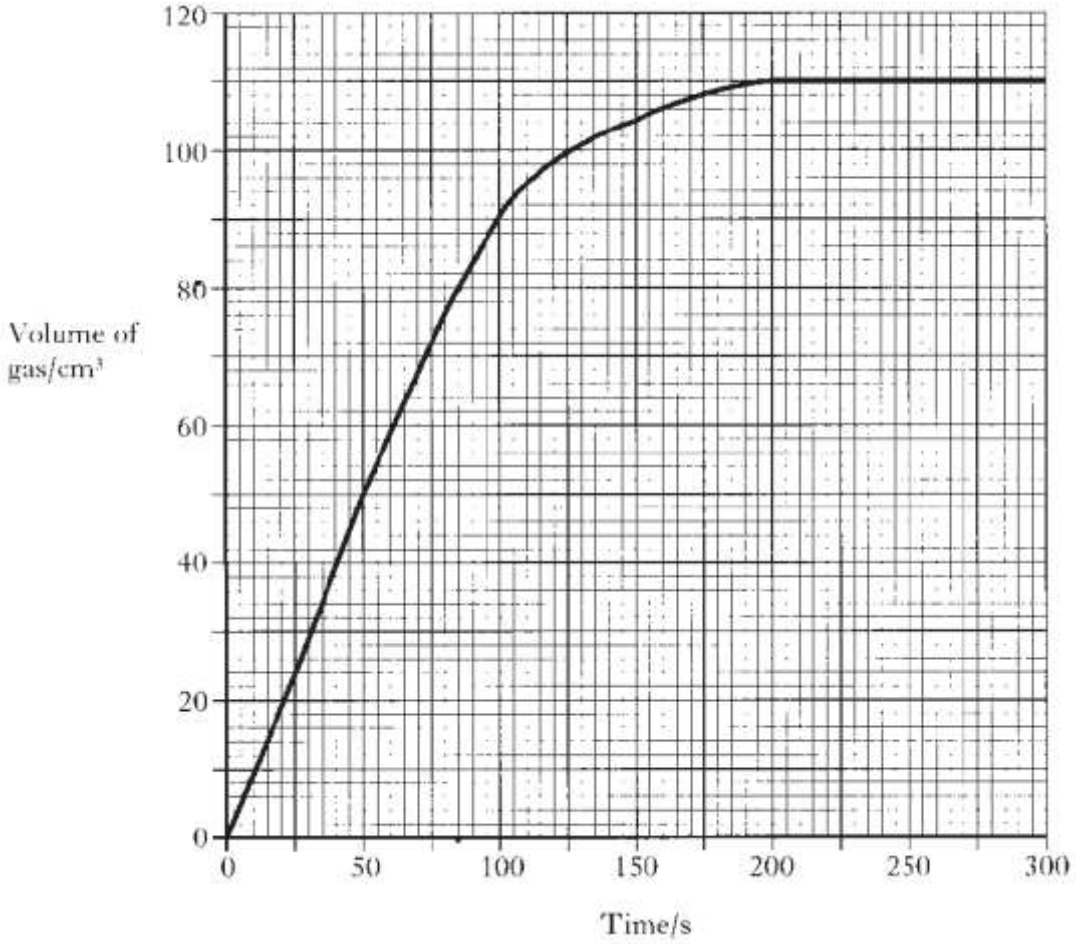
Unfortunately herbicides also kill wild flowers. As a result many wild flowers are extinct or very rare. Herbicides have helped remove weeds and reduce the world food problem. However the absence of the colour and beauty of wildflowers is a great loss to the environment.

Give one advantage and one disadvantage of using herbicides.

Task 3: Questions to try – Problem Solving

1) Anna added an indigestion tablet containing calcium carbonate to some acid and measured the volume of gas given off. The whole tablet was used up in the reaction. Here are her results:





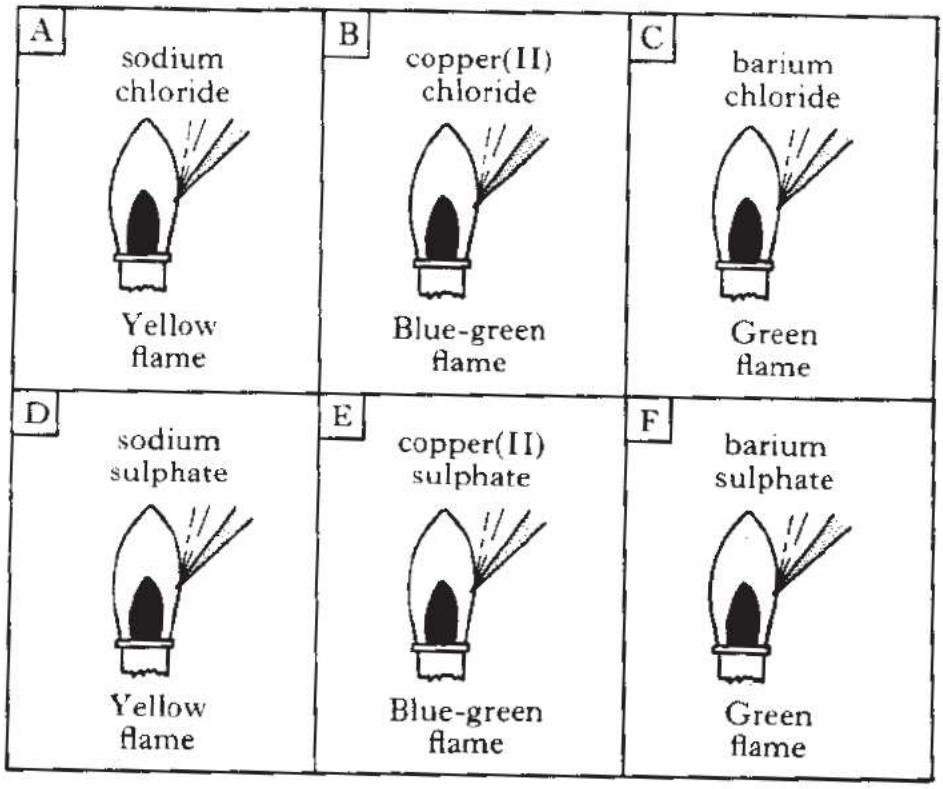
a) How long did it take to produce 80cm^3 of gas?

b) What volume of gas was produced after 50 seconds?

c) What was the final volume of gas produced?

d) What final volume of gas would have been produced if Anna had used half of an indigestion tablet?

2) Salts can give a colour to a Bunsen flame. June used 6 different salts and found out the colours they gave to a Bunsen flame. Her experiments are shown below.



June then made 6 statements, only two of which were correct. Her statements were:

A Copper compounds give red flames.

B All sulphates give green flames.

C All chlorides give green flames

D Sodium compounds give yellow flames.

E Copper ions give blue-green flames

F Chloride ions give yellow flames.

Identify the two statements which were correct.

3) The old names of chemicals are often different from their modern names.

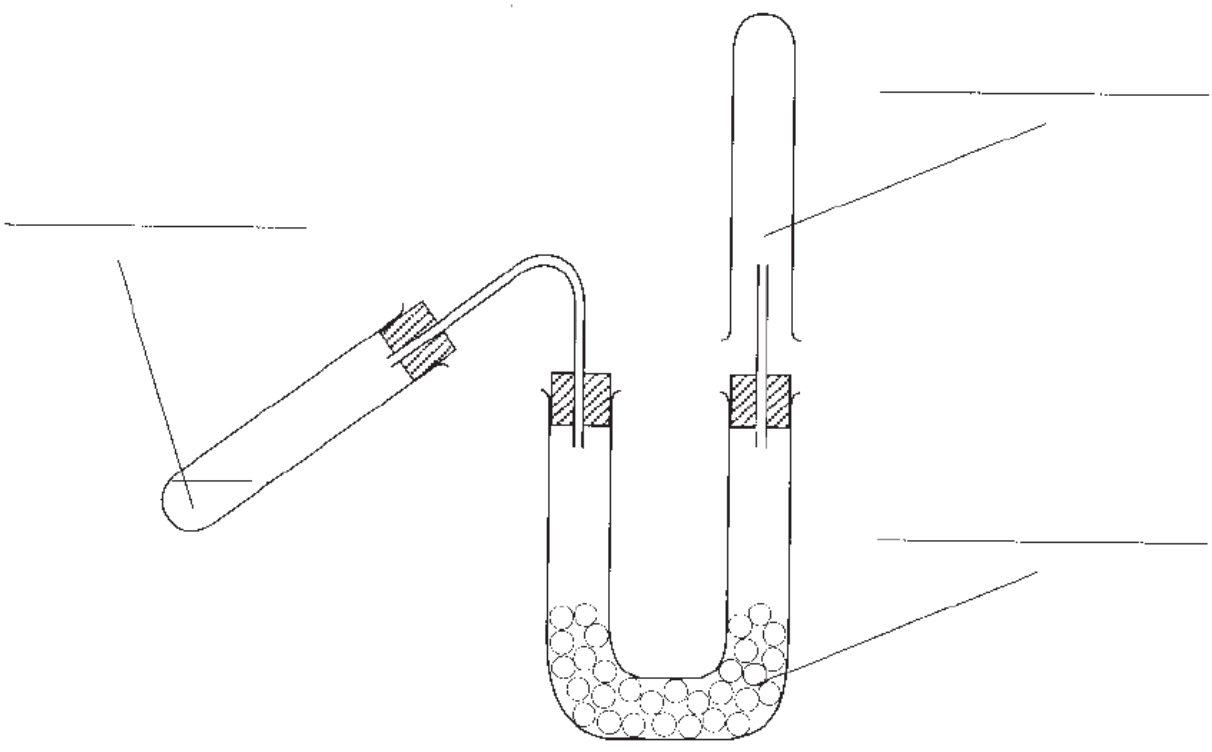
Old Name	Modern Name	Formula
Epsom salts		$MgSO_4$
Blue vitriol	copper sulphate	$CuSO_4$
Green vitriol	iron sulphate	$FeSO_4$

a) What would the modern name for Epsom salts be?

b) What acid would be used to make these salts?

4) Ammonia is an alkaline gas which is made by heating a mixture of ammonium chloride and calcium hydroxide. To dry the ammonia it is passed through lumps of calcium chloride before being collected.

Use this information to copy and label the diagram below.



Remember: All diagrams should be drawn with pencil.

Task 4: Correct today's starter

Starter answers

1) Magnesium reacts more vigorously, a very bright white light is produced during this reaction
2)
   a) Copper oxide
   b) Sodium oxide

Extension activity

Once completed all your Chemistry work, here is a link to look further into the Acids and Metals topic:

Twig – Reactivity Series

- Watch **the experiment video** (10 minutes long)
- Now answer the following questions about the video

1) Why have metals such as gold and silver been used for centuries?
2) Why are the Group 1 metals stored under oil?
3) Which Group 1 metals were used in the experiment?
4) What is the name given to the Group 1 metals?
5) Is Beryllium more or less reactive than Magnesium?
6) What is the test for Hydrogen gas?