1.What is a Chemical Reaction?

Chemical reactions are happening all the time all over the world.

We can recognise if a chemical reaction is taking place by looking for:

1. A change in c _ _ _ _ _
2. H _ _ _ is given out or taken in
3. A g _ _ is given off
4. A s _ _ _ _ forms when two solutions mix

Experiment	Evidence of Chemical Reaction
1. Heating copper carbonate	
2. Adding health salts to water	
3. Adding acid to marble	
4. Mixing cobalt chloride and sodium carbonate solutions	
5. Mixing acid and alkali	

6. Adding ammonium nitrate to water	
7. Adding ammonia to copper sulphate solution	
8. Adding starch to iodine solution	

2. More Chemical Reactions

A change which makes a **new substance** is called a chemical change. We say that a **chemical reaction** has taken place.

Experiment results:

Chemicals	What you see	Chemical reaction? (yes/no)
sulphuric acid + bicarbonate of soda		
water + copper oxide		
sulphuric acid + copper carbonate		
copper sulphate + iron filings		
lead nitrate + potassium iodide		

3. Energy In or Out?

Energy is taken in or given out when a chemical change takes place.

Sometimes we can observe this:

- the temperature may change
- we may see light or hear sound.

Experiment 1

We dissolved c _ _ _ _ _ acid in water and took the temperature. It was _____°C. We then added one spatula of s _ _ _ _ _ b _ _ _ _ _ _ _ _ _ _ at a time. The temperature was measured each time:

Temperature after 1 spatula _____°C.

Temperature after 2 spatulas _____°C.

Temperature after 3 spatulas _____°C.

Temperature after 4 spatulas _____°C.

Temperature after 5 spatulas _____°C.

Conclusion

The temperature went d _ _ _ as more sodium carbonate was added.

Experiment 2

We added 20cm^3 of dilute s _ _ _ _ _ _ _ _ a _ _ _ to a beaker and measured the temperature. It was _____°C.

We then added 5cm^3 of s _ _ _ _ _ h _ _ _ _ _ _ _ _ solution at a time. The temperature was measured each time:

Temperature after 1st addition _____°C.

Temperature after 2nd addition _____°C.

Temperature after 3rd addition _____°C.

Temperature after 4th addition _____°C.

Temperature after 5th addition _____°C.

Temperature after 6th addition _____°C.

Conclusion

The temperature went u _ as more sodium hydroxide solution was added.

Notes

Most chemical reactions g _ _ _ o _ _ energy. They are called e _ _ _ _ _ _ _ _ _ reactions.

Some reactions t _ _ _ i _ energy from the surroundings.

These are called e _ _ _ _ _ _ _ _ _ _ _ reactions

Questions

1. The temperature went d _ _ _ in experiment 1.
2. Experiment 1 was e _ _ _ _ _ _ _ _ _ _ _
3. The temperature went u _ in experiment 2.
4. Experiment 2 was e _ _ _ _ _ _ _ _ _ _

4 Chemical and Physical Changes

When a **chemical** change happens, a new substance is always made.

A **physical** change involves a substance changing physical state. e.g. a solid melts or a gas condenses.

No new substances are formed during a physical change.

Chocolate melting is a p _ _ _ _ _ _ _ change.

Egg cooking is a c _ _ _ _ _ _ _ change.

Experiment	After heating	After cooling	Physical or chemical change?
1. Burning splint			
2. Zinc oxide			
3. Magnesium			

Chemical change	Physical change

5. Acids and Alkalis

Name of Indicator	Colour in acid	Colour in alkali
Litmus Phenolphthalein Methyl orange Bromothymol blue Thymol blue Methyl red Xylene cyanol Congo red		

An i _ _ _ _ _ _ _ _ _ is a chemical which turns one colour when mixed with an a _ _ _ and a different colour when mixed with an a _ _ _ _ _.

6. Making An Indicator

My ideas for what makes a good indicator:

_____

_____

_____

Name of Indicator	Colour in acid	Colour in alkali

Report

We made our own indicators by crushing up plant pieces using a m _ _ _ _ _ and p _ _ _ _ _ . We then added some water and used a d _ _ _ _ _ _ to put some in a test tube. The indicator was tested by adding it to an a _ _ _ and an a _ _ _ _ _ and noting the colour.

The best indicator was _____ because

_____.

Evaluation

Two things I did well today were:

1.

2.

Two things I didn't do well today were:

1.

2.

The two things I am going to improve next time are:

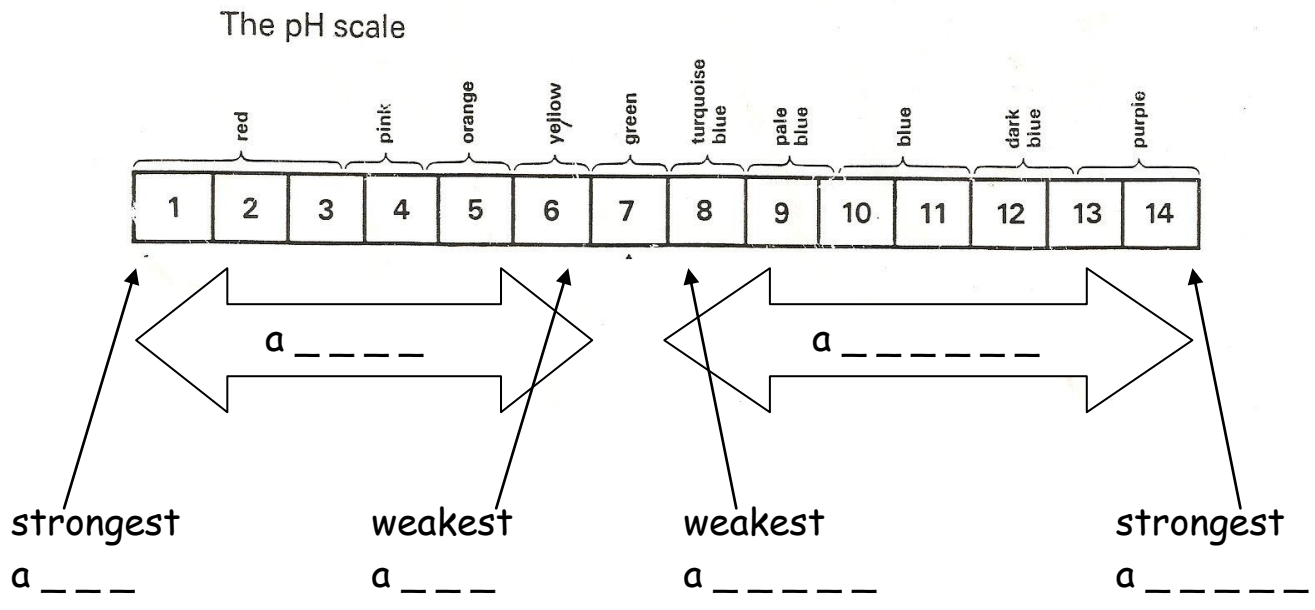
1.

2.

7. The pH Scale

- Universal indicator shows how strong or weak acids and alkalis are.
- pH numbers tell us how strong or weak acids and alkalis are.
- Acids have pH numbers 6 or less
- Alkalis have pH numbers 8 or above.

Household Chemical	Colour of Indicator	pH	Acid / alkali



7. Universal Indicator is a better indicator because it gives a large range of c _ _ _ _ _ _.

8. (a) Two household acids are _____ and _____

   (b) Two household alkalis are _____ and _____

8. Neutralisation

- Neutral solutions can be made by mixing acids and alkalis together.
- Neutral solutions have pH number 7.
- A salt and water is formed in neutralisation reactions.
- Hydrochloric acid produces chloride salts.

Volume of alkali added	0	1	2	3	4	5	6	7	8	9	10
Colour											
pH											

Notes:

When an a _ _ _ reacts with an a _ _ _ _ _ and a n _ _ _ _ _ _ solution is produced we say that **neutralisation** has taken place.

A c _ _ _ _ _ _ _ reaction has occurred which has produced two new chemicals. One of these is water. The other is a **salt**.

acid + alkali ⟶ s _ _ _ + w _ _ _ _

When hydrochloric a _ _ _ is used in a neutralisation experiment the salt formed is a c _ _ _ _ _ _ _.

In this reaction the salt made is called
s _ _ _ _ _ c _ _ _ _ _ _ _ _.
It is common salt used as seasoning on f _ _ _.

In this experiment the word equation is

hydrochloric acid + s _ _ _ _ _ hydroxide ⟶ sodium + water
c _ _ _ _ _ _ _

Different acids and alkalis form different s _ _ _ _.

9.Curing Sourness

Alkalis can be used to neutralise stomach acids.

Sugar will not neutralise acid.

Amount of stomach powder added	Colour	pH
0		
1		
2		
3		
4		
5		

Notes:

1. The pH of the citric acid solution rose to pH _ when stomach powder was added.
2. A g _ _ was also given off when s _ _ _ _ _ _ p _ _ _ _ _ was added to the acid.
3. The pH of stomach powder is pH _ .
4. Stomach powder n _ _ _ _ _ _ _ _ _ _ citric acid.

Amount of stomach powder added	Colour	pH
0		
1		
2		
3		
4		
5		

Notes:

1. The pH of the citric acid s _ _ _ _ _ the s _ _ _
3. The pH of sugar is pH _ .
4. Sugar does not n _ _ _ _ _ _ _ _ _ _ citric acid, it removes the sour taste because sugar tastes s _ _ _ _.

10. A balancing act!

Stomach powders can be used to neutralise stomach acid.

In this lesson you are going to investigate 3 stomach powders and decide which stomach powder is best at neutralising acid.

Results:

Amount of stomach powder A added	Colour	pH
0 1 2 3 etc		

Amount of stomach powder B added	Colour	pH
0 1 2 3		

Amount of stomach powder C added	Colour	pH
0 1 2 3		

The best stomach powder for neutralising stomach acid was __.

11.Salt of the Earth – making a fertiliser.

- Some salts can be used as fertilisers.
- The three main elements in fertilisers are Nitogen (N), Phosphorus (P) and Potassium (K).

In this experiment you are going to make the fertiliser ammonium sulphate. Ammonium sulphate is made by neutralisation.

Report:

1. I put _____ cm^3 of _____ acid into a _____.
2. I added _____ drops _____ _____ to the beaker.
3. Add some ammonium hydroxide to the second beaker.
4. Using the syringe I added ammonium hydroxide ___ cm^3 at time to the sulphuric acid in the beaker.
5. I counted the number of cm^3 I added until the solution turned green.
6. I repeated the experiment by adding 10 cm^3 of sulphuric acid into a beaker and the volume of ammonium hydroxide which had turned the solution pale green.

This is a colourless solution. Neutralisation has taken place and I have a solution of ammonium sulphate.

7. I poured the solution into an evaporating basin.
8. I placed the evaporating basin on top of a beaker which is half full of water and evaporated off the water until crystals form.

9. I left the evaporating basin to cool.

10. I filtered off the crystals.

11. I dried them with a paper towel.

Notes:

The name of the fertiliser I have made is

_____ _____ .

12. Acids and Metals

Metal	Reaction with hydrochloric acid

Metal	Reaction with sulphuric acid

When a METAL reacts with an ACID , a gas is formed.

The gas is HYDROGEN.

METAL + ACID ⟶ SALT + HYDROGEN

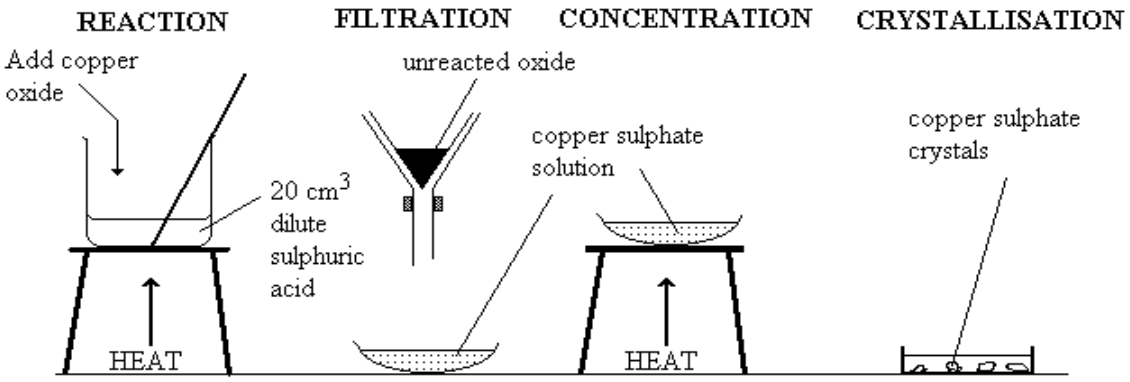
Testing for Hydrogen Gas

Hydrogen gas can be tested for using a burning splint. If hydrogen is present, it will burn with a 'pop'.

Notes

I made some hydrogen gas by reacting together m_ _ _ _ _ _ _ _ and h_ _ _ _ _ _ _ _ _ _ _ _ a _ _ _.

13. Acids and Metal oxides



METAL OXIDE + ACID ⟶ SALT + WATER

Report:

1. I poured ___ cm^3 of s_____ acid into the beaker and heated it.

2. I added copper _____ and stirred.
   I continued until no more dissolved.

3. I filtered my solution into an e_____ dish and e_____ off the water until I had half the original volume.

4. I left the e_____ d____ in a safe place until the next lesson.

Notes

1. The metal oxide which I used was _____ _____ .

2. This oxide contains the metal _____ .

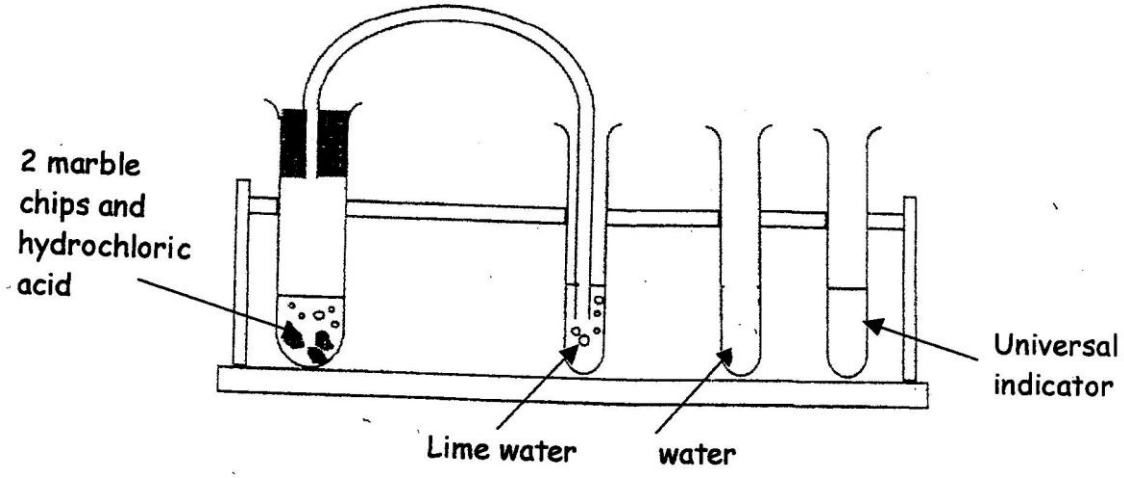
3. The crystals are _ _ _ _ in colour and d _ _ _ _ _ _ shaped.

4. Sulphuric acid makes salts called sulphates.
   The name of the salt you have made is copper sulphate.

   Complete the equation below.

_____ oxide + sulphuric acid ⟶ _____ _____ + water

14. Acids and Metal carbonates



METAL CARBONATE + ACID ⟶ SALT + WATER + CARBON DIOXIDE

Report

I put two ___ _____ into a test tube rack.
I added U _____ I _____ to one test tube and limewater to the other test tube. I also put a test tube of water between the two test tubes for rinsing the delivery tube.

I put 2 _____ _____ in the boiling tube and added $10cm^3$ _____ _____.

I put the stopper in the boiling tube and placed the delivery tube in each test tube until there was a colour change.

Notes

1. The indicator solution turned from g_ _ _ _ to _ _ _ .

2. This tells us that the gas is a_ _ _ _ _ .

3. The limewater solution turns from c_ _ _ _ _ _ _ _ _ _ to c_ _ _ _ _ . This tells us that Carbon Dioxide gas has been formed.

Complete the equation below for the experiment you have just done.

_____ + hydrochloric acid ⟶ calcium chloride + _____ + _____
_____