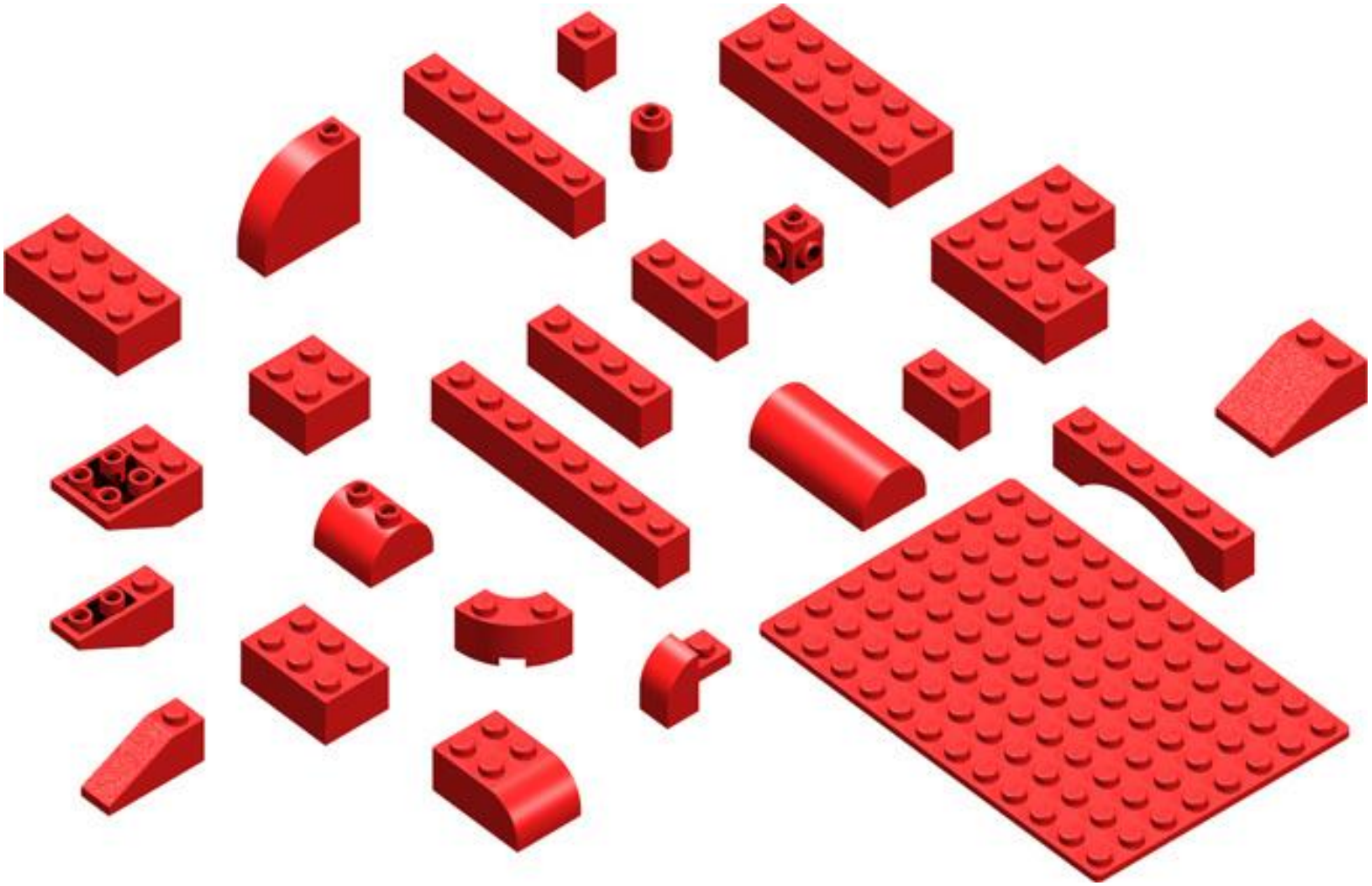
Reakcje chemiczne

Cel –
Wyjaśnić grup chemicznych

Na ile sposobów można uporządkować karty?

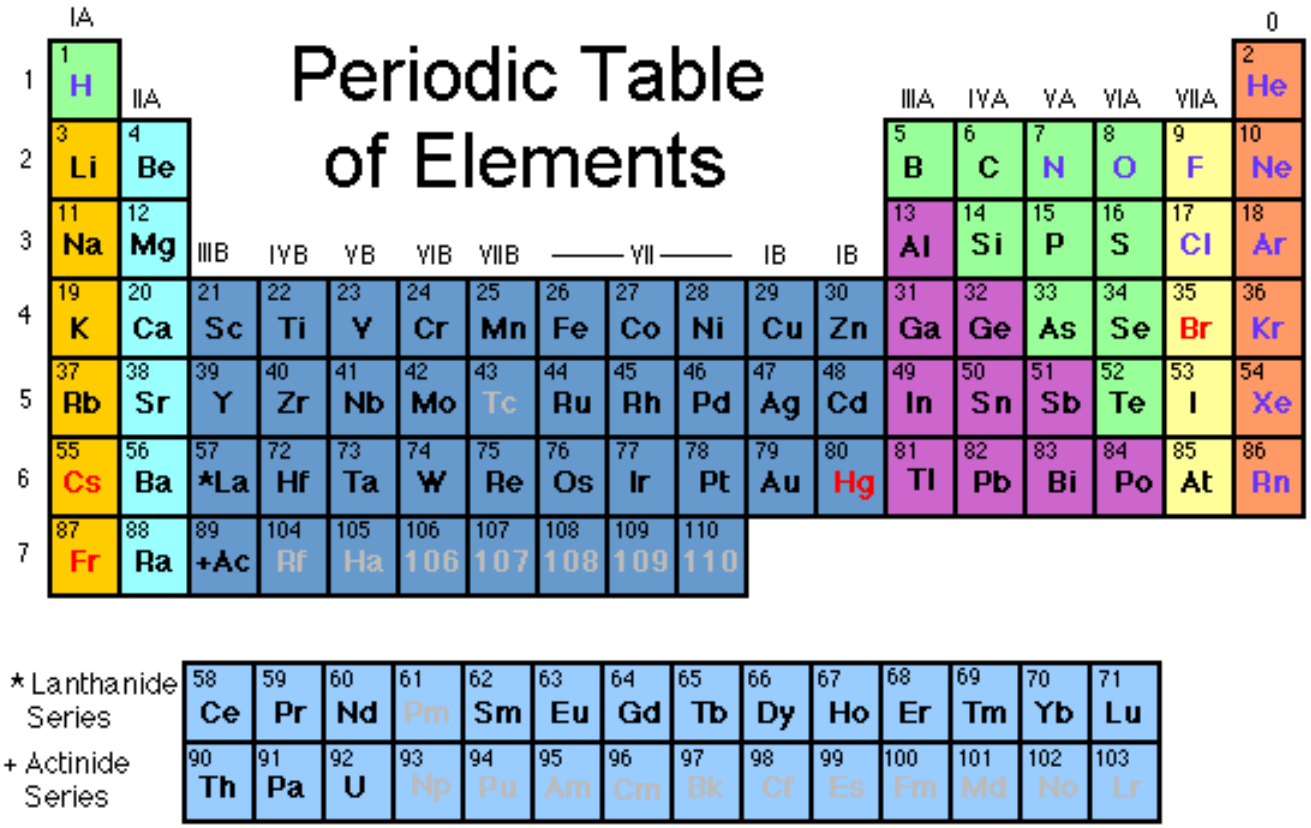
Jeśli pojawi się prośba, aby umieścić sztućce daleko, jak można rozwiązać to w szufladzie?

To jest wieża przy wejściu do ziemi Lego. Co jest wykonana z wieży?

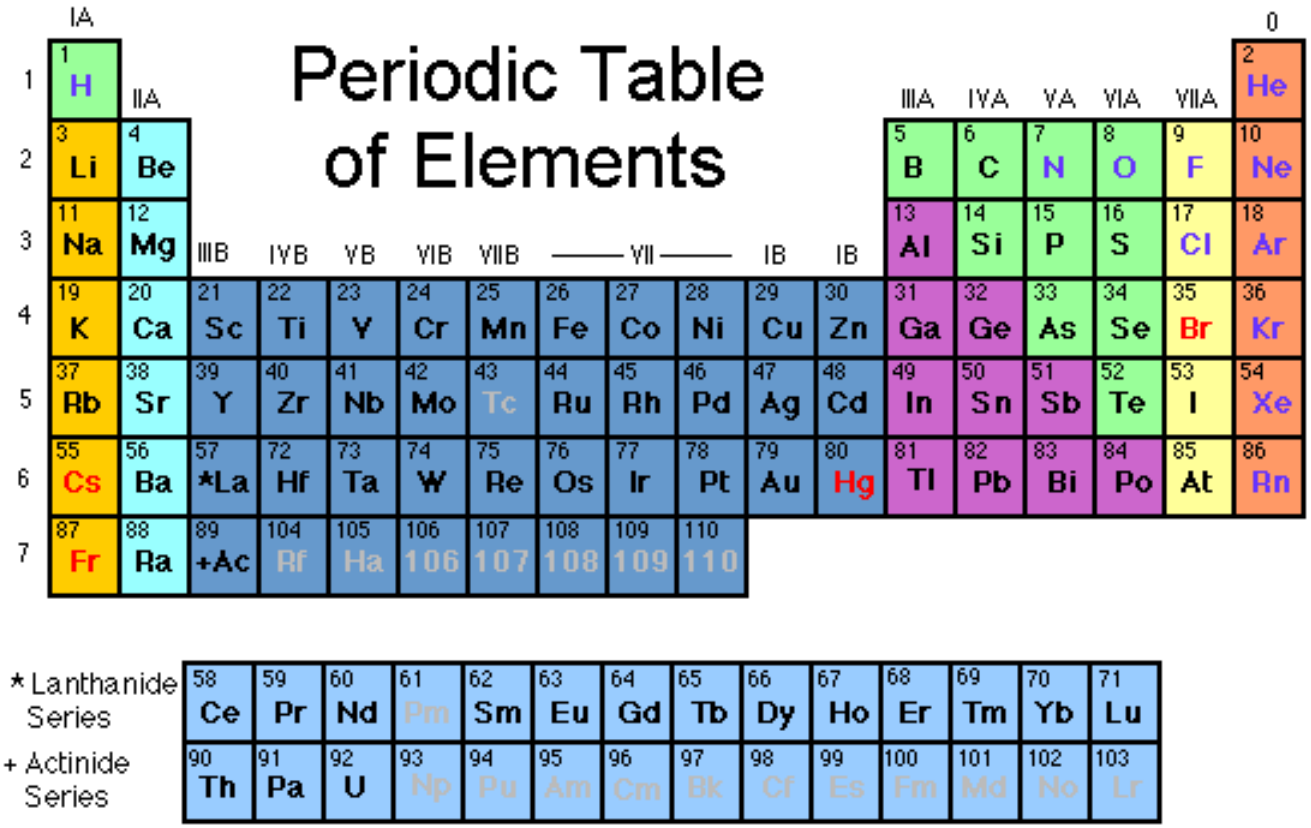


Podstawową jednostką że wszystkie lego modele są wykonane z cegły są nogi. Gdybym rozbić jedną z nich do góry, to już nie działa.

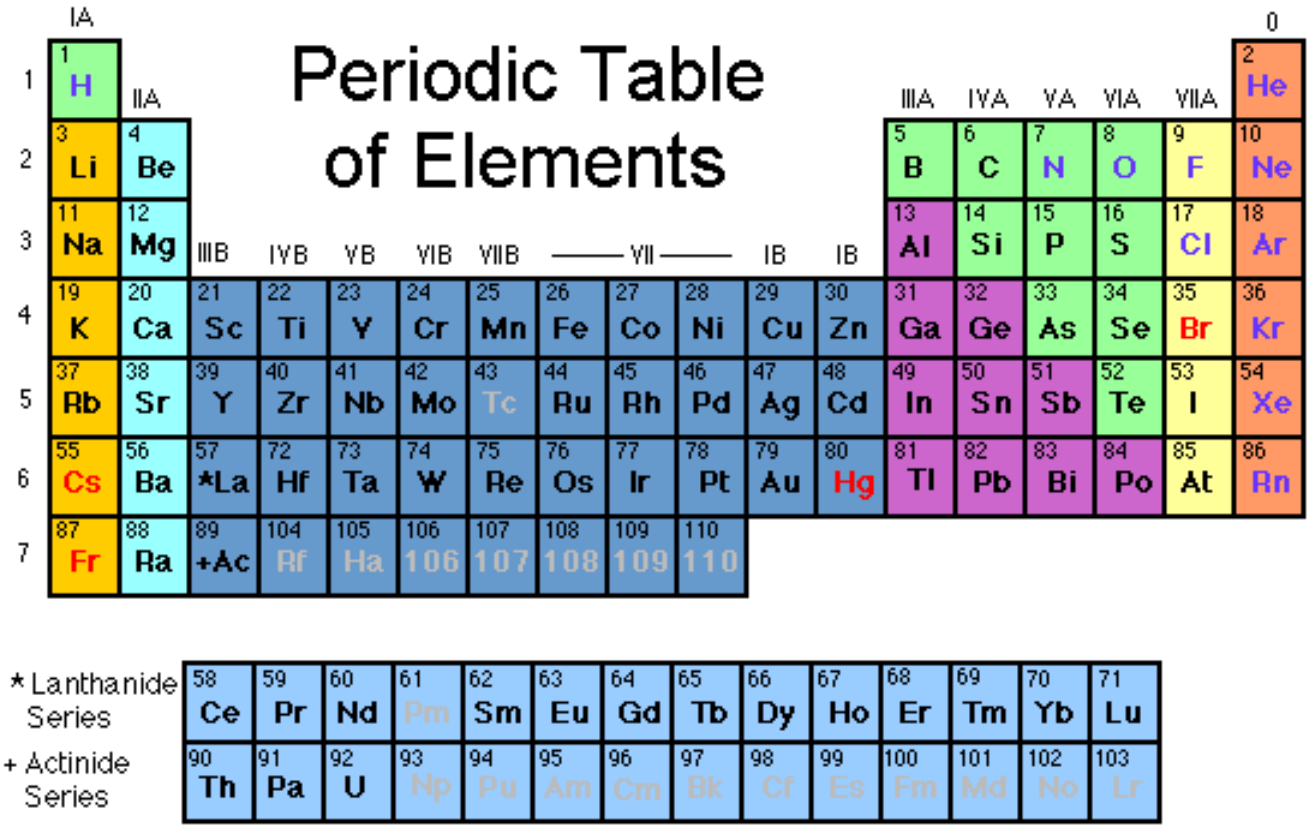
- Rzeczy mogą być klasyfikowane na grupy.
- Grupy składają się z co o podobnych właściwościach.
- Duże konstrukcje mogą być wykonane z mniejszych jednostek budowlanych. Dojdziesz do etapu, w którym można dostać się do najmniejszej jednostki budowlanej - wszelkie mniejsze i to nie działa.



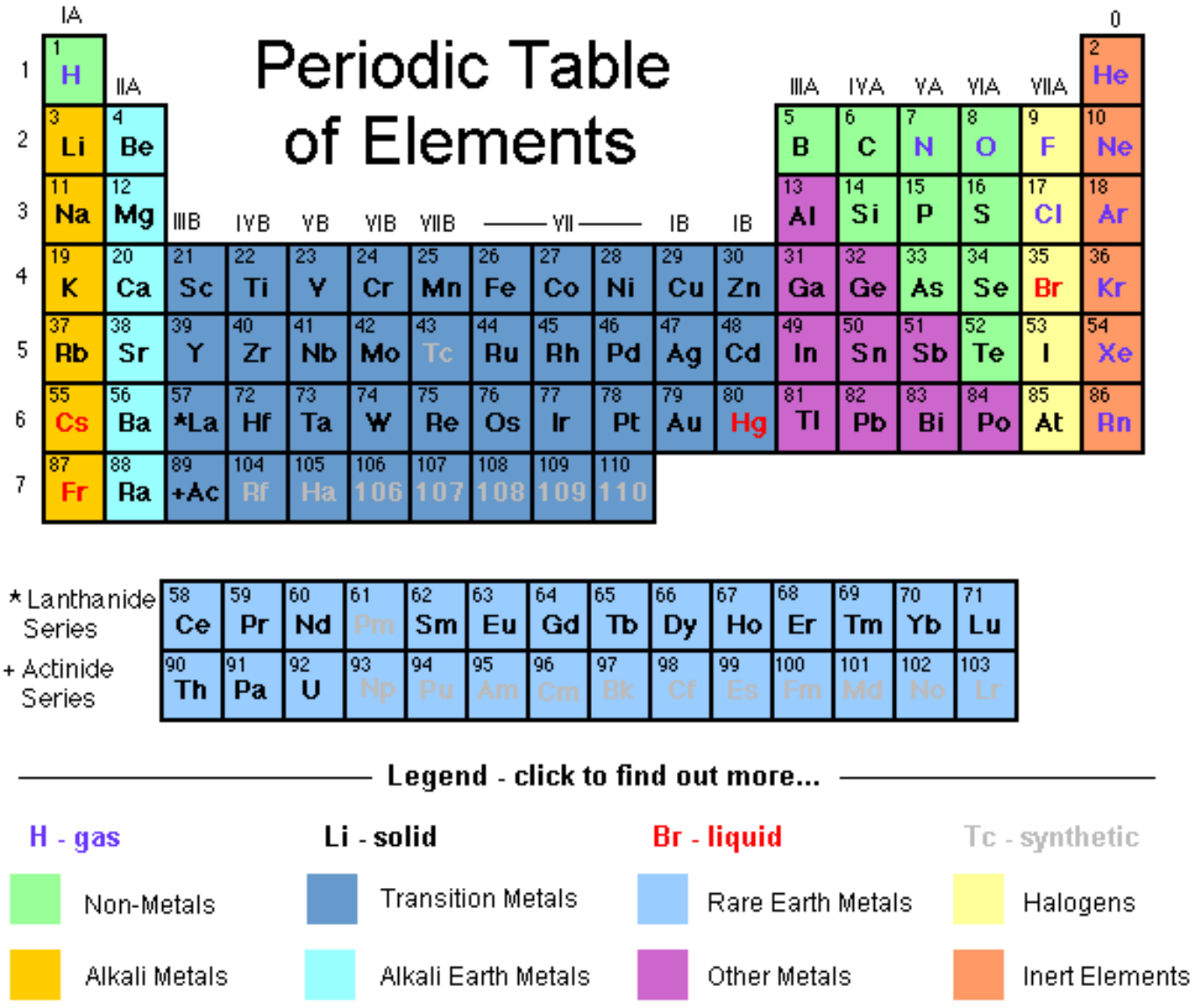
Ten wątek jest o sortowaniu chemikalia na grupy. Współpracujemy z pierwiastków chemicznych



Pierwiastki chemiczne są budulcem do produkcji innych chemikaliów. Można łączyć elementy, aby poznać nowych chemikaliów.



Pierwiastki chemiczne są umieszczone w tabeli o nazwie okresowego. Układ w tabeli daje wskazówki na temat grup elementy można podzielić.


Periodic Table of Elements
IA
IIA
IIIB
IVB
VB
VIB
VIIB
VII
IB
IB
IIIA
IVA
VA
VIA
VIIA
0
1 H
2 He
3 Li
4 Be
5 B
6 C
7 N
8 O
9 F
10 Ne
11 Na
12 Mg
13 Al
14 Si
15 P
16 S
17 Cl
18 Ar
19 K
20 Ca
21 Sc
22 Ti
23 V
24 Cr
25 Mn
26 Fe
27 Co
28 Ni
29 Cu
30 Zn
31 Ga
32 Ge
33 As
34 Se
35 Br
36 Kr
37 Rb
38 Sr
39 Y
40 Zr
41 Nb
42 Mo
43 Tc
44 Ru
45 Rh
46 Pd
47 Ag
48 Cd
49 In
50 Sn
51 Sb
52 Te
53 I
54 Xe
55 Cs
56 Ba
57 *La
72 Hf
73 Ta
74 W
75 Re
76 Os
77 Ir
78 Pt
79 Au
80 Hg
81 Tl
82 Pb
83 Bi
84 Po
85 At
86 Rn
87 Fr
88 Ra
89 +Ac
104 Rf
105 Ha
106 106
107 107
108 108
109 109
110 110
* Lanthanide Series
58 Ce
59 Pr
60 Nd
61 Pm
62 Sm
63 Eu
64 Gd
65 Tb
66 Dy
67 Ho
68 Er
69 Tm
70 Yb
71 Lu
+ Actinide Series
90 Th
91 Pa
92 U
93 Np
94 Pu
95 Am
96 Cm
97 Bk
98 Cf
99 Es
100 Fm
101 Md
102 No
103 Lr
Legend - click to find out more...
H - gas
Li - solid
Br - liquid
Tc - synthetic
Non-Metals
Transition Metals
Rare Earth Metals
Halogens
Alkali Metals
Alkali Earth Metals
Other Metals
Inert Elements

Cel –
Porównywanie metale i niemetale

Właściwości pierwiastków

Metale

Niemetale

Silny
Ciągliwy
przewodzą ciepło
przewodzenia elektryczności
Dźwięczny
Lśniący

Elementy_

Bloki strukturalne, z których utworzone są wszystkie inne środki chemiczne Są wykonane z jednego rodzaju _____ (cząstek) Są albo _____or non -_____ Są umieszczone w tabeli _____ elementów według ich _____

Elementy

Bloki strukturalne, z których utworzone są wszystkie inne środki chemiczne Są wykonane z jednego rodzaju atomu (cząsteczki) Są albo metale lub niemetale Są rozmieszczone w układzie okresowym pierwiastków, zgodnie z ich właściwościami

Badania

Wybrać pięć różnych elementów (Dwa muszą być niemetale, trzy metale)
Rejestruje informacje o nich w tabeli na aktywny 3

Element plakat –
Użyj informacji o przygotowanie plakatu A3 na jednym elemencie, który Twoim zdaniem jest ważne lub ciekawe.

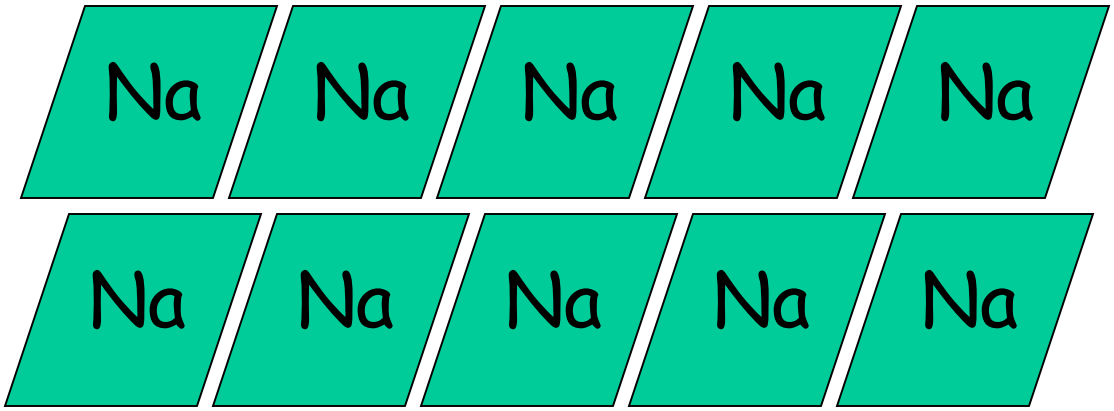
Target – Describe atomic structure

- I can label an atomic diagram to show position and charges of protons, neutrons and electrons. I can describe the nucleus.
- I can label an atomic diagram to show position or charges of protons, neutrons and electrons. I can say what is in the nucleus.
- I can recognise differences between protons, neutrons and electrons

- Elements are the building blocks of other chemicals
- Elements can be arranged in the **Periodic table**
- Elements are grouped by **properties**
- Elements which are sonorous, lustrous, strong, malleable, conduct heat and electricity are in the group **metals**.
- Different elements have different **properties** – this gives them different **uses**.

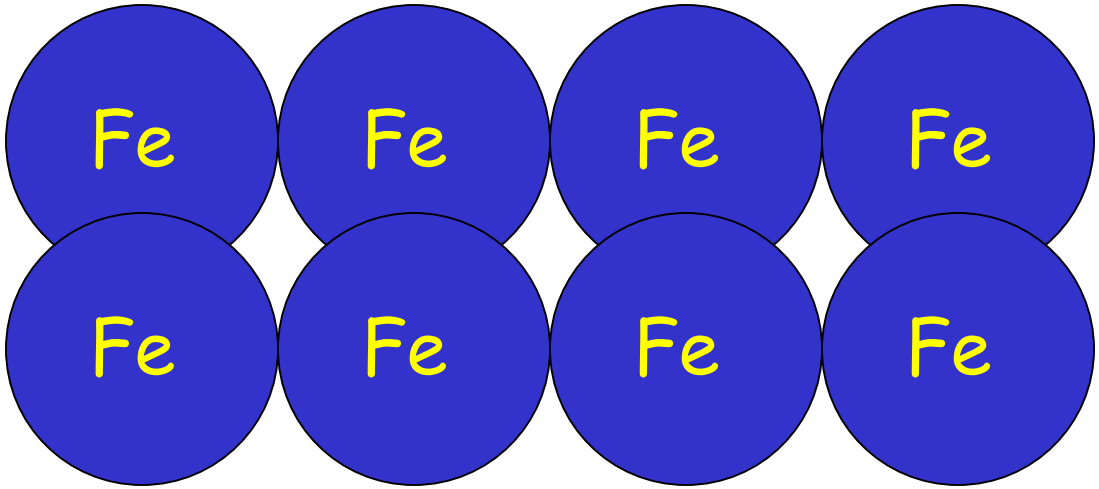
What makes an element is the way that the tiny particles which make it up are arranged.

These particles are **atoms**.

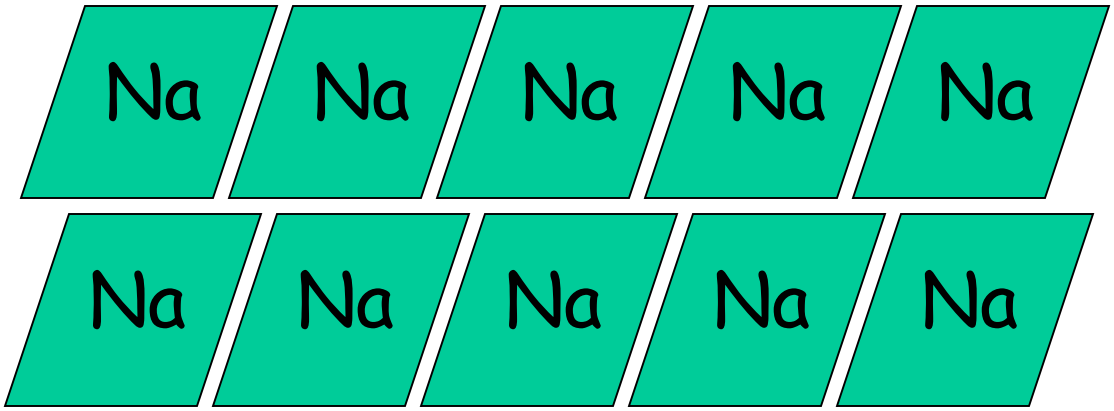


Sodium

Each element is made up of a number of identical atoms.

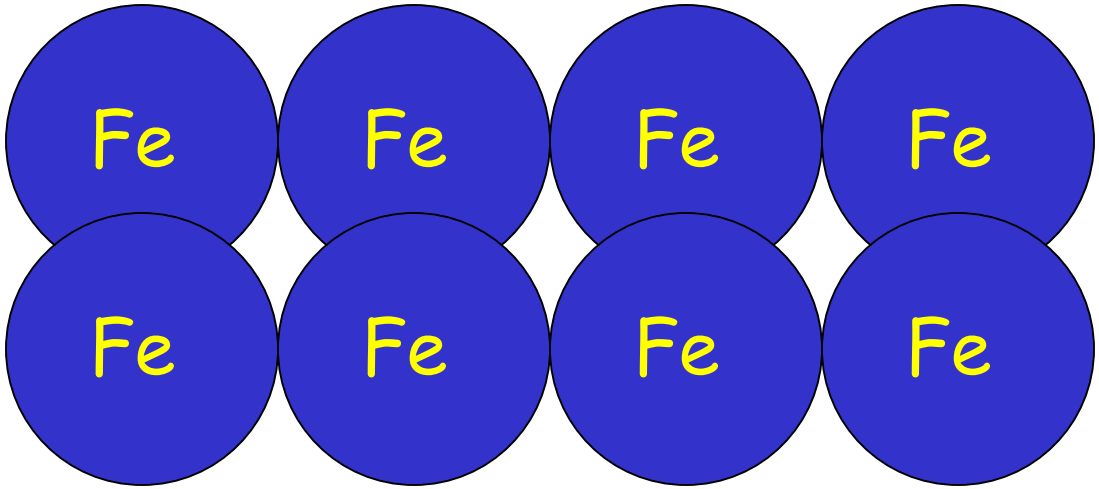


Iron

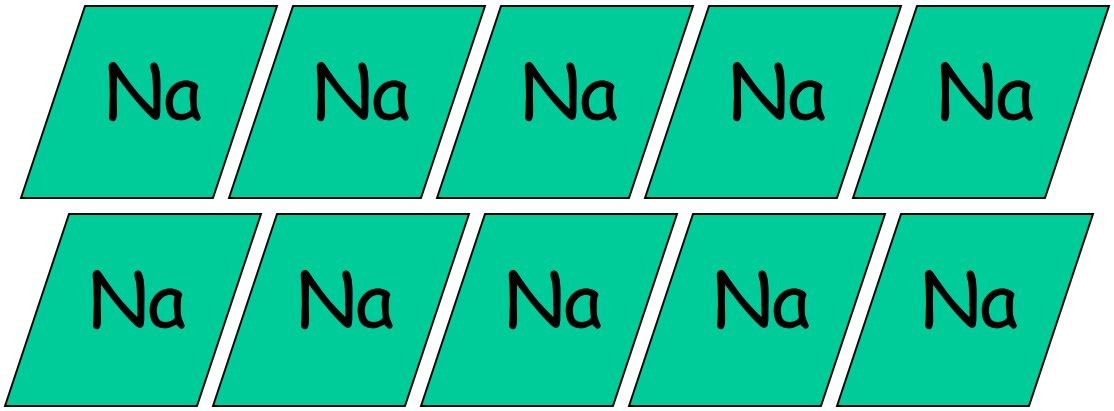


Sodium

There is only one type of atom in each element – iron has only iron atoms.

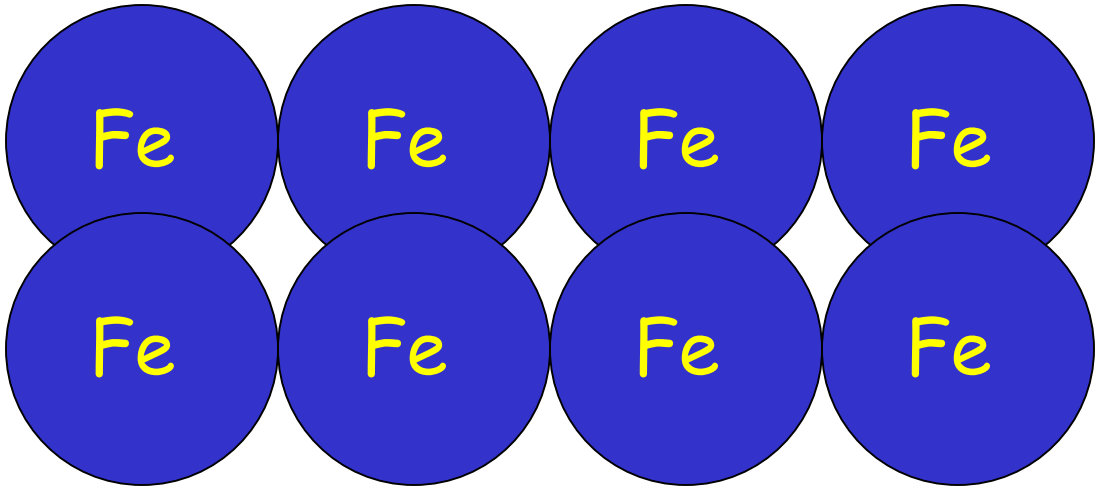


Iron



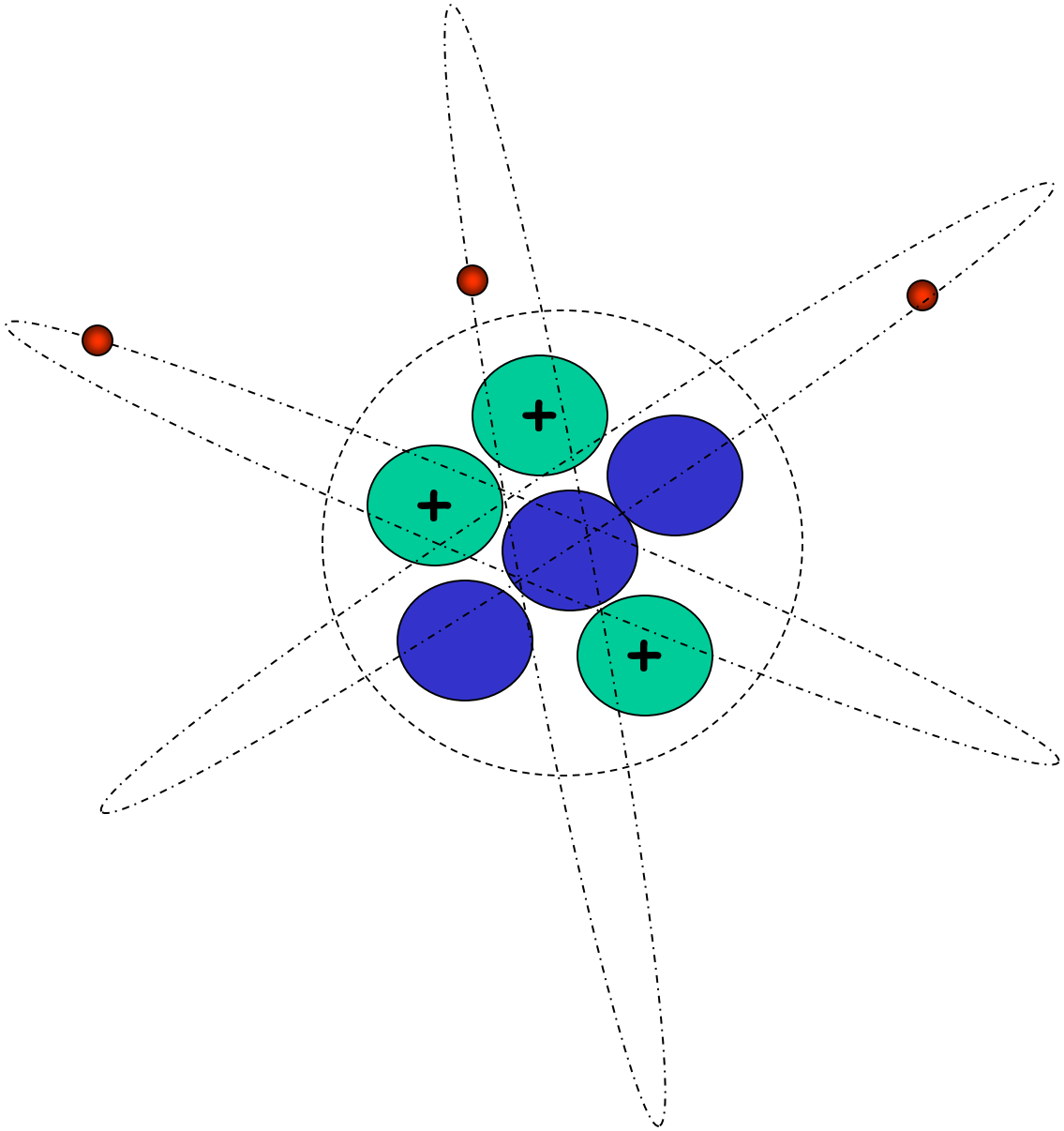
Sodium

Different elements are made up of different atoms. Iron atoms are different to sodium atoms.

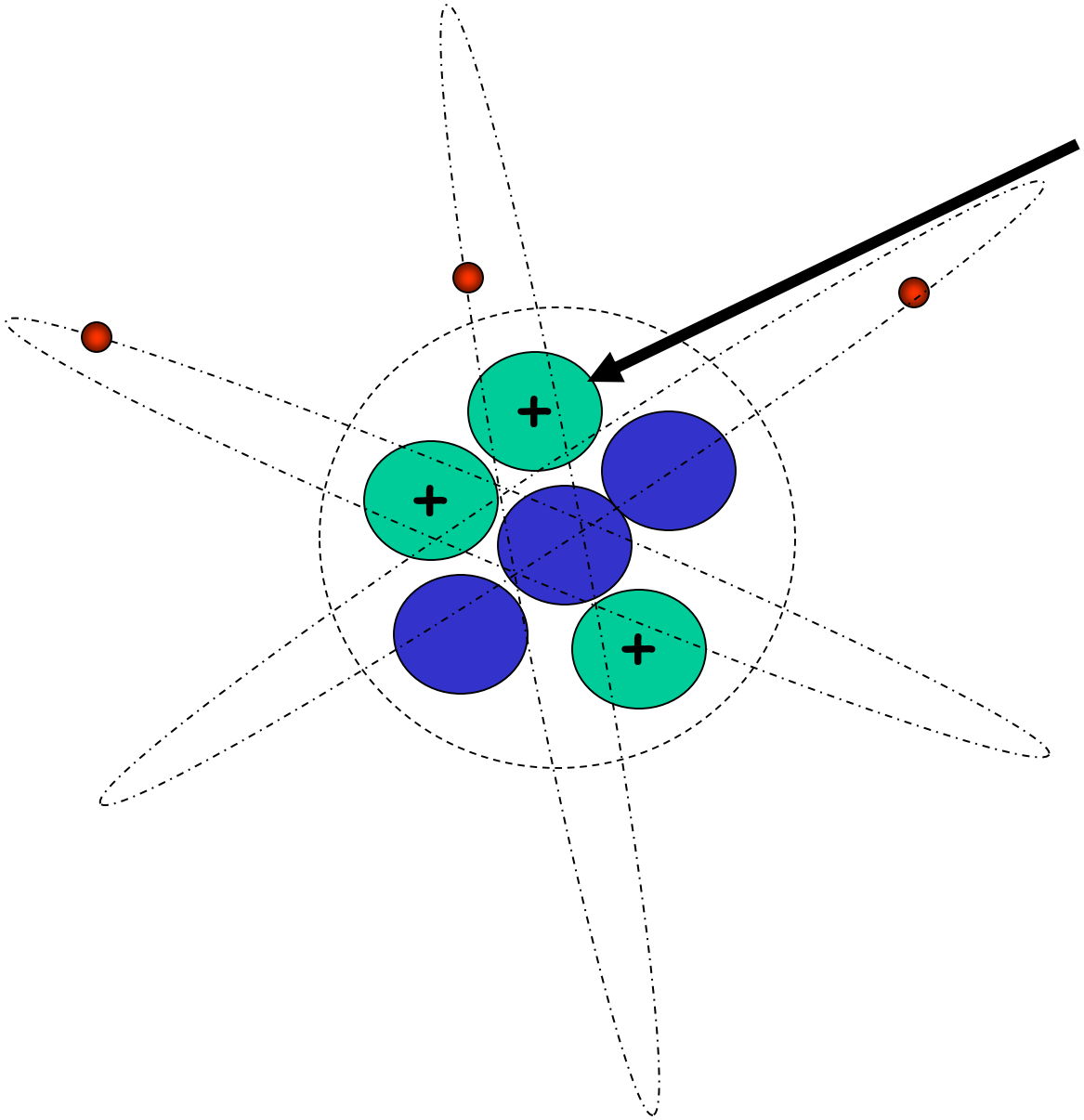


Iron

So, what is an atom, and what makes them different?



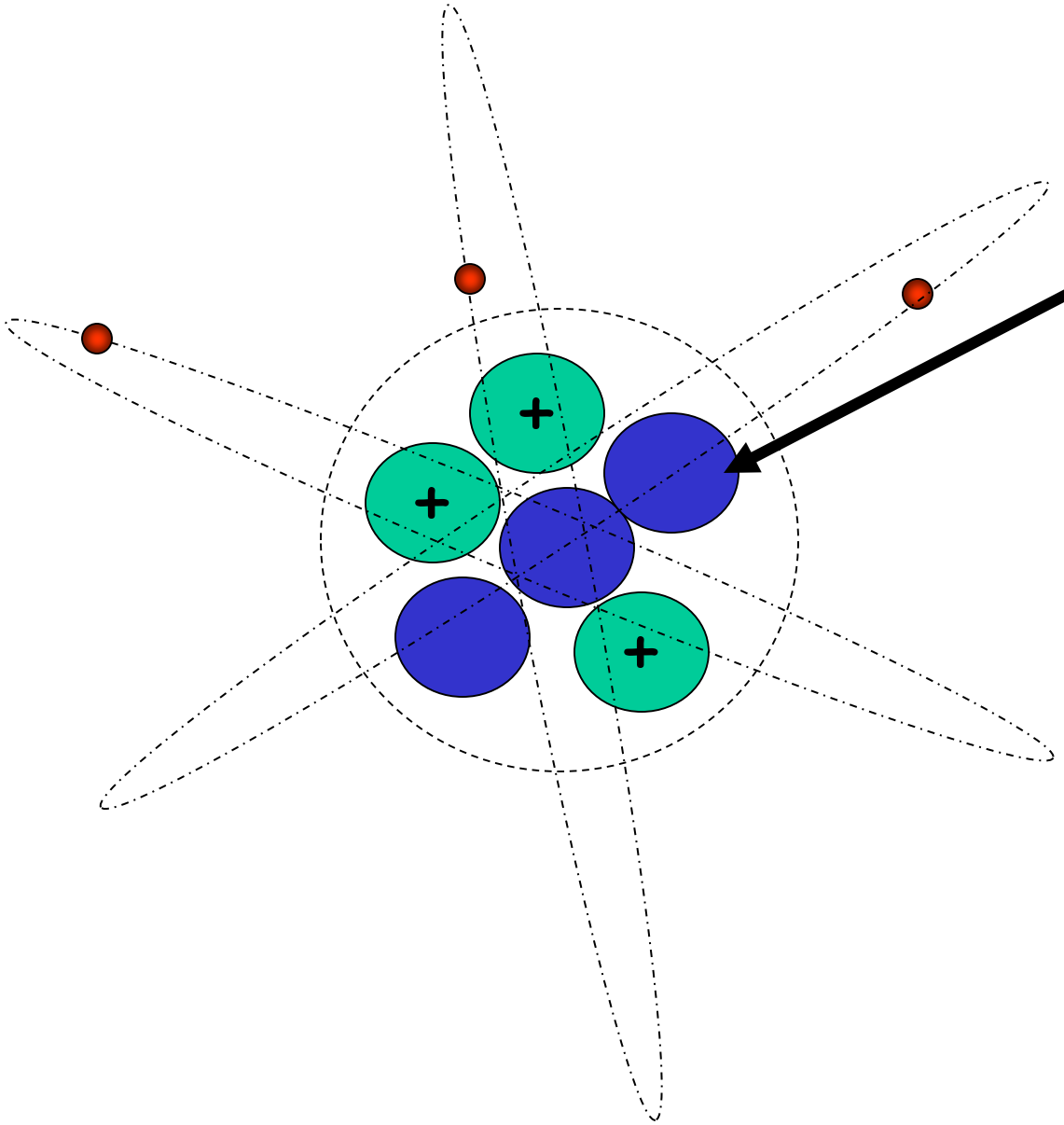
The atoms is made up of smaller units.



Protons stay in the **nucleus**.

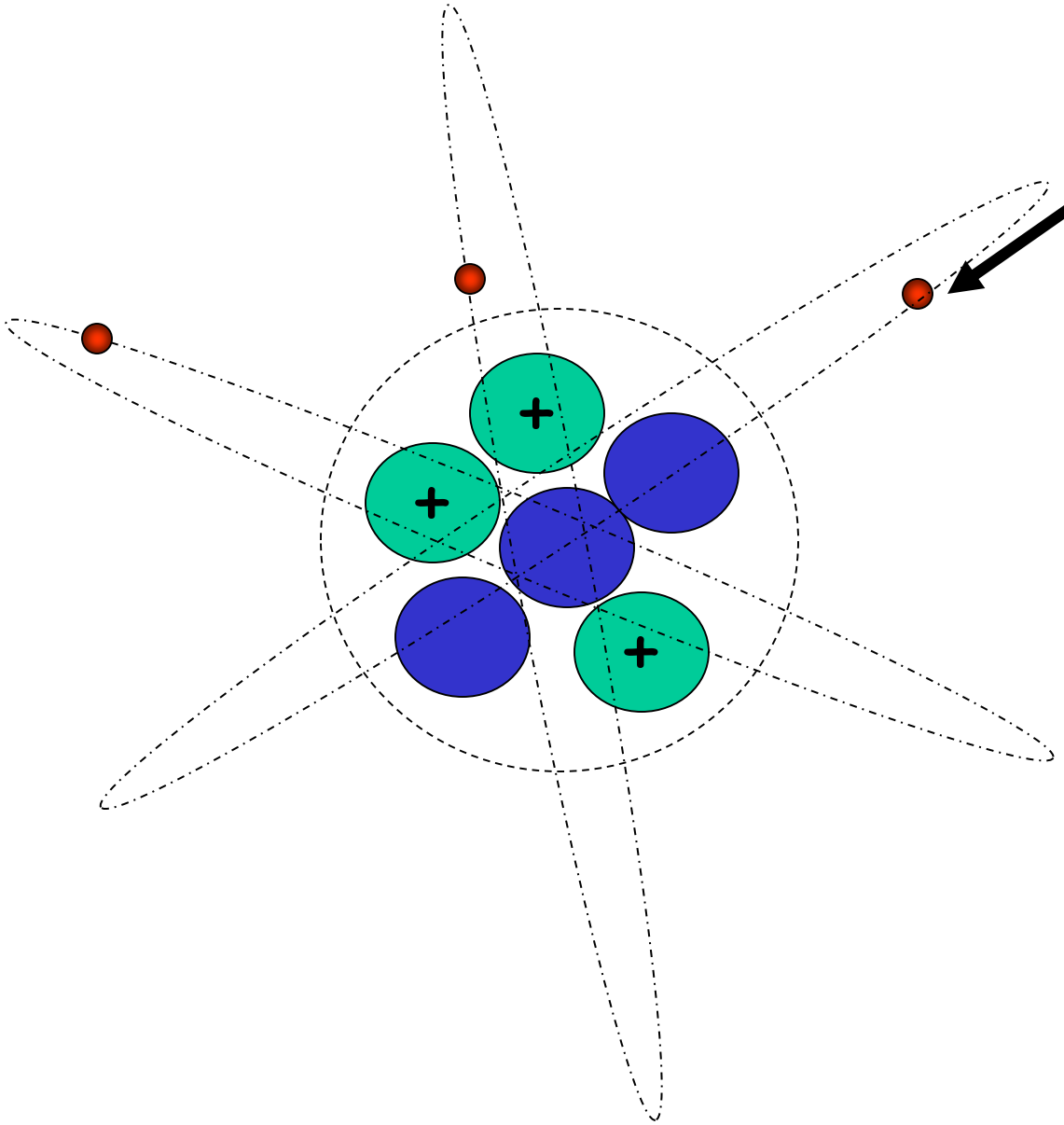
(centre)

They have a **positive (+) charge**.



Neutrons are also found in the **nucleus**.

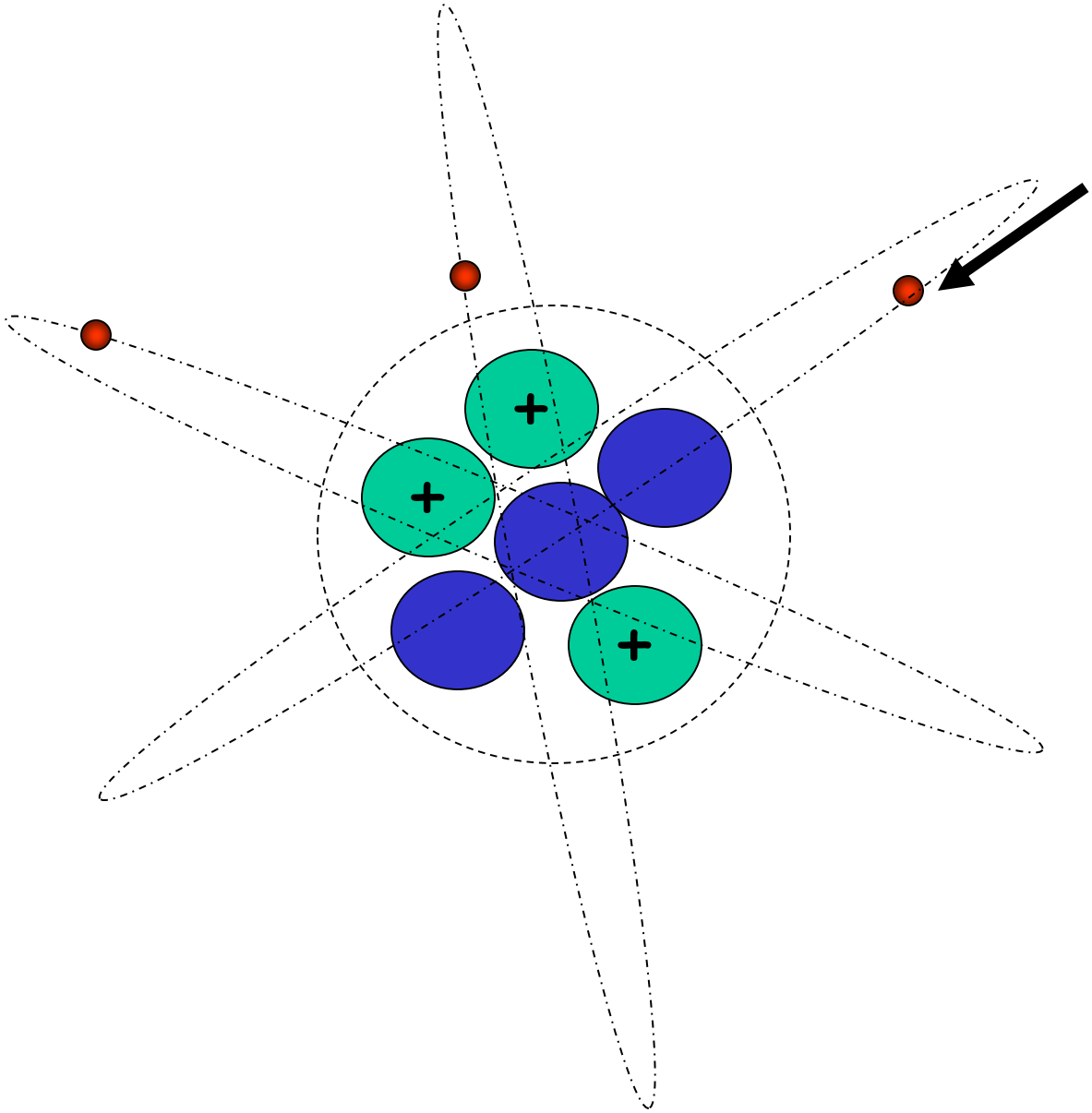
They have **no charge**.



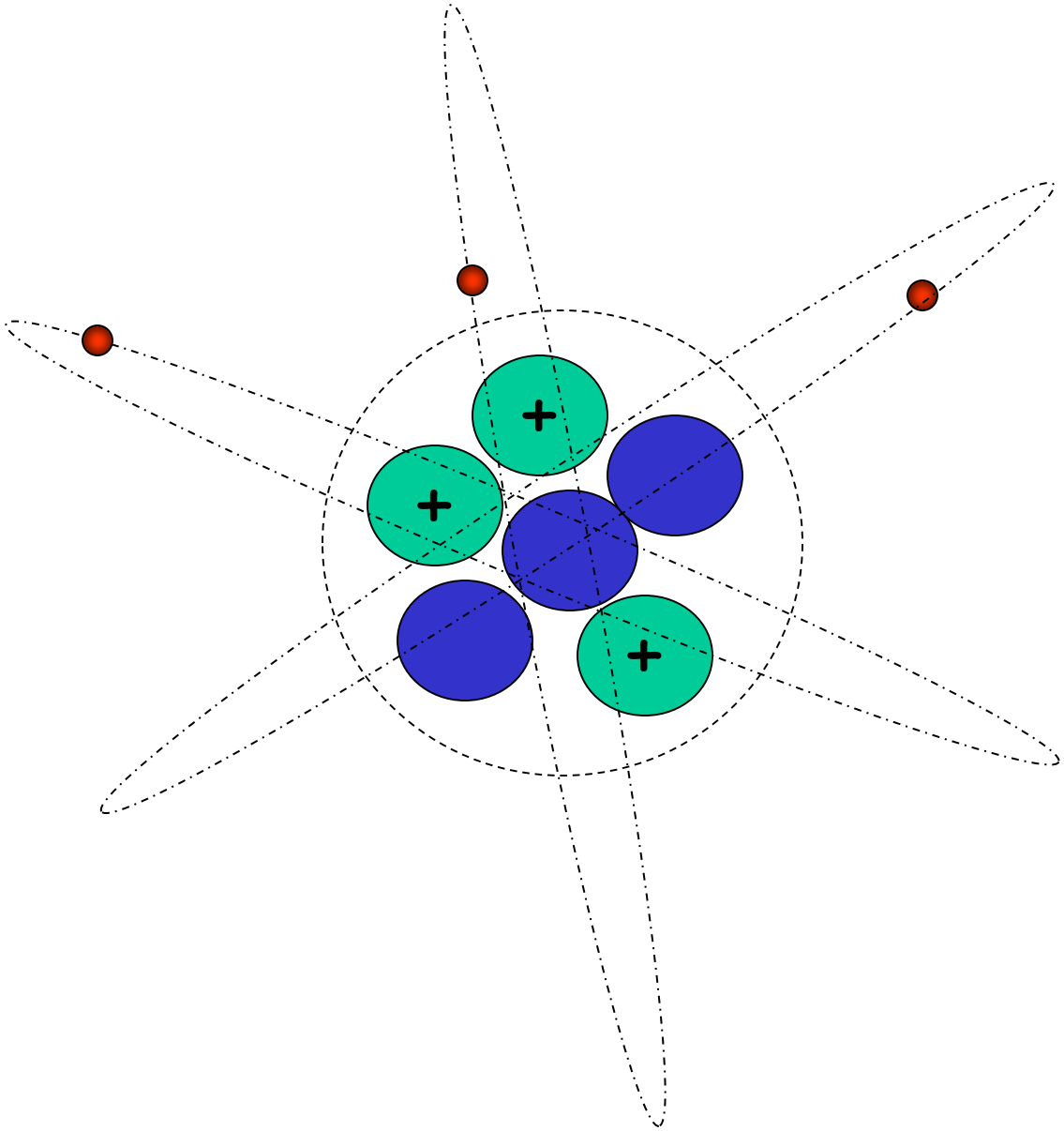
Electrons are **tiny**, and have virtually **no mass**.

They have a **negative (-) charge**.

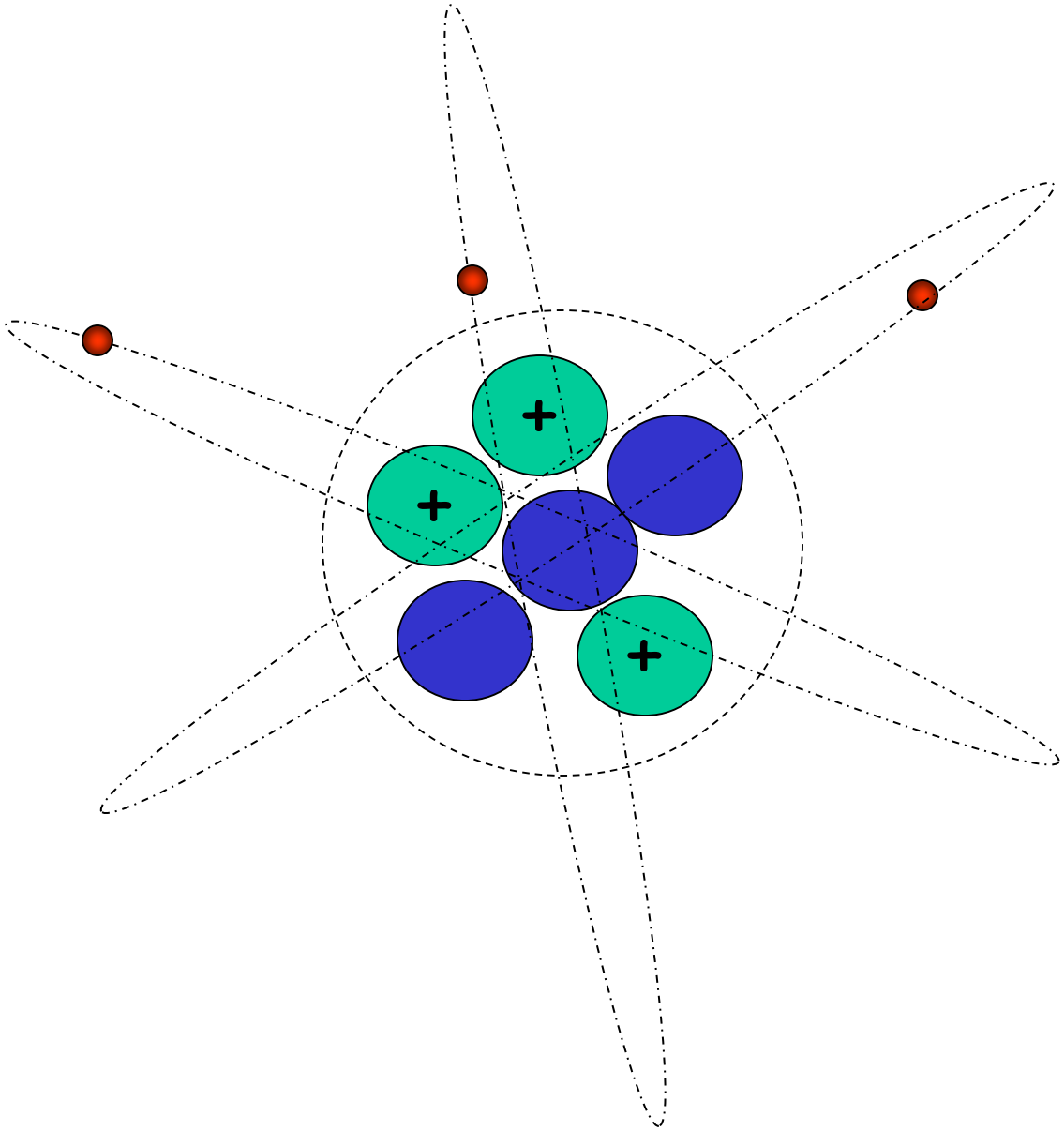
Electrons move very fast and **orbit the nucleus**, like the moon orbits the earth.



To balance out the charges, there are always the **same number of protons and electrons in the atom.**

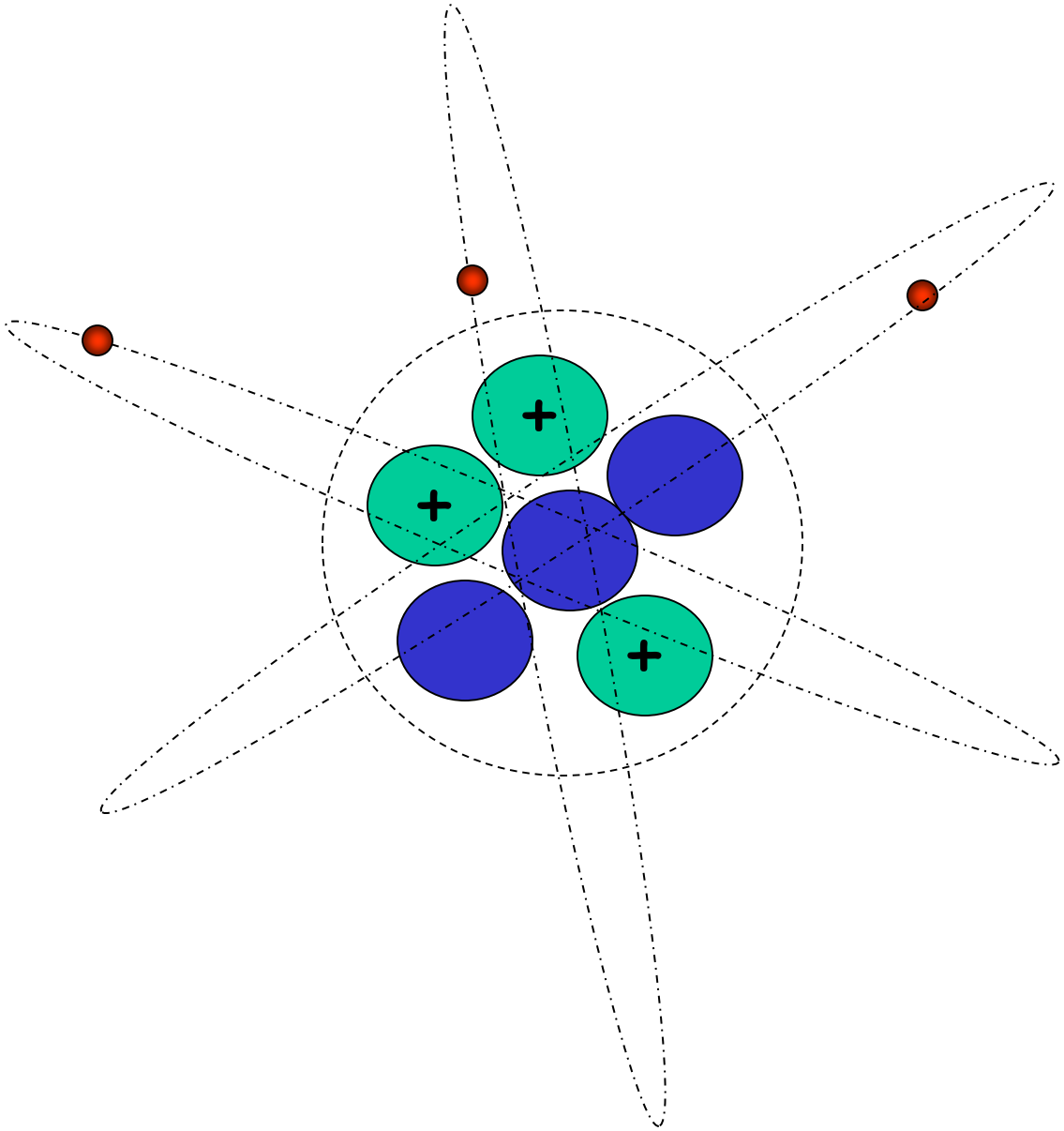


When you were researching elements, there were some **numbers** which were important.

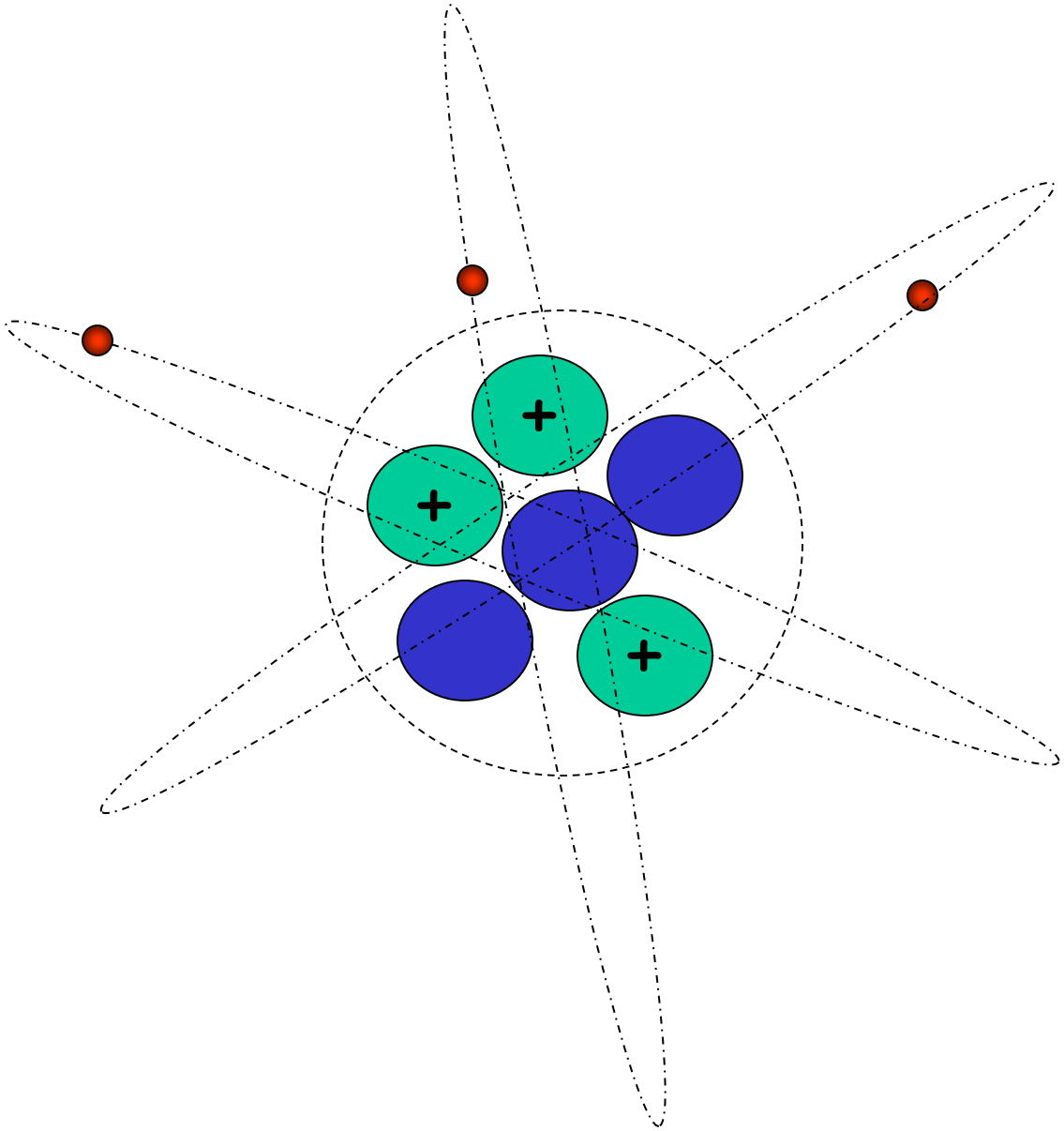


The atomic number is the number of **protons**.

The atomic number of this atom is ..



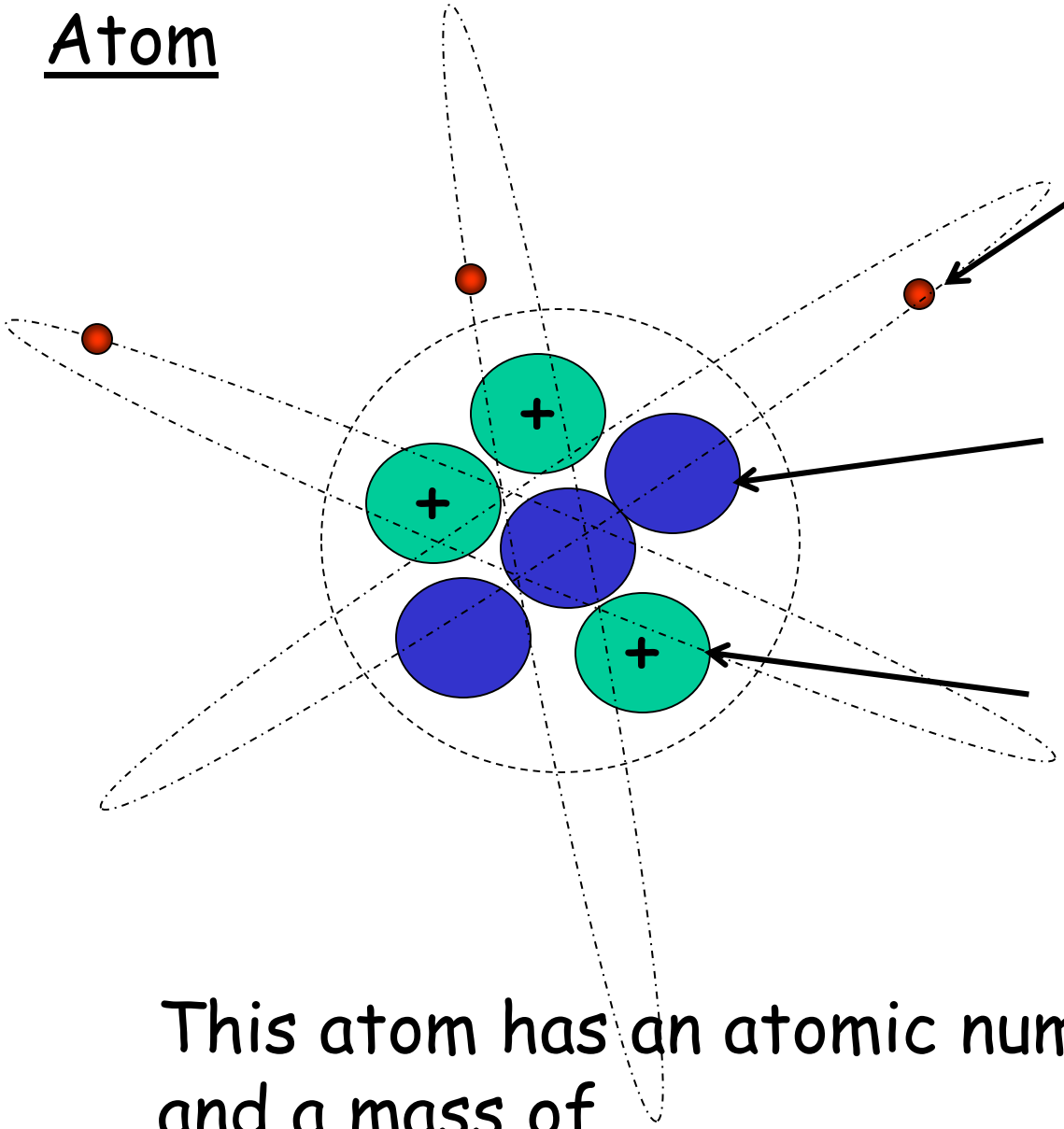
The **atomic number** is very important because this is the number used to put the elements in order in the Periodic Table.



The **atomic mass** is the number of the heavy items in the nucleus.

The atomic mass number of this atom would be ..

Atom



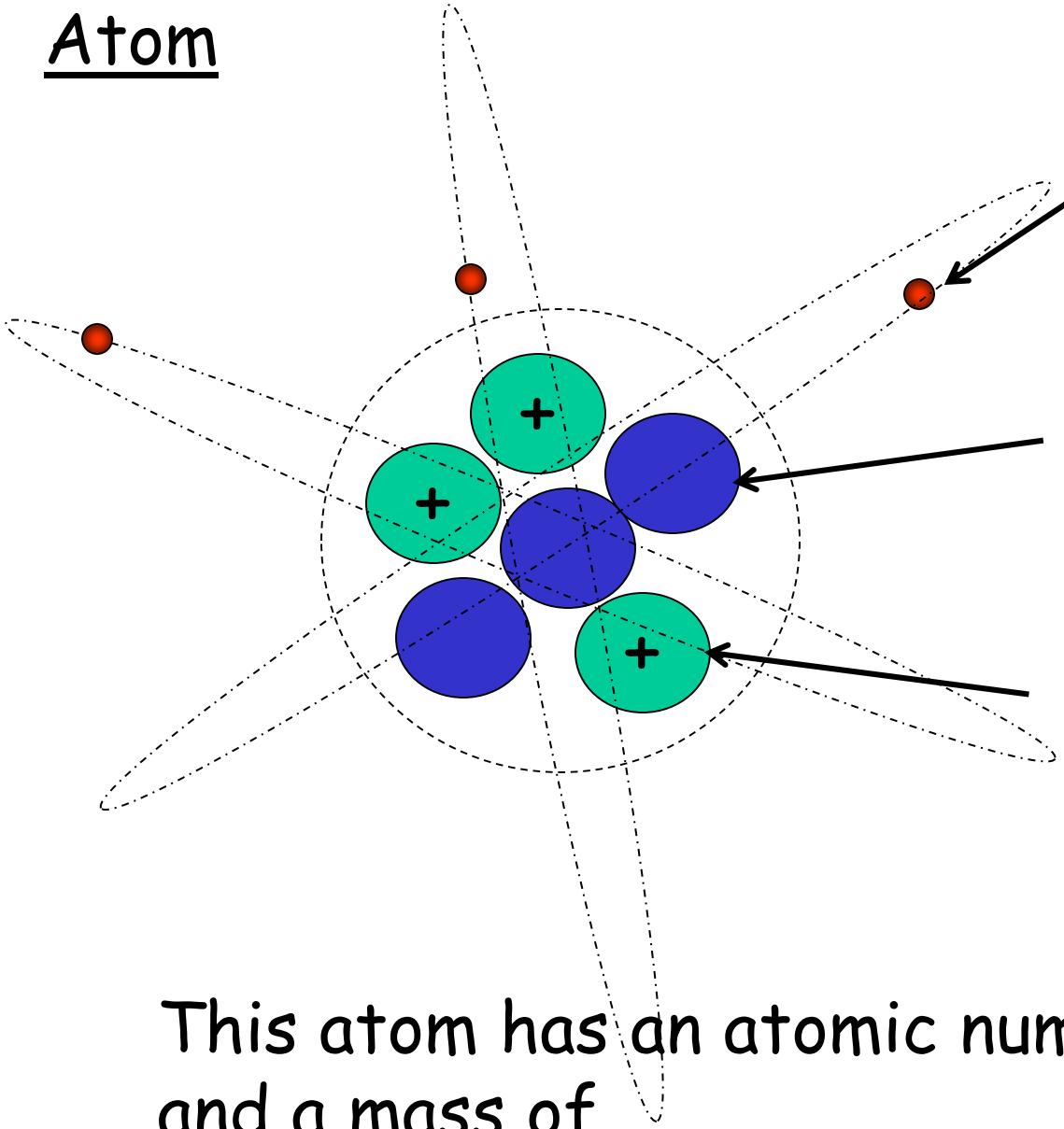
_____
Charge ____
Mass _____

_____
Charge ____
Mass _____

_____
Charge ____
Mass _____

This atom has an atomic number of _____ and a mass of _____.

Atom



_____
Charge ____
Mass _____

_____
Charge ____
Mass _____

_____
Charge ____
Mass _____

This atom has an atomic number of _____ and a mass of _____.

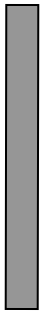
Elements and atoms.

…… are chemicals.
…… are particles.
…… are made of …… .
In an ……, all the ……s are identical.
Each …… only contains one type of …… .
Different …… have different …….
Sodium is and example of an ……
Sodium is made of sodium ……s.

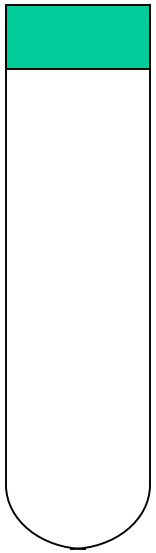
Elements and atoms.

Elements are chemicals.
Atoms are particles.
Elements are made of atoms .
In an **element**, all the **atoms** are identical.
Each **element** only contains one type of **atom** .
Different **elements** have different **atoms**.
Sodium is and example of an **element**.
Sodium is made of sodium **atoms**.

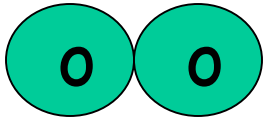
Target - Define **Elements**, **mixtures** and **compounds**



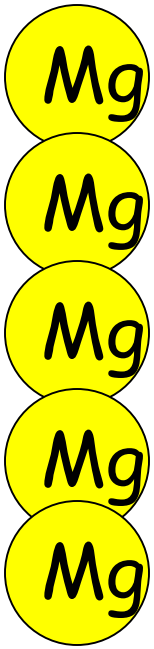
Magnesium ribbon



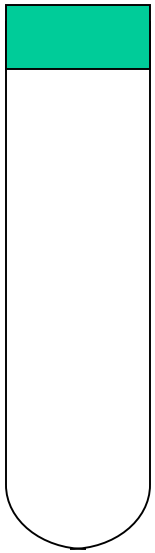
oxygen



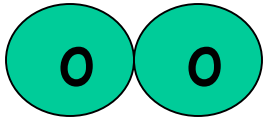
Oxygen is an **element**. It is made of only **oxygen atoms.**



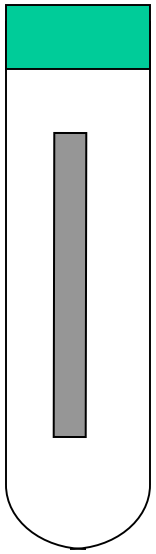
Magnesium ribbon



oxygen

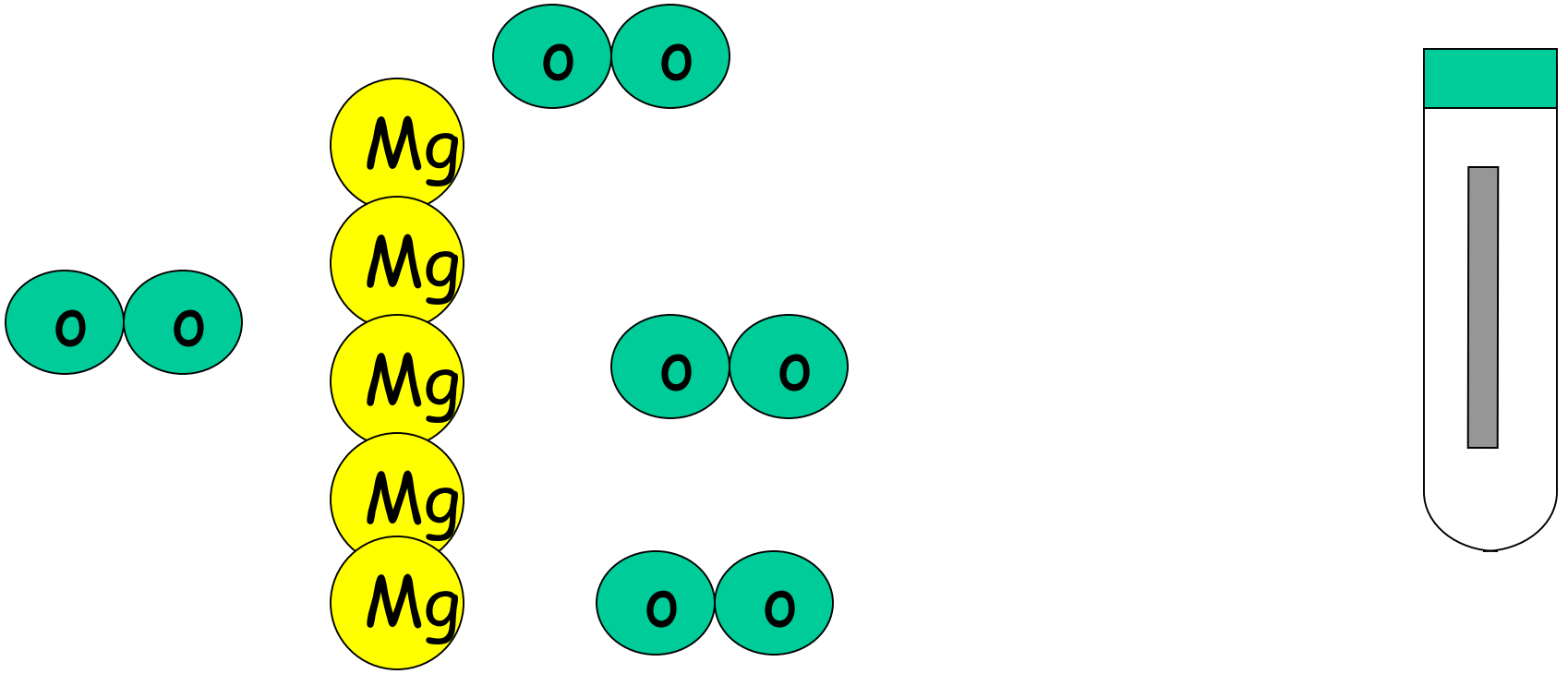


Magnesium is an **element**. It is made of only **magnesium atoms.**



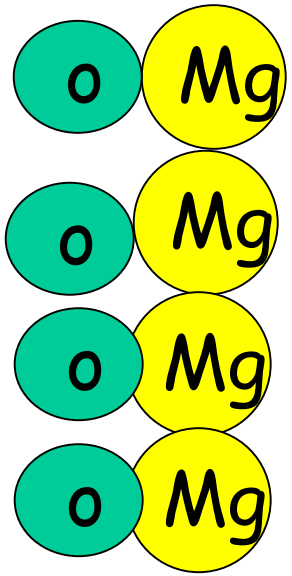
Shake up the magnesium in the oxygen.

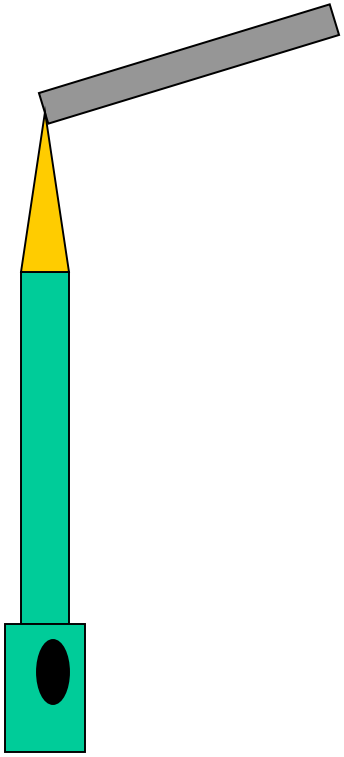
Is there any sign of a chemical reaction?



Shake up the magnesium in the oxygen.

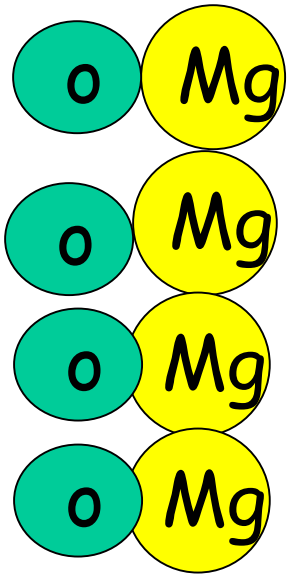
What has happened to the atoms?

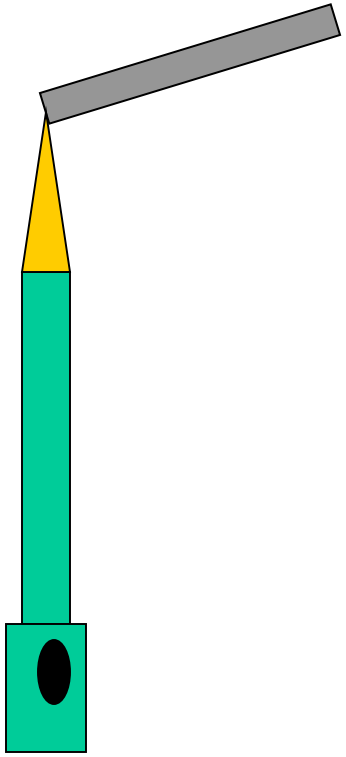




Heat up the magnesium in the oxygen.

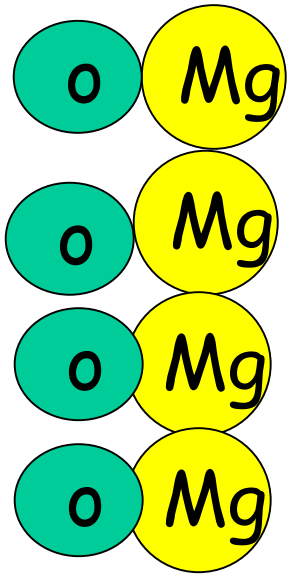
What has happened to the atoms?

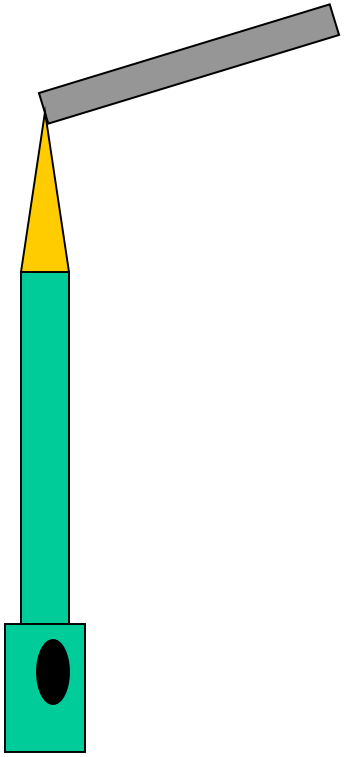




Heat up the magnesium in the oxygen.

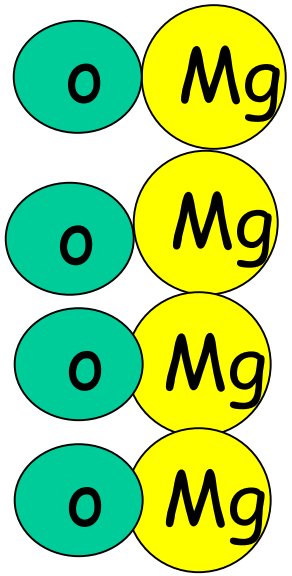
The atoms of magnesium have joined with the atoms of oxygen.

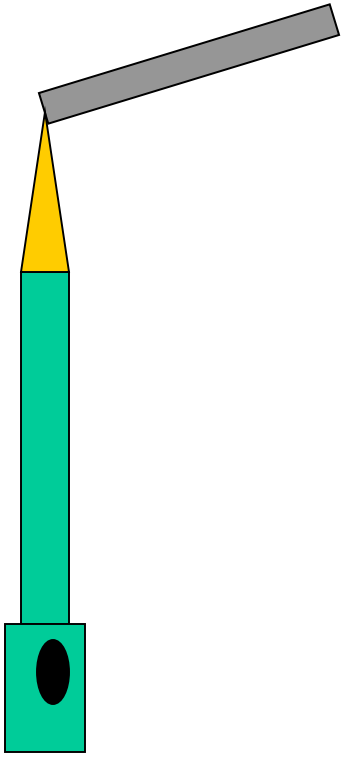




Heat up the magnesium in the oxygen.

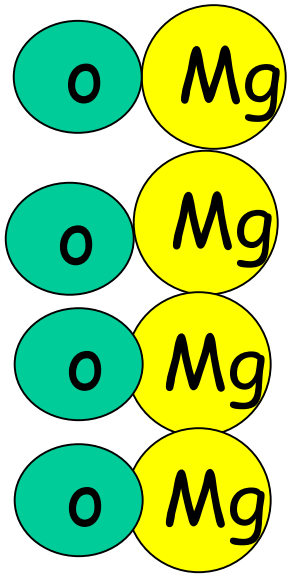
A new substance has been formed. Its ***properties*** *are* ***different*** *to magnesium and to oxygen.*

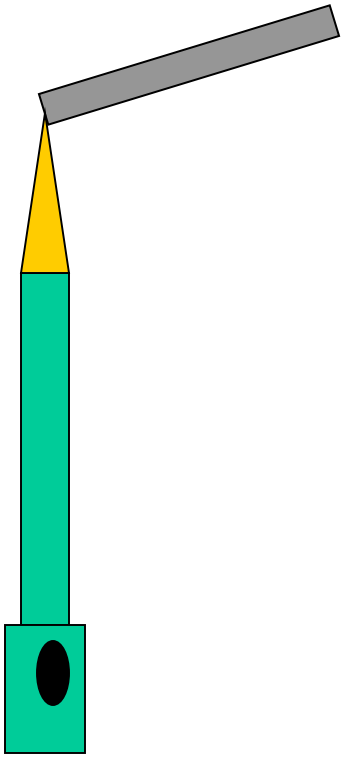




Heat up the magnesium in the oxygen.

*The new substance is a **compound**. A compound is a substance made form **two or more kinds of atoms joined together**.*

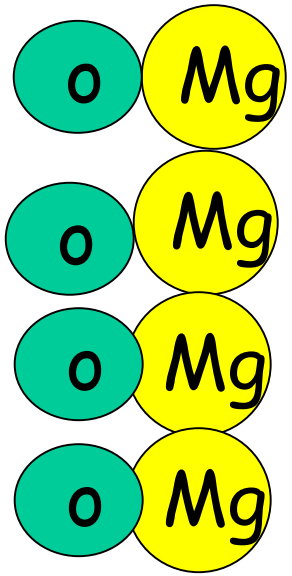


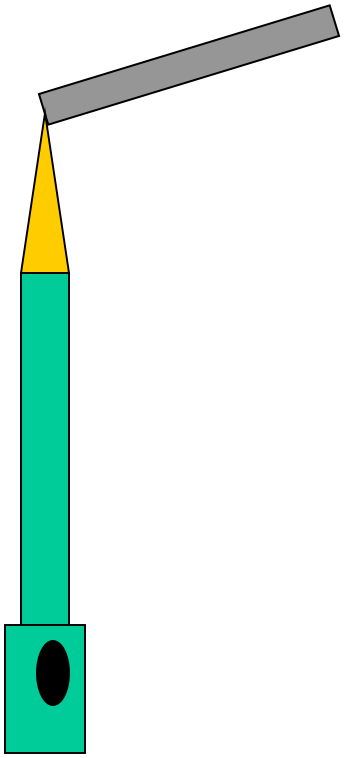


Heat up the magnesium in the oxygen.

The new compound gets its name form magnesium and oxygen – it is

Magnesium oxide.





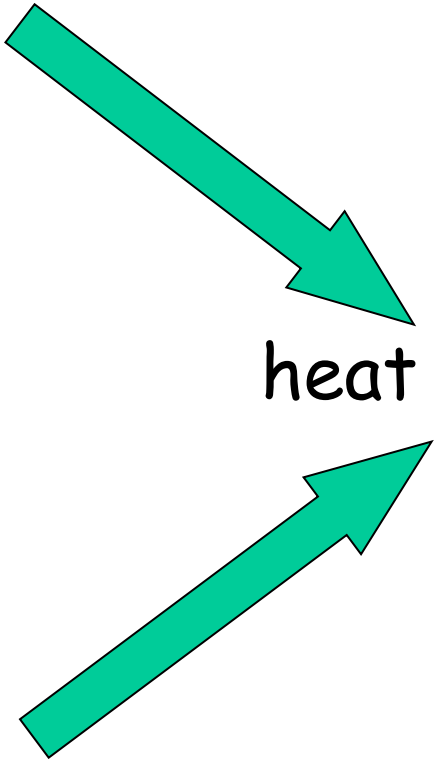
Heat up the magnesium in the oxygen.

The new compound gets its name form magnesium and oxygen – it is

Magnesium oxide.

Element

magnesium
(grey metal)



heat

Compound

Magnesium oxide
(white powder)

oxygen
(colourless gas)

Element

Making magnesium oxide

When we burned magnesium in oxygen (air), evidence of a **physical** change was .....

When we burned magnesium in oxygen, evidence of a **chemical** change was .....

Making magnesium oxide

When we burned magnesium in oxygen (air), evidence of a physical change was **that the magnesium changed form a grey, bendy metal to a white crumbly powder.**

When we burned magnesium in oxygen, evidence of a chemical change was **that lots of energy was released as light and heat.**

Target – **Conceptualise** iron sulphide

Recording – **Separating Iron and sulphur**

In a **mixture** of iron and sulphur, are the atoms joined?

If the atoms are **not** joined, are they easy or hard to separate?

How can you separate the iron from the sulphur in a mixture?

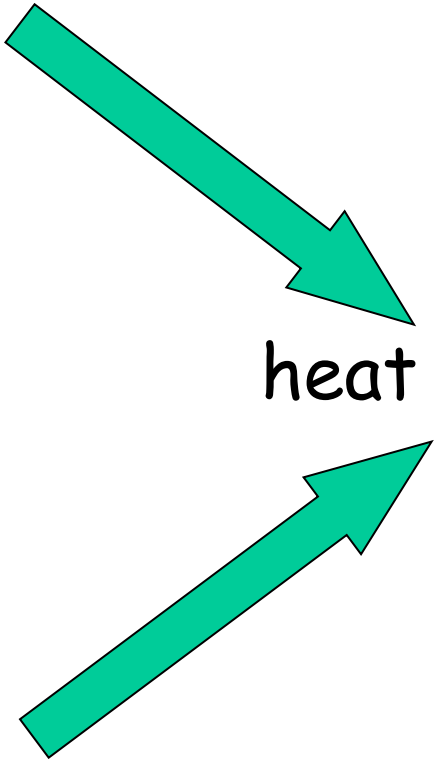
What happens when you test iron *sulphide* with a magnet? Why is this different?

What is picked up by the magnet?

What is left in the dish?

Element

iron
(grey metal)



heat

Compound

Iron sulphide
(grey solid)

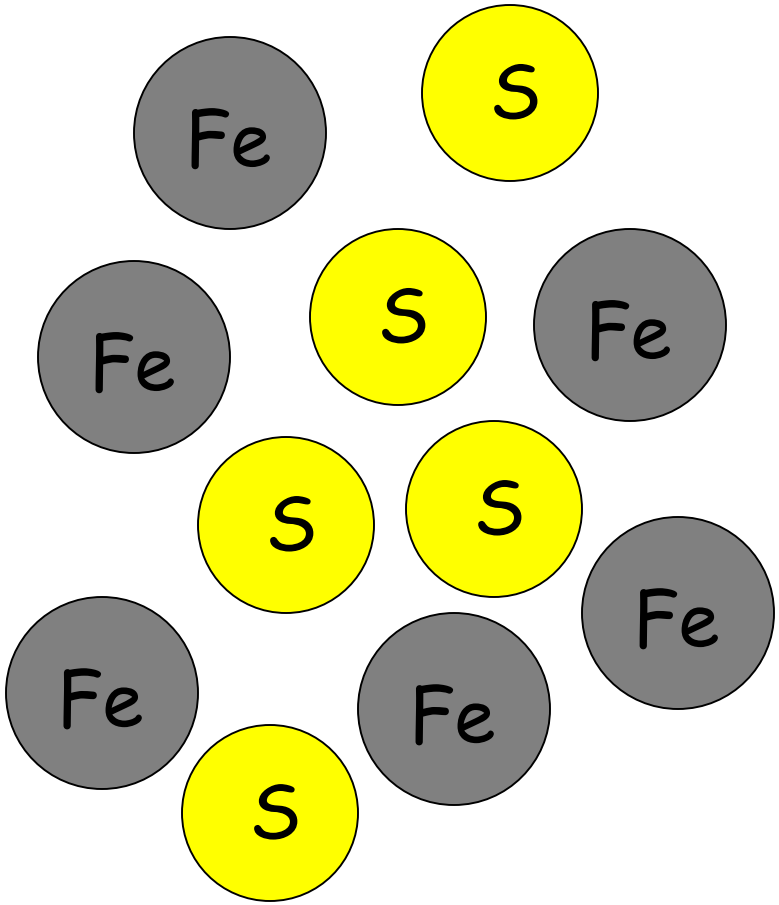
sulphur
(yellow powder)

Element

What would happen if we tried the magnet on iron sulphide?

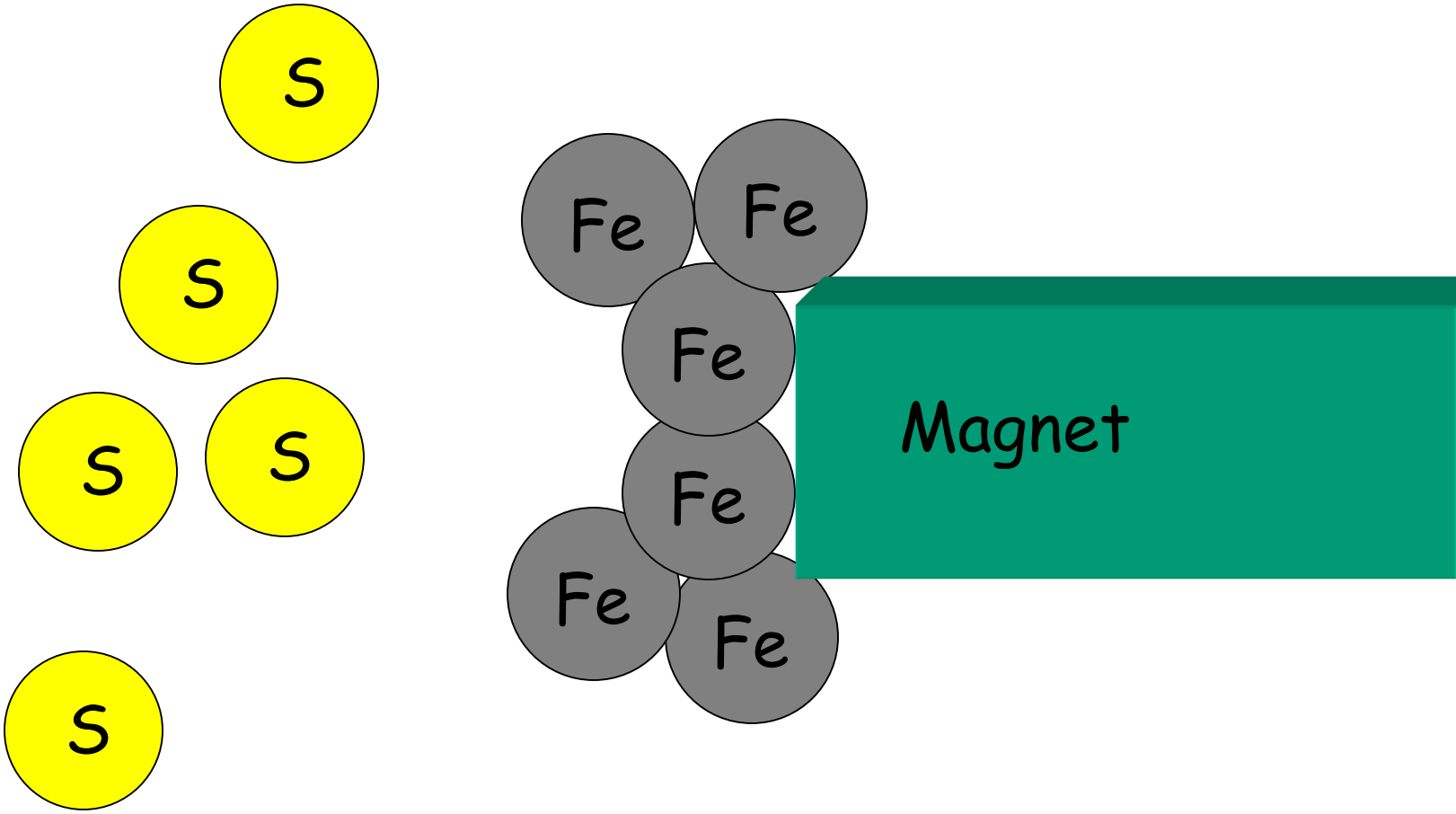
Are the atoms in iron sulphide separate or joined?

Would this make them easier or harder to separate?

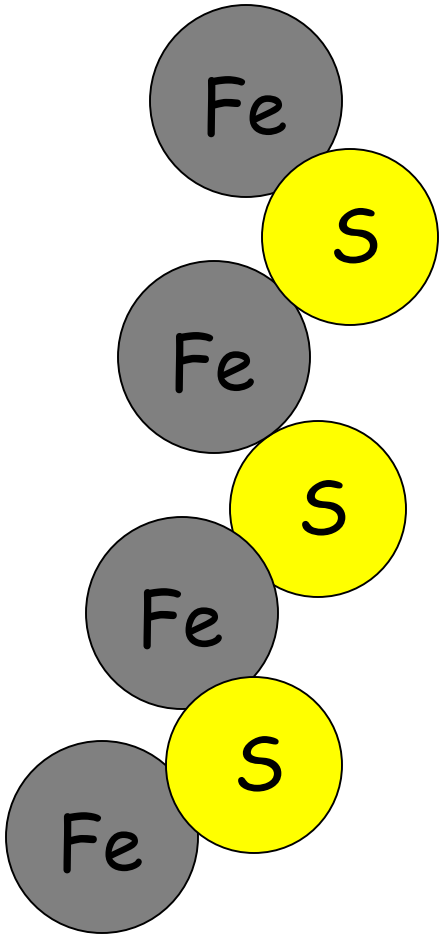


Magnet

Iron / sulphur **mixture**

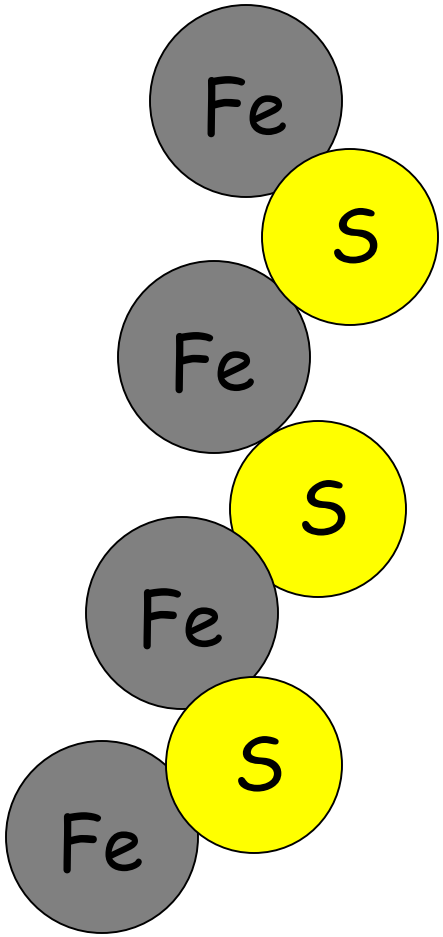


The iron is attracted to the magnet. They are free to move because they are not joined to the sulphur atoms.



Magnet

The iron sulphide particles are **magnetic**, so they are **attracted to the magnet**. The iron suphide particles are pulled to the magnet. The sulphur is **joined to** the iron, so moves **with** the iron.



Magnet

Iron / sulphur **compound**

What have I learned?

In an **element**, all the particles are .....

The **particles** in elements are called .....

In a **mixture**, the particles are .....

When elements **combine**, they form a .....

In a compound, atoms are .....

Joining elements to make a compound often gives out .....

What have I learned?

In an **element**, all the particles are the **same**.

The **particles** in elements are called **atoms**.

In a **mixture**, the particles are **separate**.

When elements **combine**, they form a **compound**.

In a compound, atoms are **joined**.

Joining elements to make a compound often gives out **energy**.

Design brief –

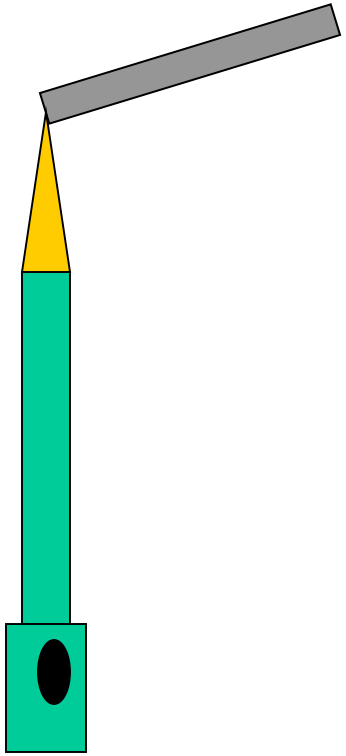
- Produce an **A3** (big paper) **poster**
- Show **either** how oxygen and magnesium atoms combine to make magnesium oxide
- **Or** how sulphur and iron atoms combine to make iron sulphide
- Include **atom diagrams** (arrangement), labels or key, notes
- **Explain** how we know a chemical reaction has taken place
- **Note** differences between the properties of the original chemicals and the products

Target -

Describe breaking compounds

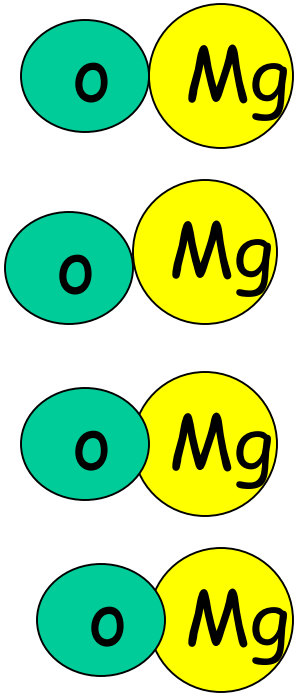
A **compound** is a chemical which –

- Is made up of two or more elements
- Contains two or more kinds of atoms
- Has different atoms joined together

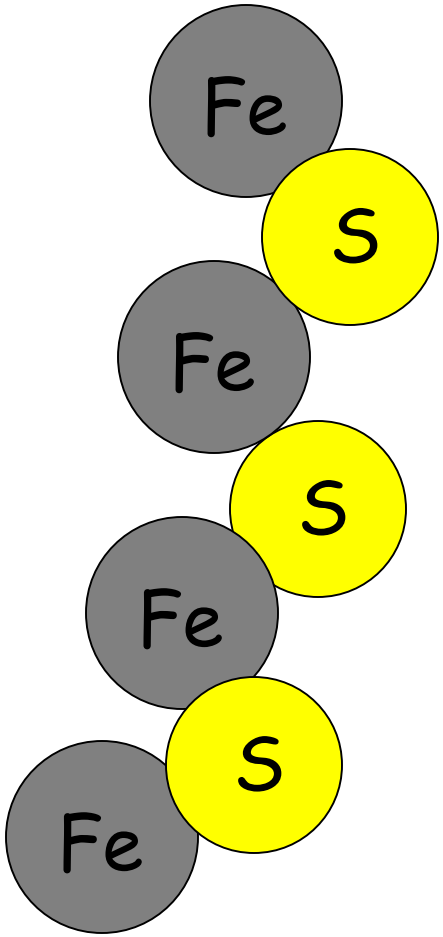


You saw when we burned the magnesium in oxygen that **energy** was needed to make the atoms of the different elements join together.

The source of energy was **heat** from the Bunsen flame.



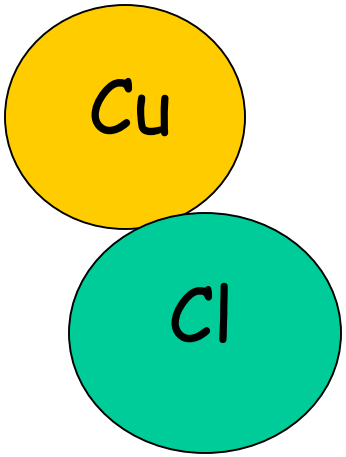
When the atoms were joined together, this was a **permanent** change.



You found that a magnet could not pull the atoms of iron and sulphur when they were joined together in iron sulphide.

So, how can we get atoms which are joined together in a compound to separate from each other?

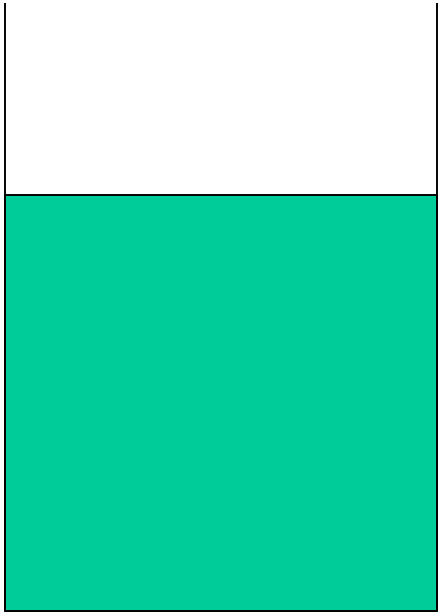
Target – Electrocute atoms



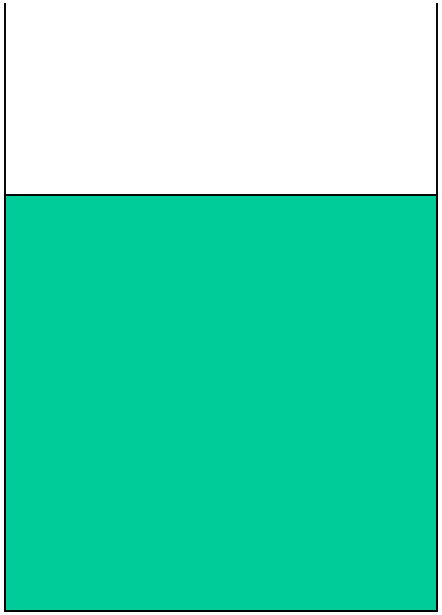
This is copper chloride.

Copper chloride is made of the **elements** …

The atoms are **joined**, so copper chloride is a …

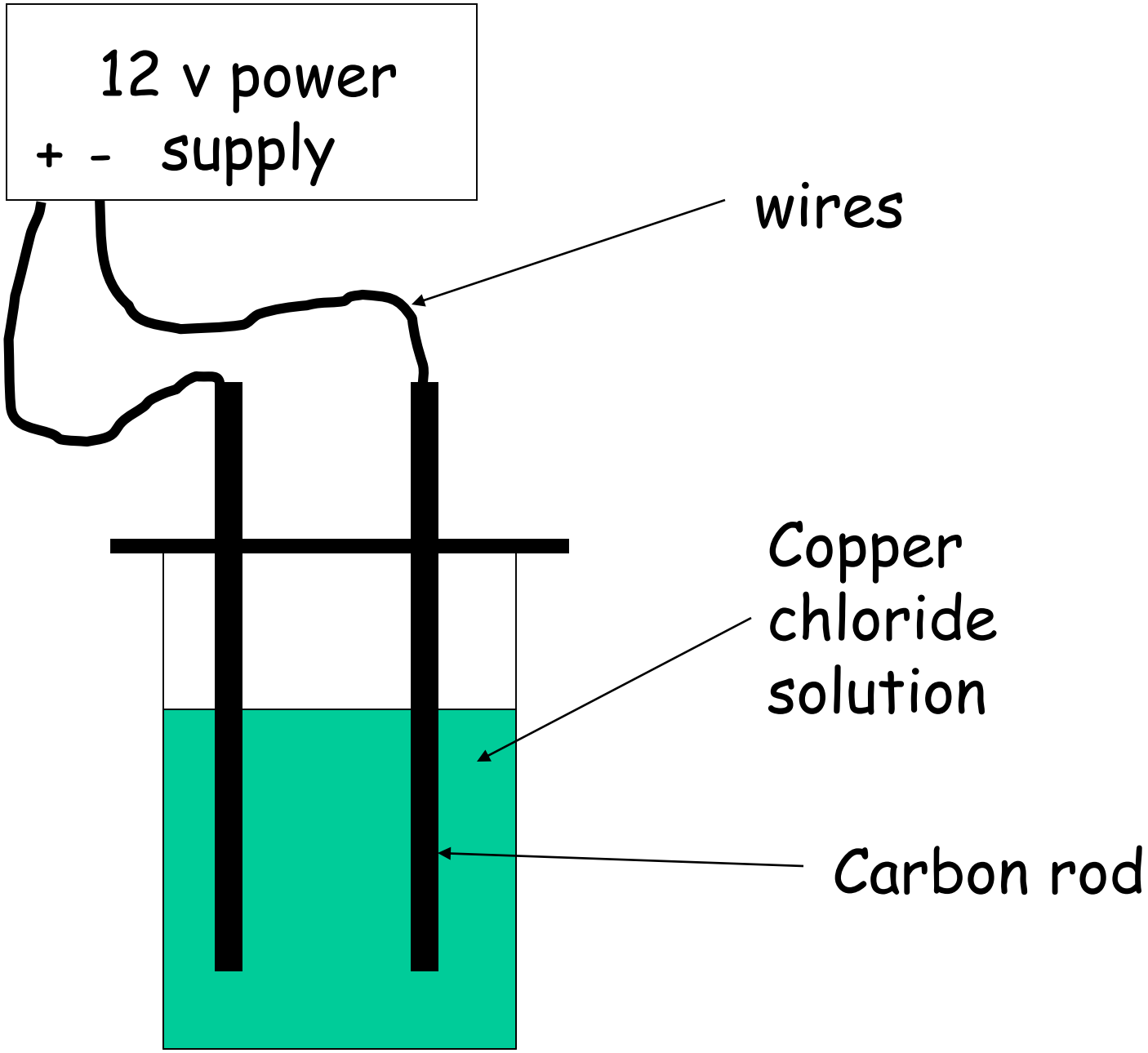


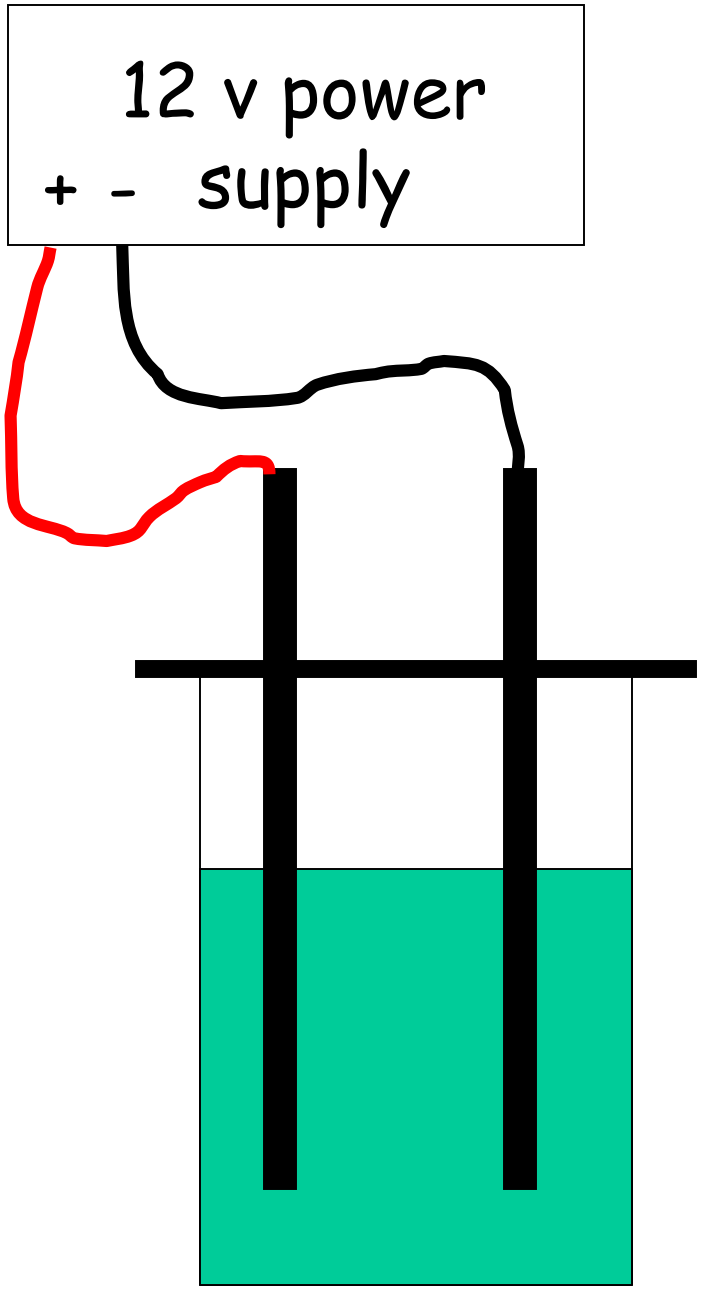
Copper choride is soluble in water. It dissolves to form a green / blue solution.



Our job is to try to **separate the atoms of copper and chlorine** in the solution.

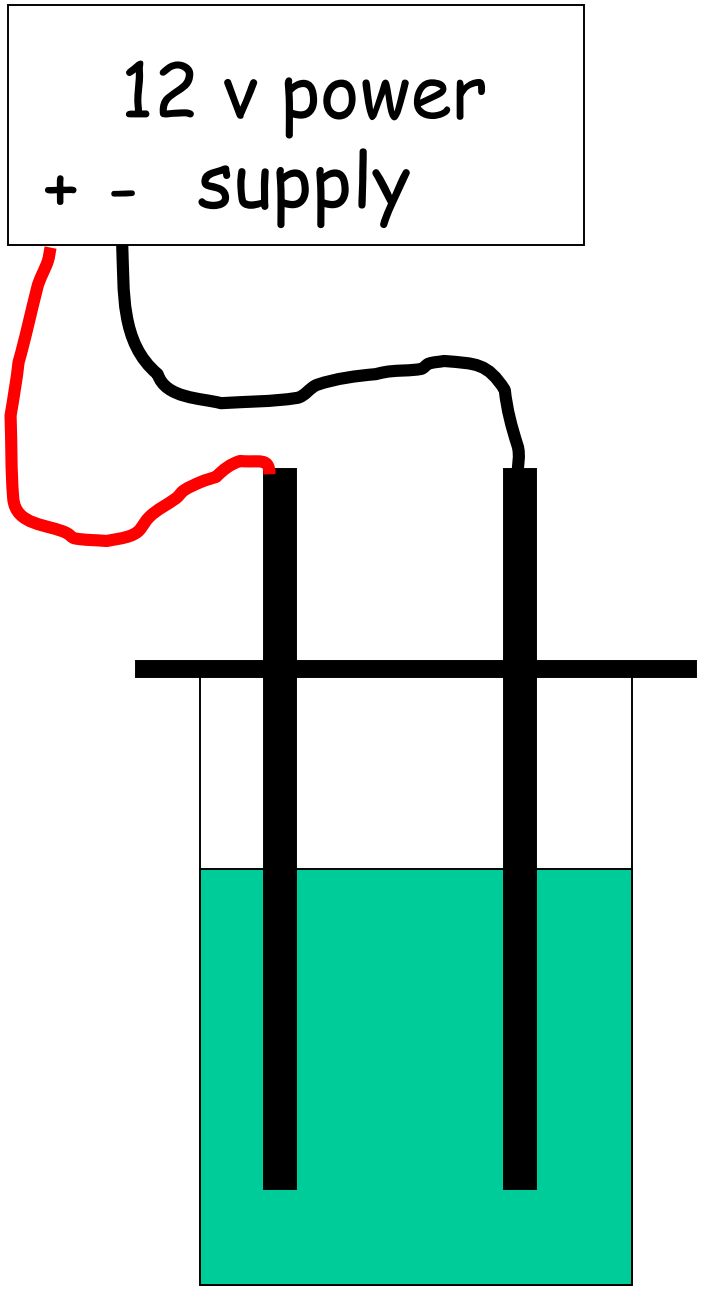
To make this happen we need to put **energy** in. This energy is in the form of **electricity**.


12 v power
+ - supply
wires
Copper
chloride
solution
Carbon rod



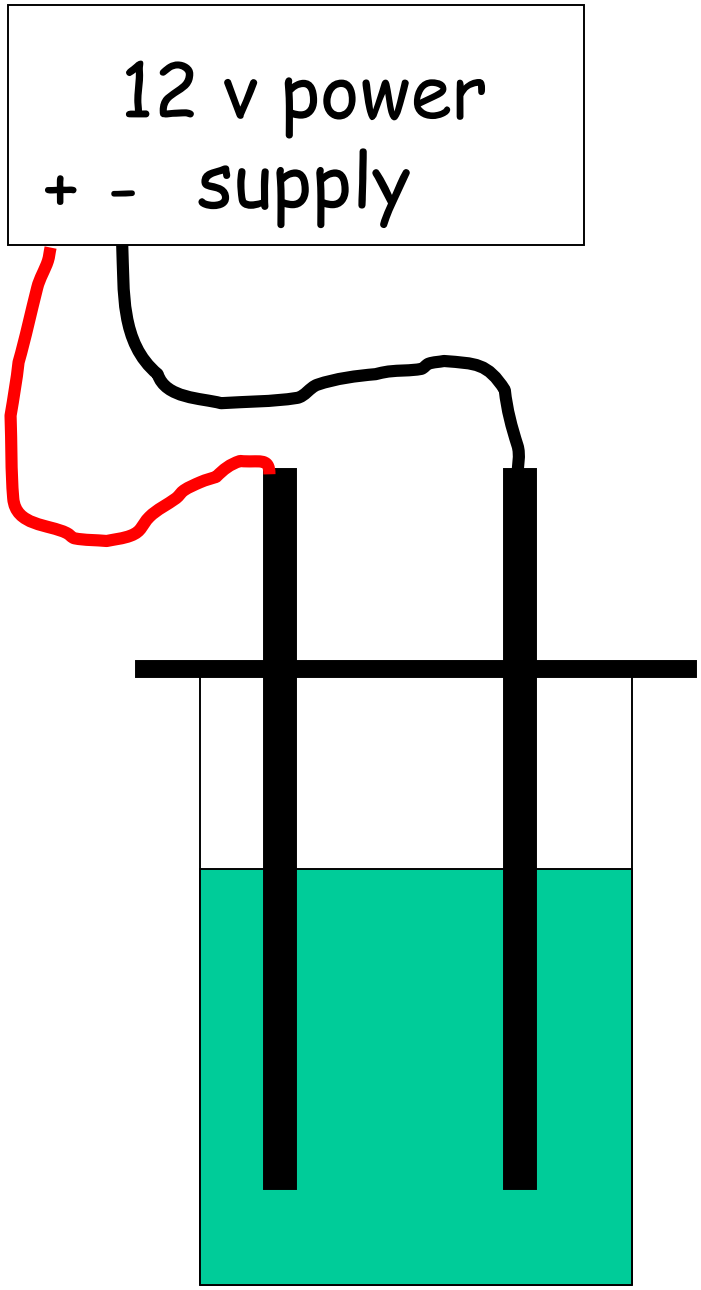
Use a **red** wire to attach one carbon rod to the **positive (+)** side of the power pack

Use a **black** wire to attach one carbon rod to the **negative (-)** side of the power pack



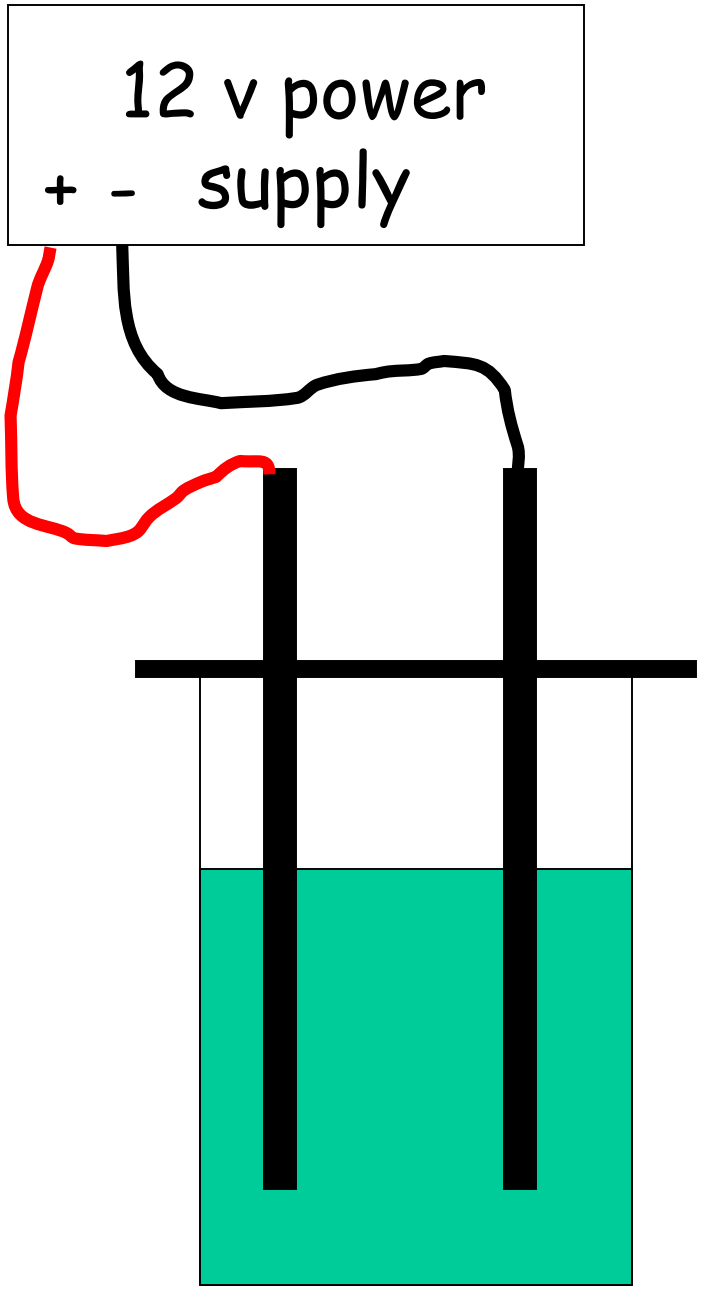
The **positive (+)** side of the power pack is called the **anode**.

The **negative (-)** side of the power pack is called the **cathode**.

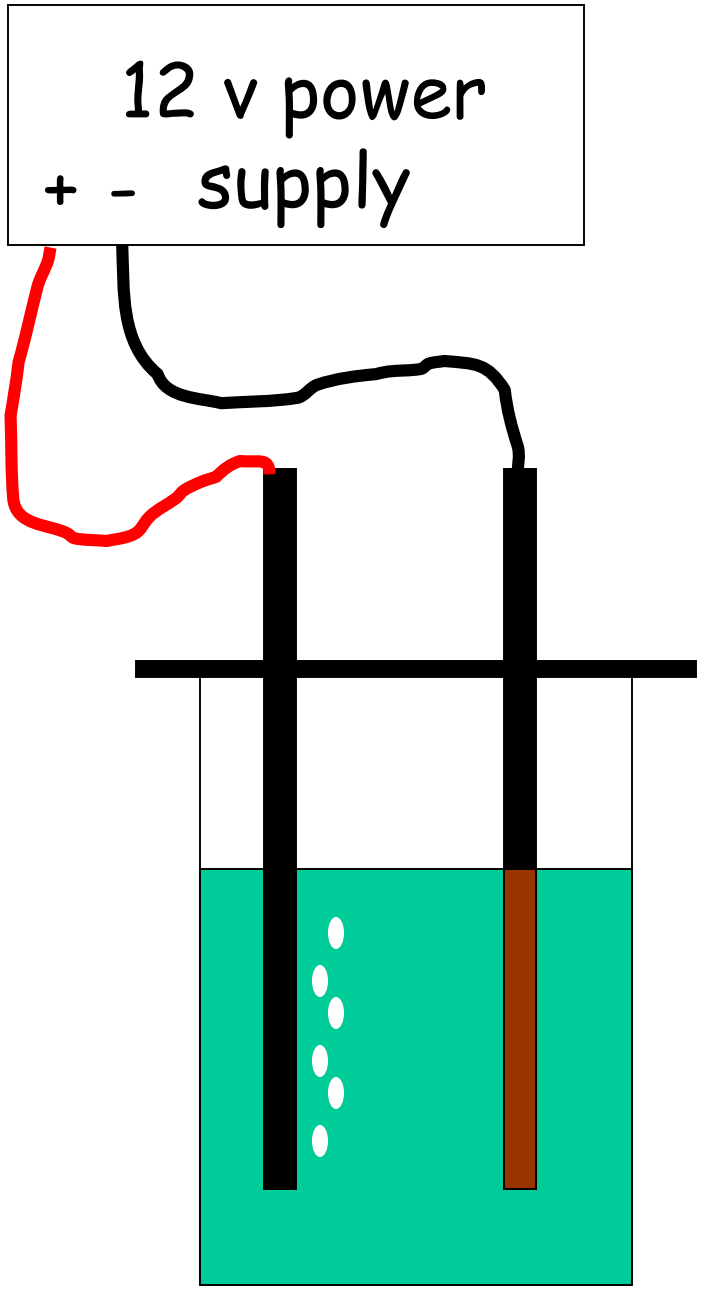


How will we know if we get chlorine?

How will we know if we get copper?

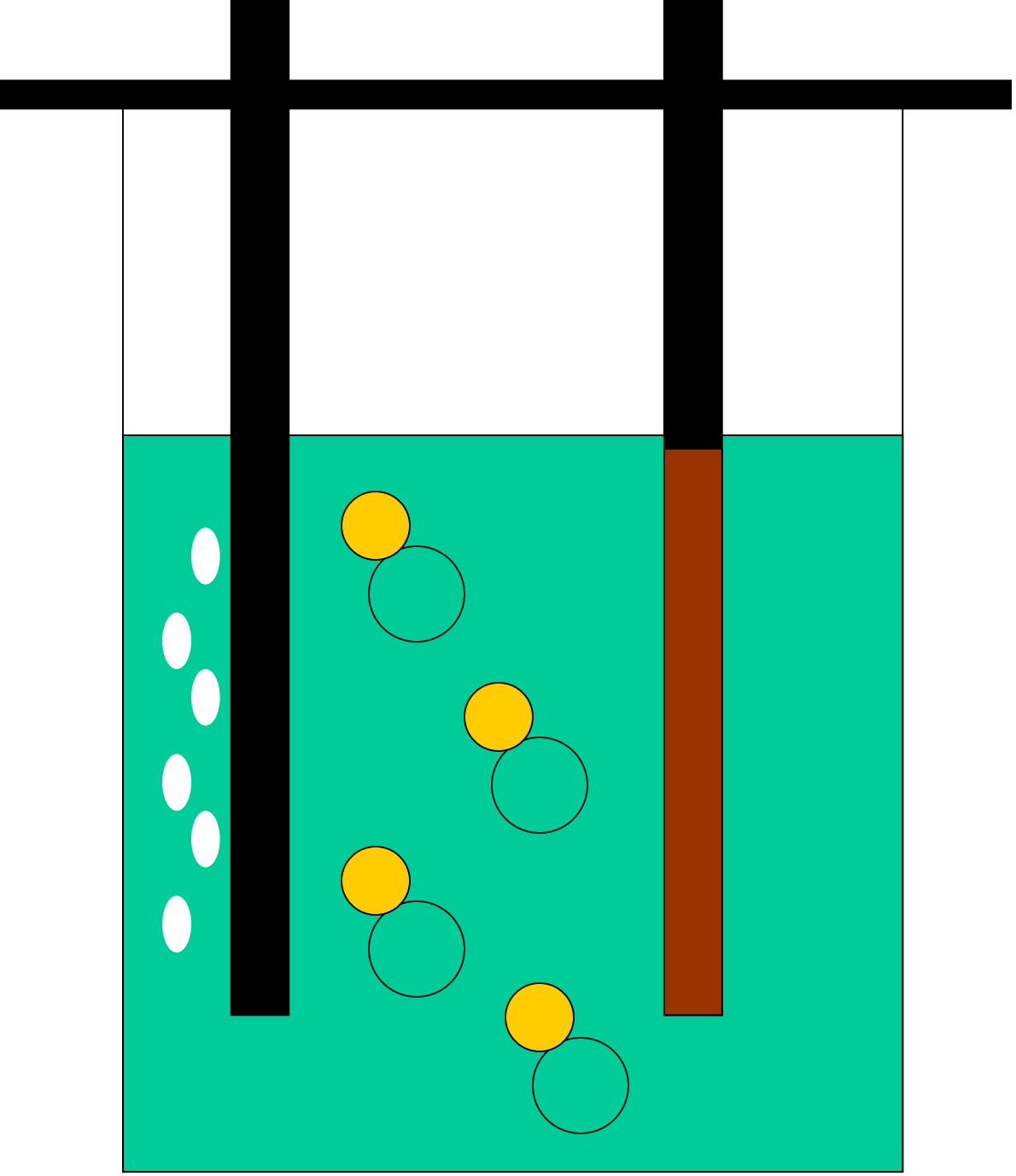


- Switch on
- Watch
- Sniff **gently**

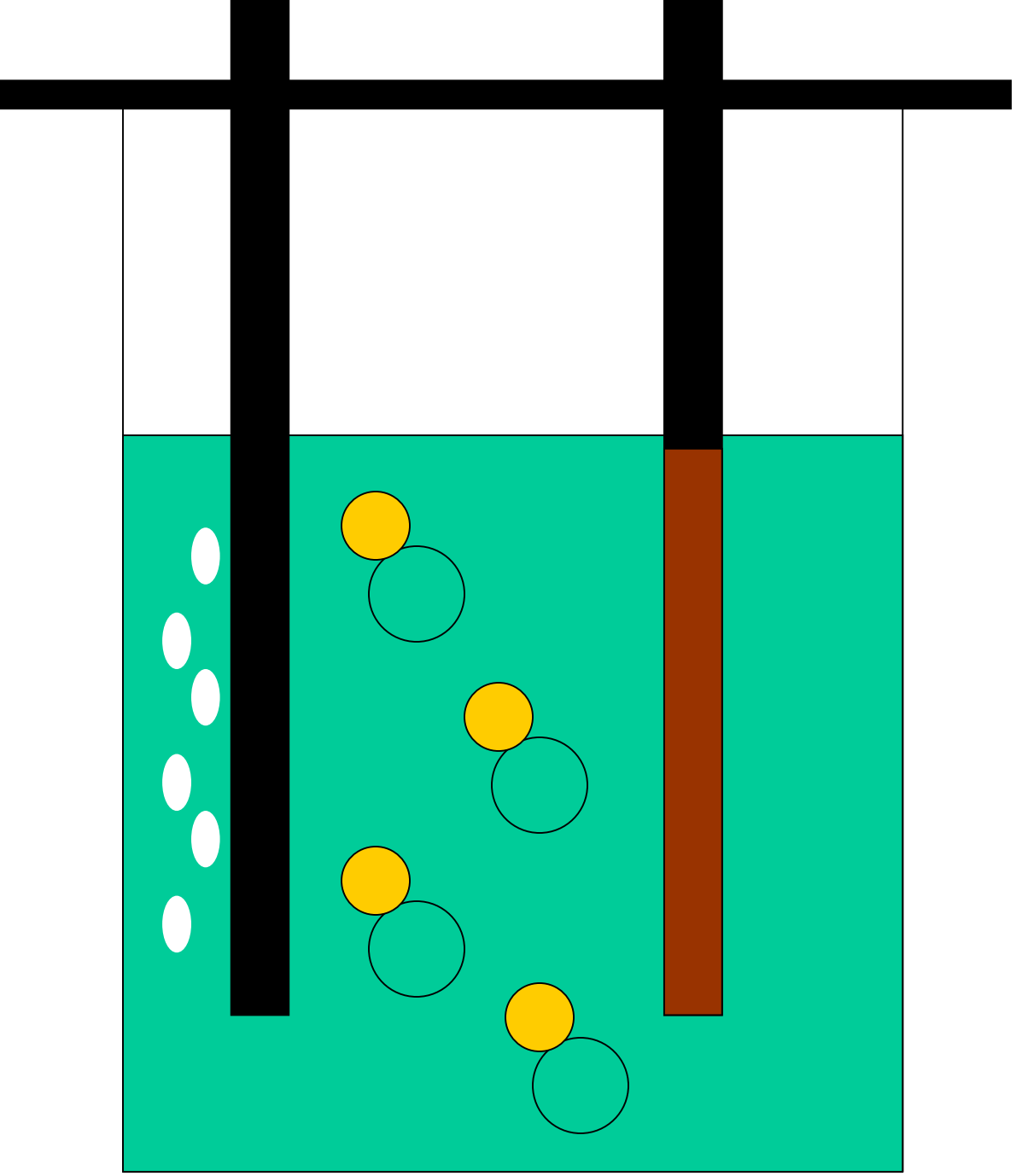


A reddish brown solid formed on the negative rod. This must have been ..

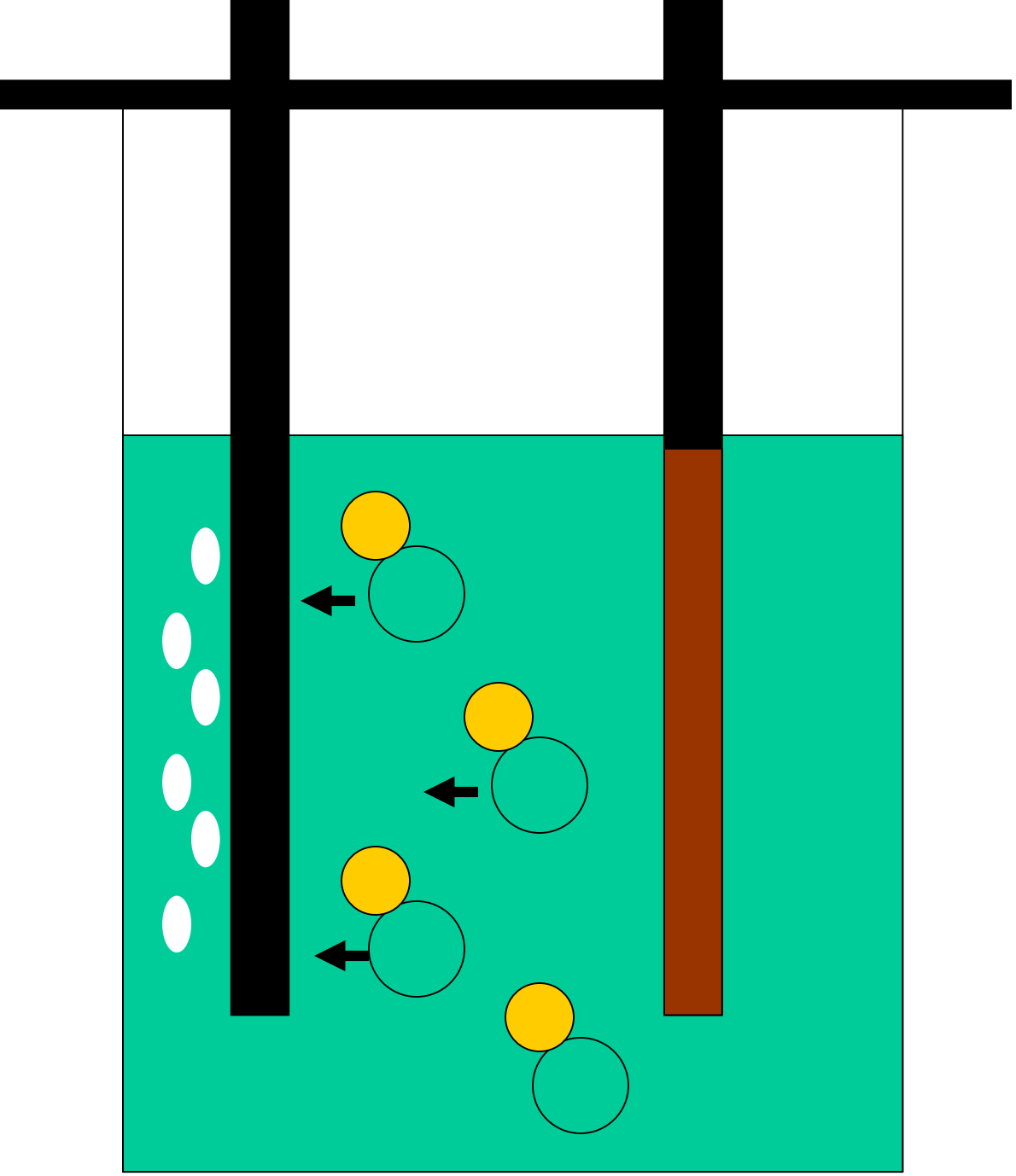
Bubbles of 'swimming pool' gas came off from the positive rod. This must have been ..



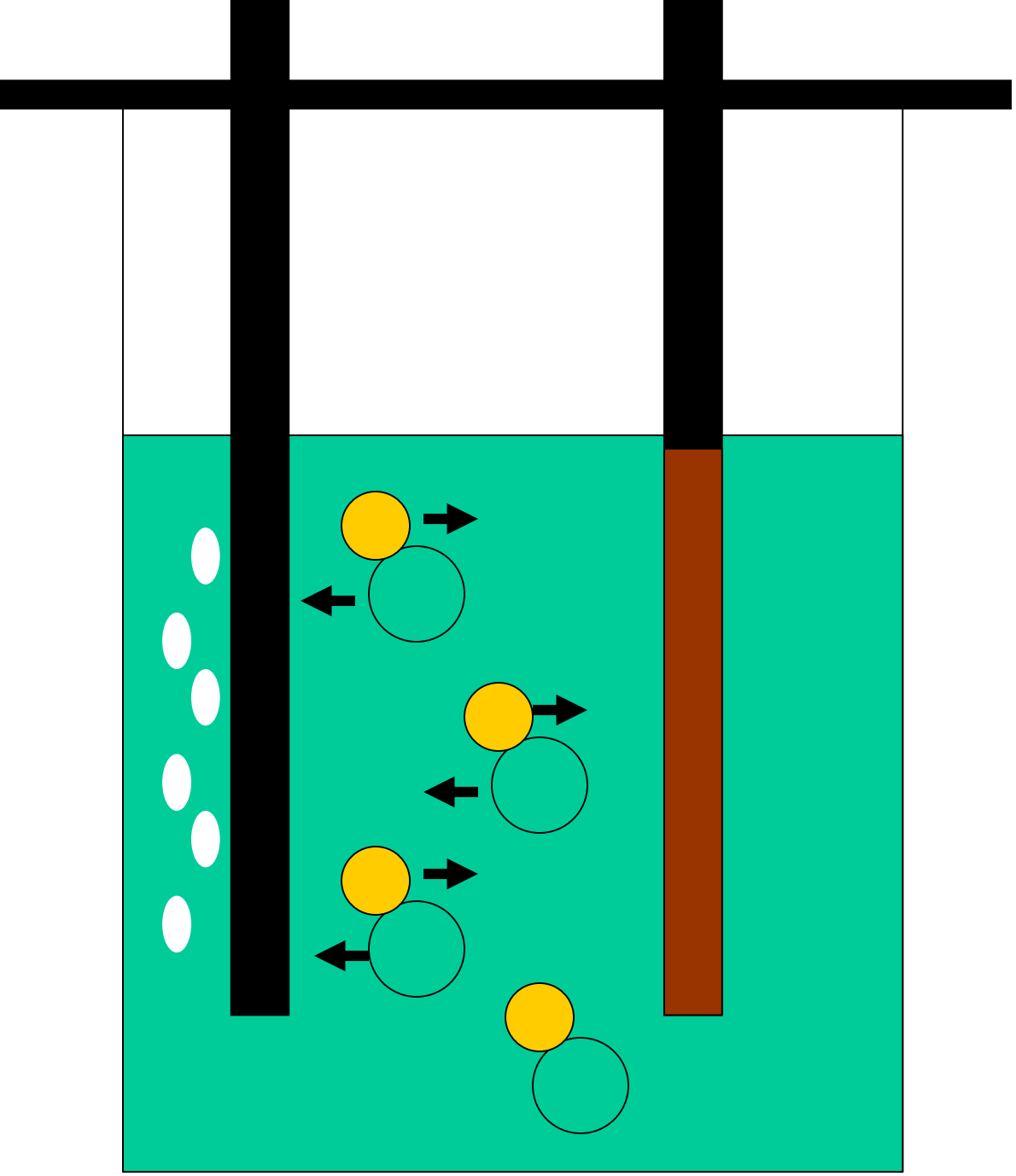
Atoms of copper and atoms of chlorine are **joined** to make **copper chloride**.



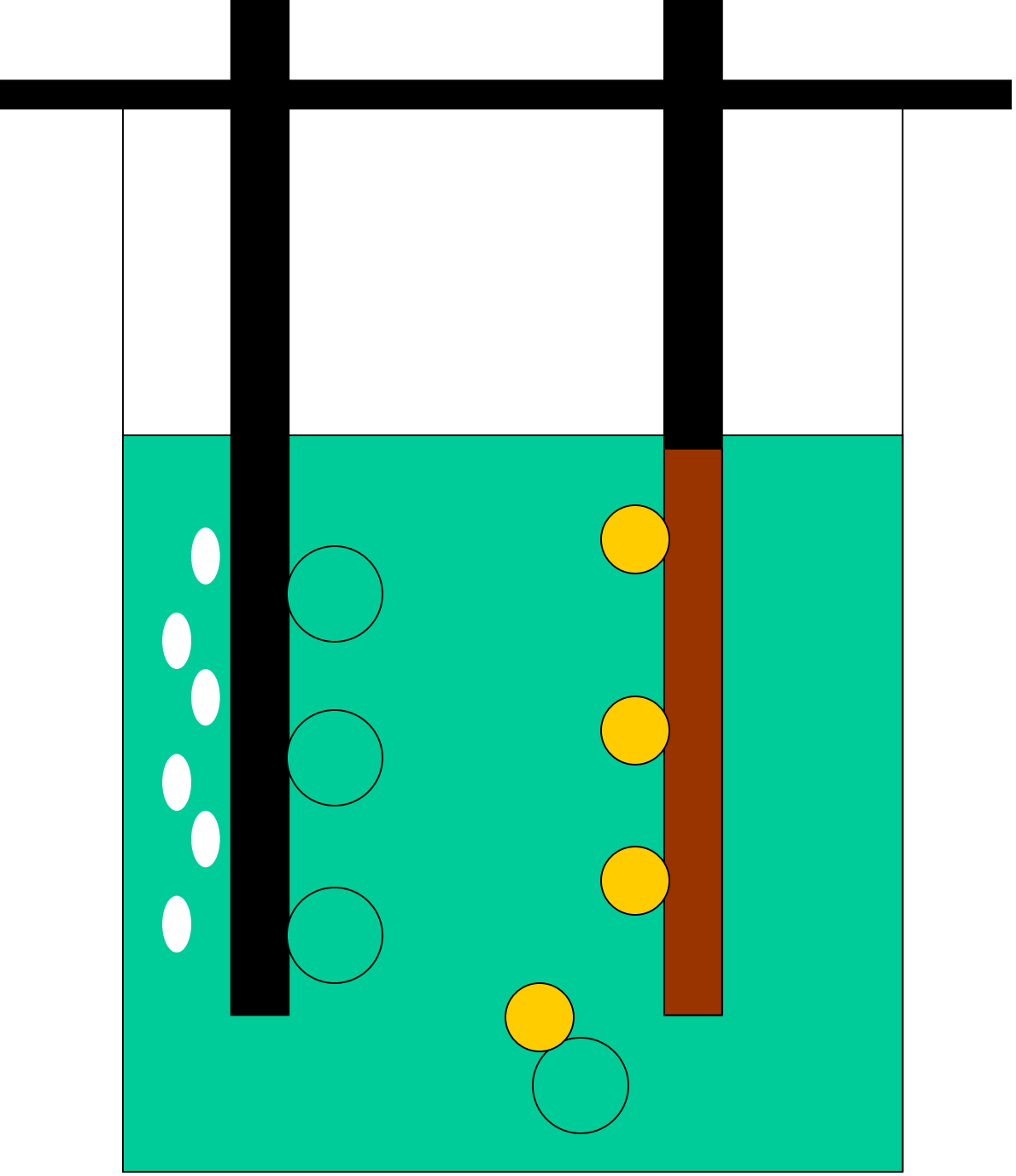
The electricity attracts the different atoms to different rods.



Chlorine is attracted to the **positive rod.**

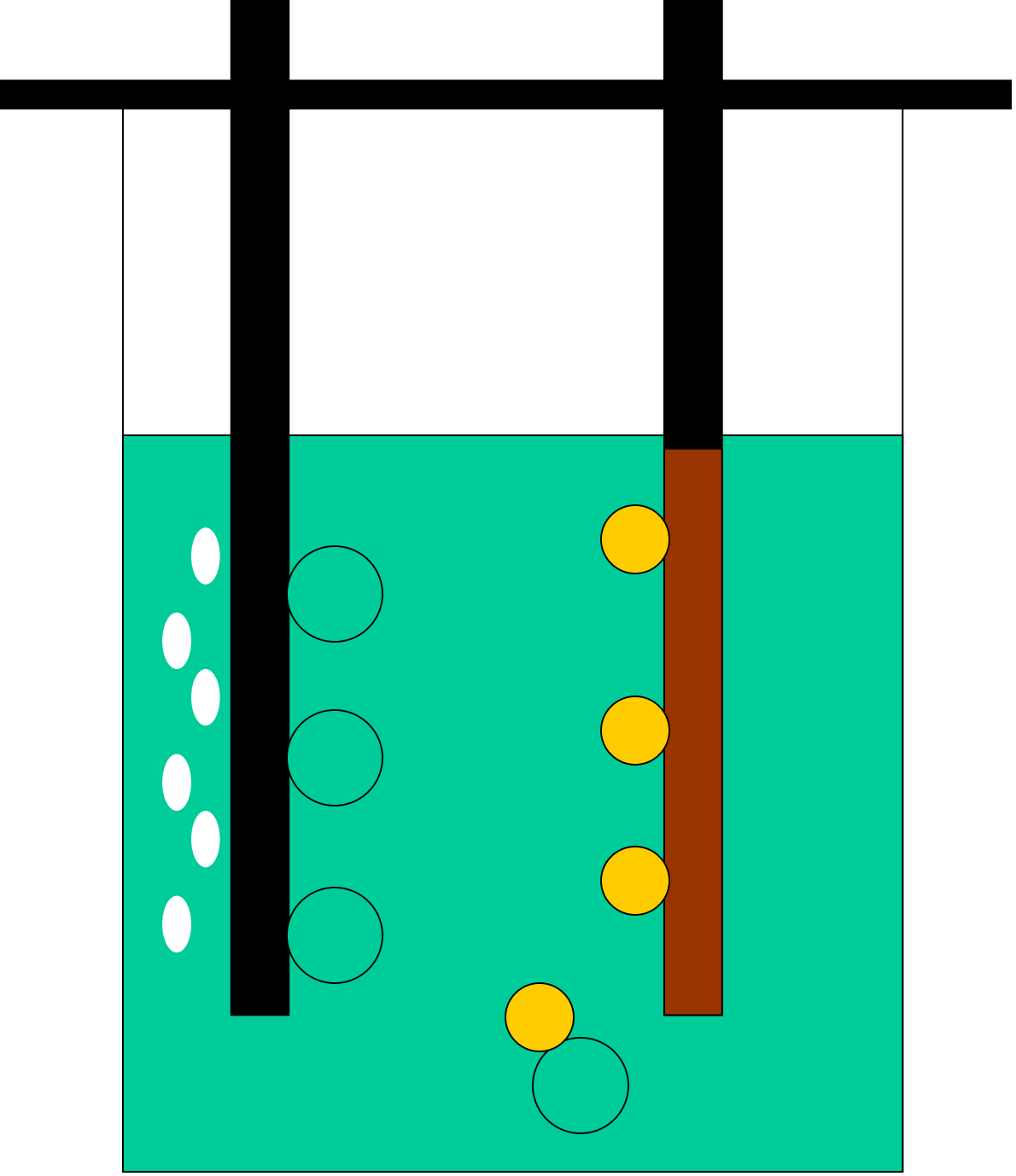


The energy from the electricity pulls the different atoms apart. .



We now have only copper atoms at the negative rod. This is pure copper element.

It shows up as a reddish brown solid on the rod.



We now have only chlorine atoms at the positive rod. This is pure chlorine element.

It shows up as bubbles of chlorine gas.

Target –

Write chemical equations

$5 + B = 12$

What is B?

How did you work it out?

$$5 + B = 12$$

This is an example of an **equation**.

The word equations starts like **equal**.

In an equation whatever is on one side is **equal** to the other.

Magnesium + oxygen → **magnesium oxide**

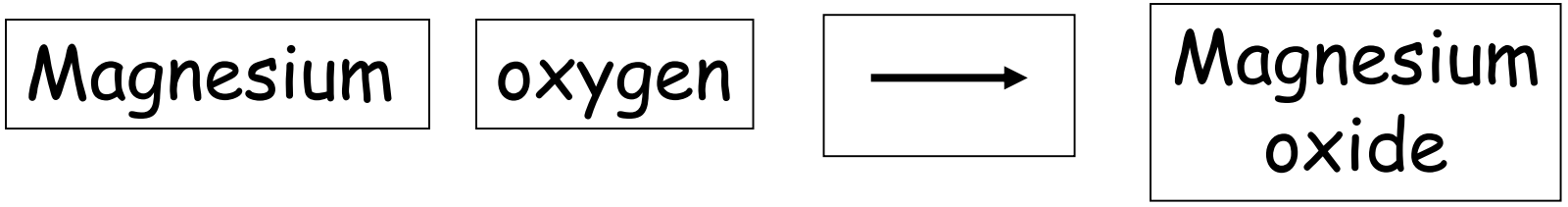
This side of the equation is the **reactants**. They take part in a **reaction** to make …

… the **products**. These are the chemicals **produced** in the reaction.

This symbol shows what changes to what.

→

Use the reaction cards to make up the equations for the reactions in Activity 9.



Fill the answers in on the sheet for Activity 9

- Take the **practice test** on the next page.
- The test is **open book** – you can go back and look things up if you need to.
- When you are finished, you will need to **mark** someone elses test.

I know that a chemical reaction has taken place because I can detect –

- A change in **temperature**
- A change in **state** (solid, liquid, gas)
- A change in **colour**
- A change in the **chemicals** present (new products)

All chemical reactions involve some form of **change**.

Changes

Physical changes

Changes in the **properties** of the chemicals involved.

State

Colour

temperature

Chemical changes

Changes to **which chemicals are present**

New products

Energy change

Cheese melting under a grill	Physical
Skin going brown under a sunbed	Physical
Acid neutralising an alkali to form salt and water	Chemical
Sugar dissolving in tea	Physical
Tea going lighter when milk is added	Physical
Dough turning into bread in the oven	Physical
Magnesium burning to make magnesium oxide	Chemical
Copper chloride being electrolysed to copper and chlorine	Chemical

Target –

Identify common gases

Some chemical reactions have **physical** changes which go with them.

If we know what physical reaction should take place, they can be a **test** for a reaction.

Changes

Physical changes

Changes in the **properties** of the chemicals involved.

State

Colour

temperature

Chemical changes

Changes to **which chemicals are present**

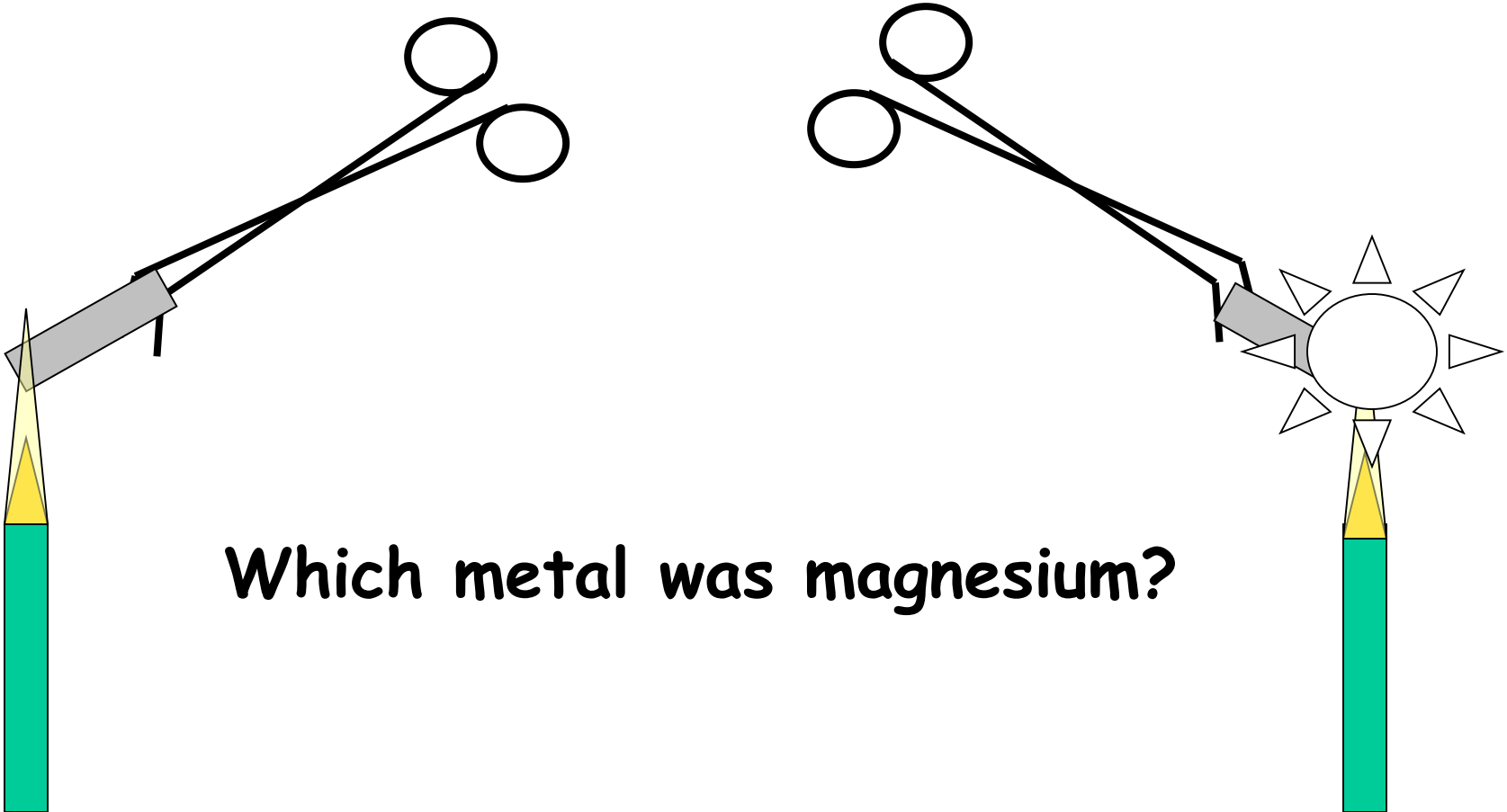
New products

Energy change

Cheese melting under a grill	Physical
Skin going brown under a sunbed	Physical
Acid neutralising an alkali to form salt and water	Chemical
Sugar dissolving in tea	Physical
Tea going lighter when milk is added	Physical
Dough turning into bread in the oven	Physical
Magnesium burning to make magnesium oxide	Chemical
Copper chloride being electrolysed to copper and chlorine	Chemical

Two silvery grey metals are held in a bunsen flame.

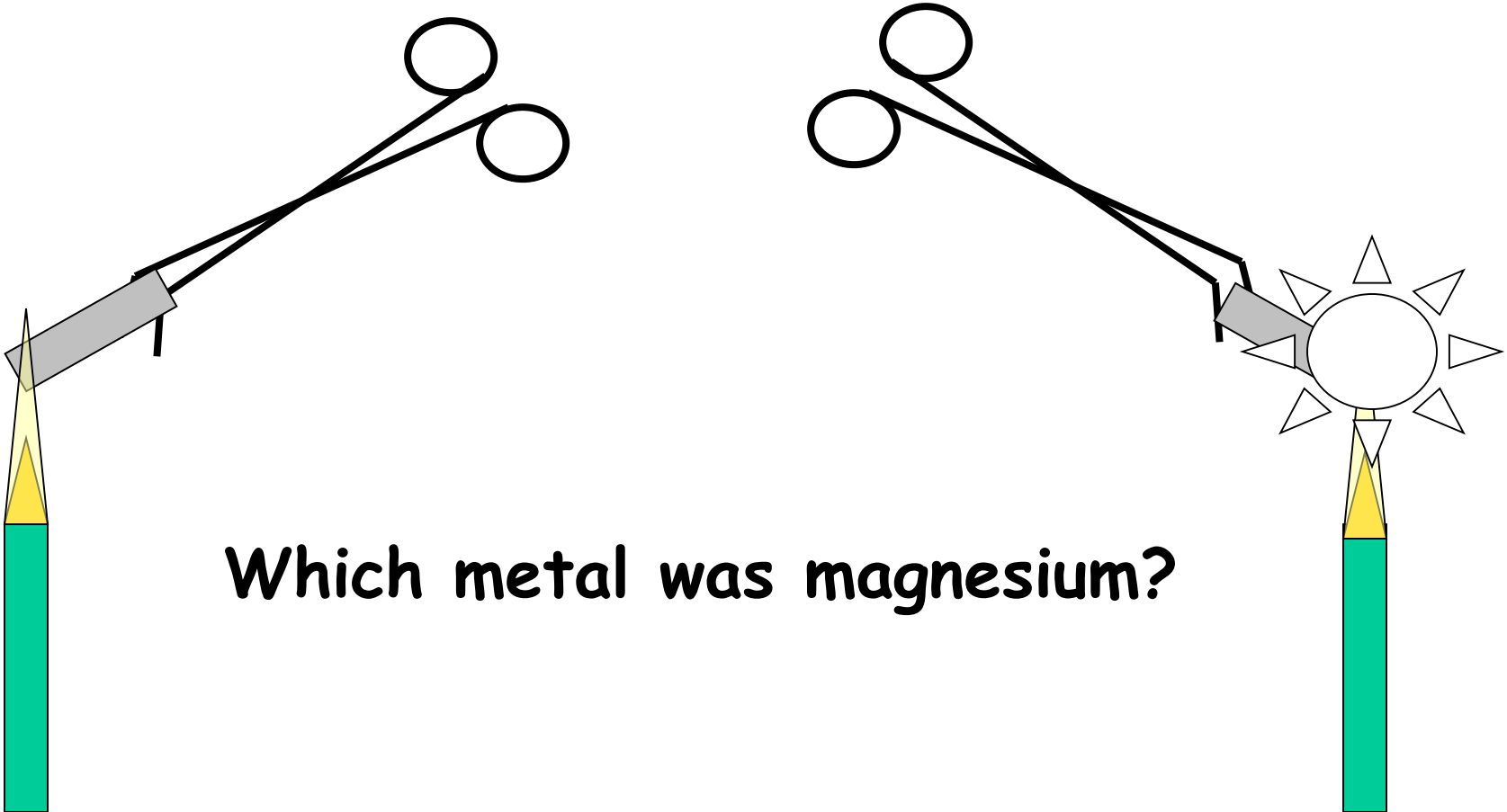
One does nothing, the other bursts into white flame.



Which metal was magnesium?

Knowing what **physical changes** we expected has given us a **test** for magnesium.

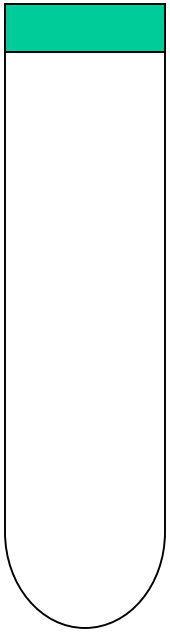
We can tell which is magnesium by the **physical changes** we see.



Which metal was magnesium?

This is a test tube of colourless gas.

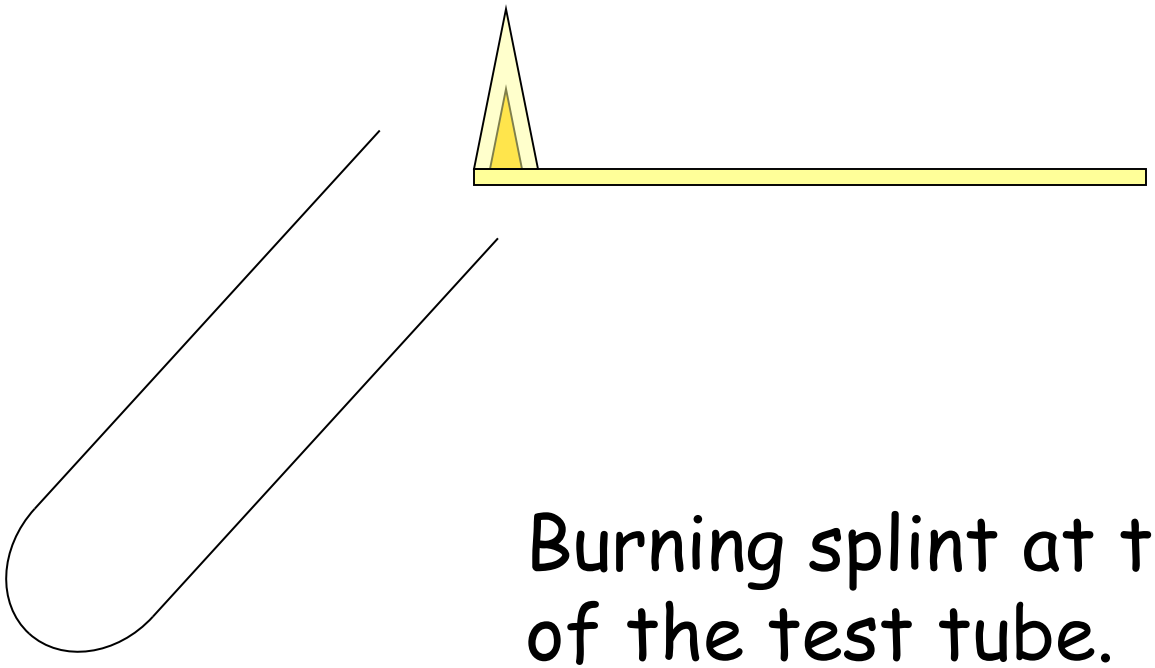
What tests could tell us what it is?



... but when is it safe for me to take my helmet off?

This is a test tube of colourless gas.

What tests could tell us what it is?

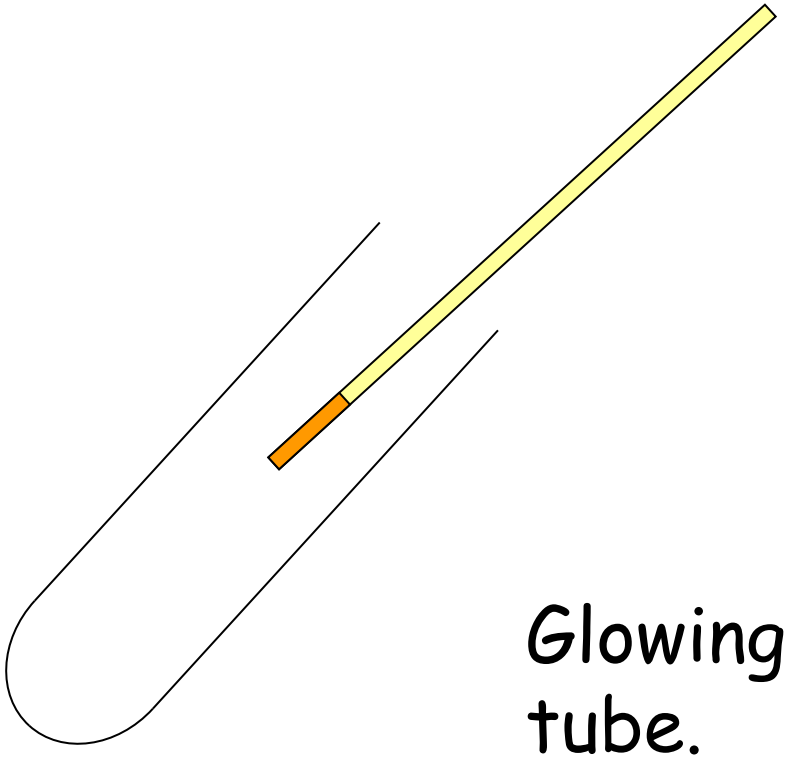


Burning splint at the mouth of the test tube.

What physical change do you see with **hydrogen**?

This is a test tube of colourless gas.

What tests could tell us what it is?

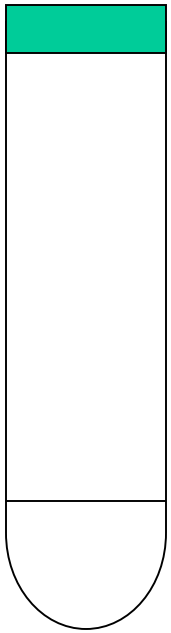


Glowing splint into the test tube.

What physical change do you see with **oxygen**?

This is a test tube of colourless gas.

What tests could tell us what it is?



Shake up with lime water

What physical change do you see with **carbon dioxide**?

Testing colourless gases

Test for	Physical change
oxygen	_____ glowing splint
hydrogen	Burns with a ____
Carbon dioxide	Turns lime water _____

Testing colourless gases

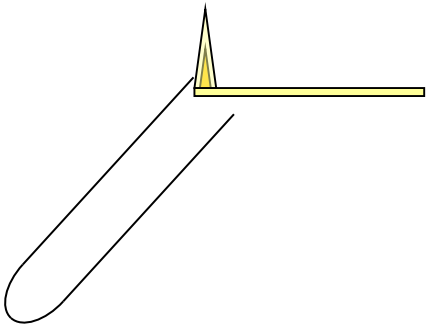
Test for	Physical change
oxygen	**Relights** glowing splint
hydrogen	Burns with a **pop**
Carbon dioxide	Turns lime water **cloudy**

Target – **identify** a gas

- I can use my knowledge of physical changes to identify oxygen, hydrogen and carbon dioxide. I can state a test and expected result for each.
- I can use my knowledge of physical changes to identify two colourless gases. I can state a test for oxygen, hydrogen and CO_2.
- I can interpret group results to identify oxygen, hydrogen and CO_2.

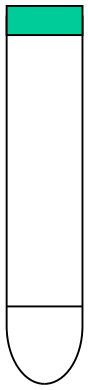
Target – **identify** a gas

Oxygen	Hydrogen	Carbon dioxide



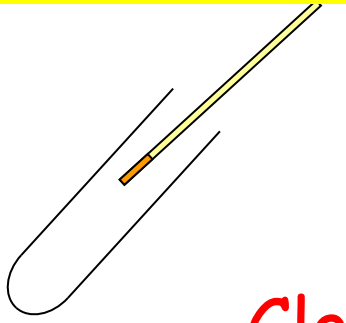
Shake with lime water

Relights



Pops

Glowing splint inside



Cloudy

Burning splint at the mouth

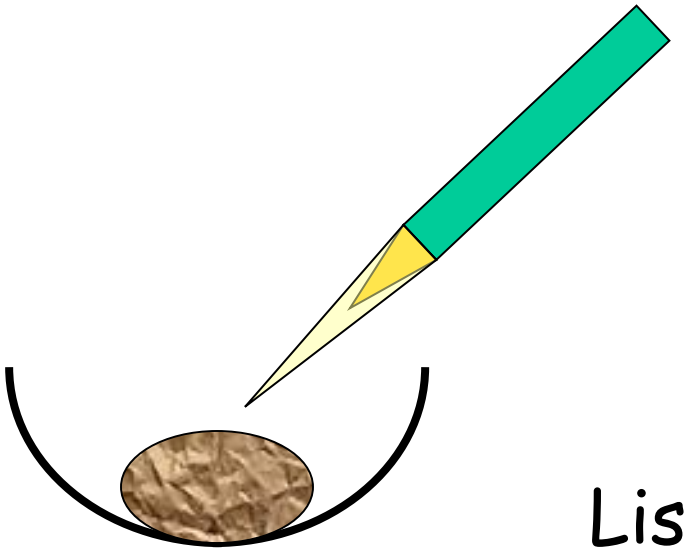
Identifying a colourless gas

We collected __ samples of gas.
In the first, we put a _____ splint at the _____, and listened for a ___. This tested to see if the gas was _____.
In the second, we put a _____ splint right _____ and looked to see if it _____. This was to show if the gas was _____.
In the last, we shook the gas with _____ _____ and looked to see if it went _____.
This was to test if the gas was _____ _____.
The test that worked was .....
This showed that our gas was .....

Target -

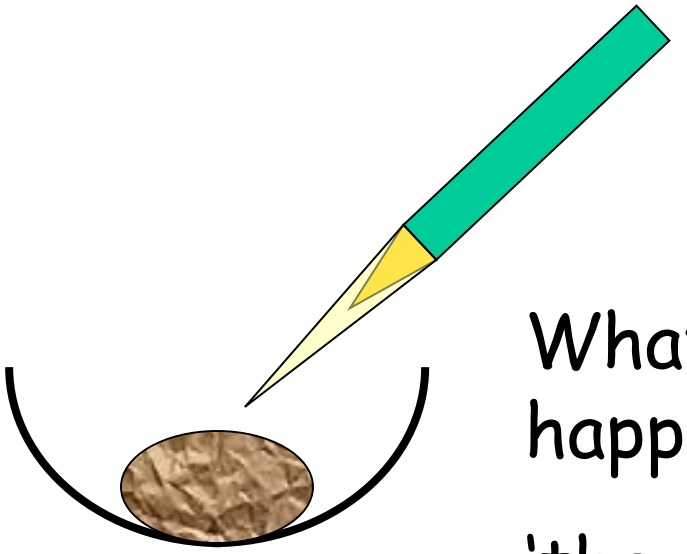
Design chemical races

What affects how quickly wood burns?



List 5 things you could change to win the race.

How does the size of the pieces affect how quickly wood burns?

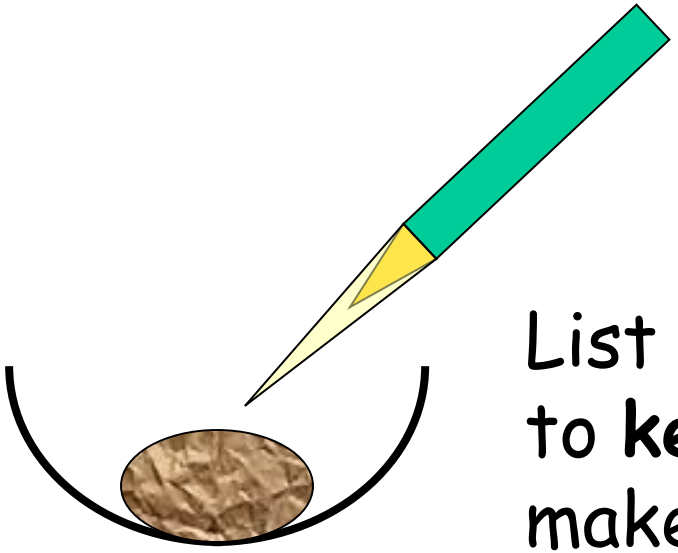


What do you think will happen –

'the small the pieces the _____ it will burn.'

Our race is between –

- Sawdust
- Shavings
- Lump



List 3 things you need to **keep the same** to make the experiment **fair**.

Results

Size of particles	Time for sample to burn
sawdust	
shavings	
lump	

Conclusions (what the results mean)

The smaller the particles of wood, the _____ the sample burns.

Recording – A3 sheet; 4 essential elements

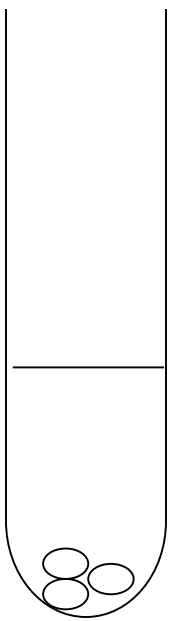
What we were trying to find out

What we did

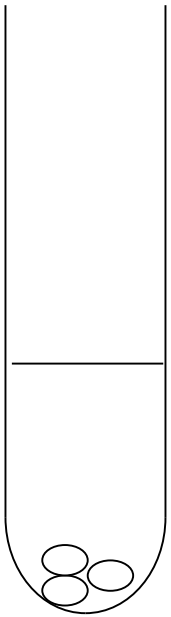
Our results

Our conclusion

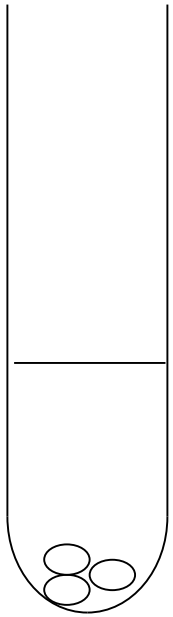
How does the concentration of acid affect how quickly it reacts with marble chips?



Strong acid



medium acid



weak acid

Conclusion -

The stronger the acid, the _____ it reacts with marble chips.

Conclusion -

The stronger the acid, the **faster** it reacts with marble chips.

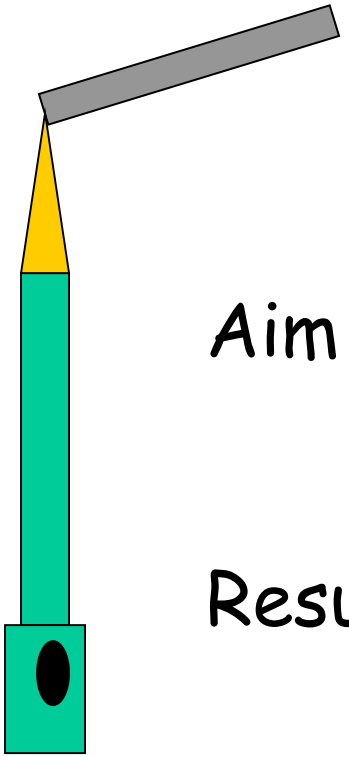
Conclusion -

The stronger the acid, the **faster** it reacts with marble chips.

Each group will get a diagram of an experiment.

Your job is to –

- **Fill in any labels missing**
- **Write the <u>aim</u> of the experiment (what you are trying to find out)**
- **Write a sentence to describe the <u>result</u> of the experiment (what happened)**

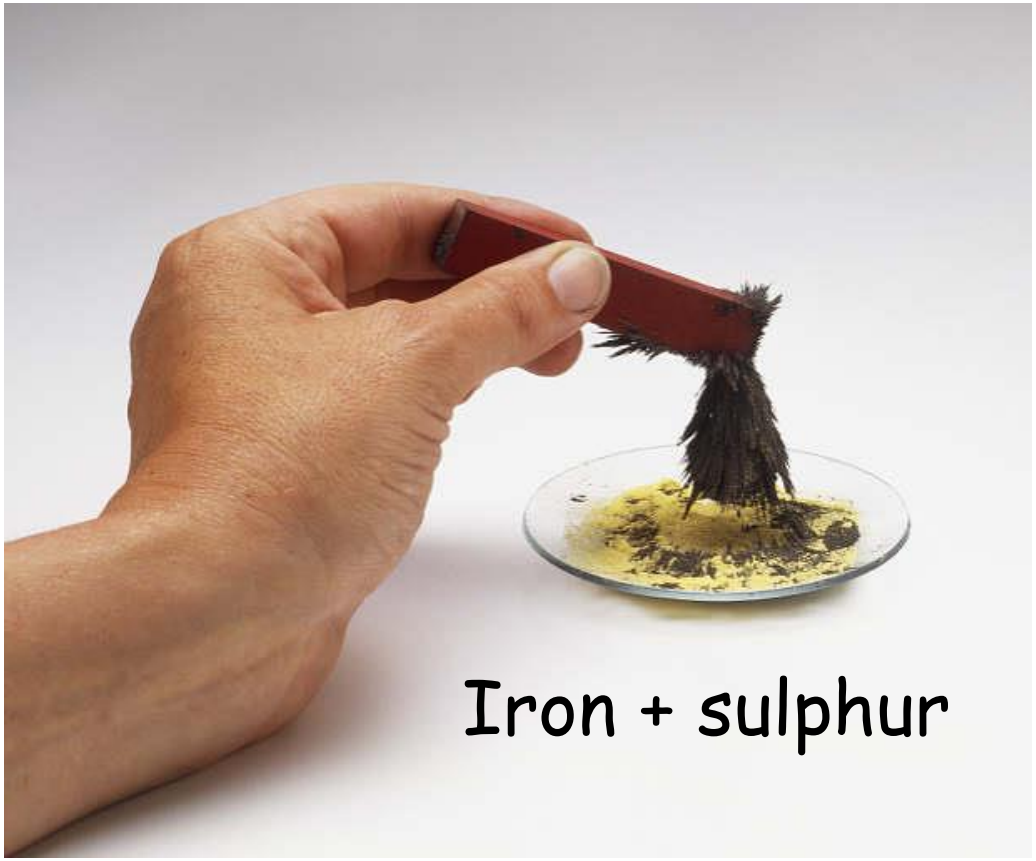


Magnesium ribbon

Aim -

Result -

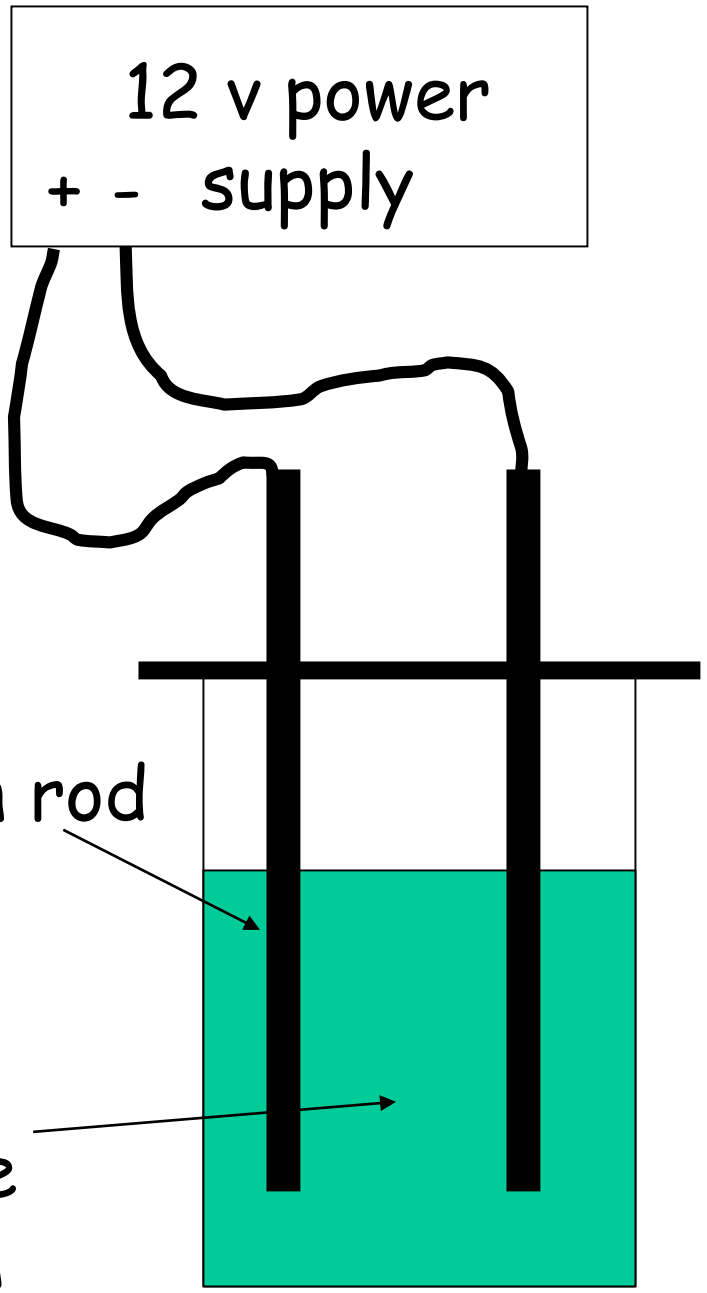
What this was trying to show -



Aim –

Result –

What this was trying to show -



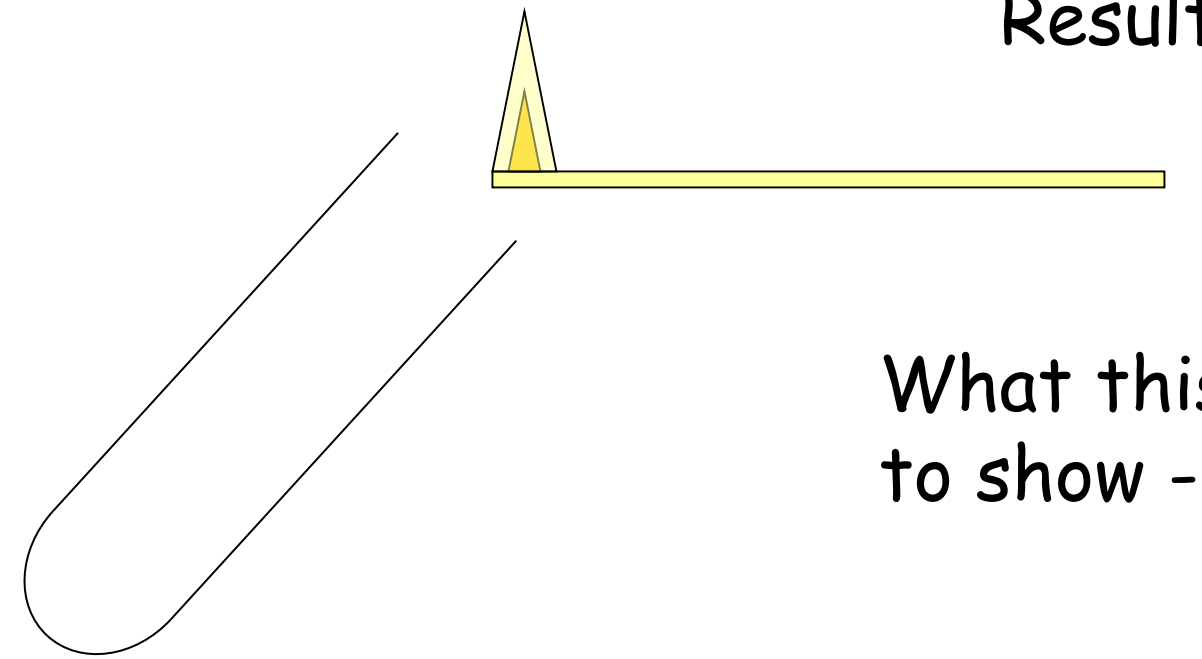
Aim -

Result -

What this was trying to show -

Aim -

Result -

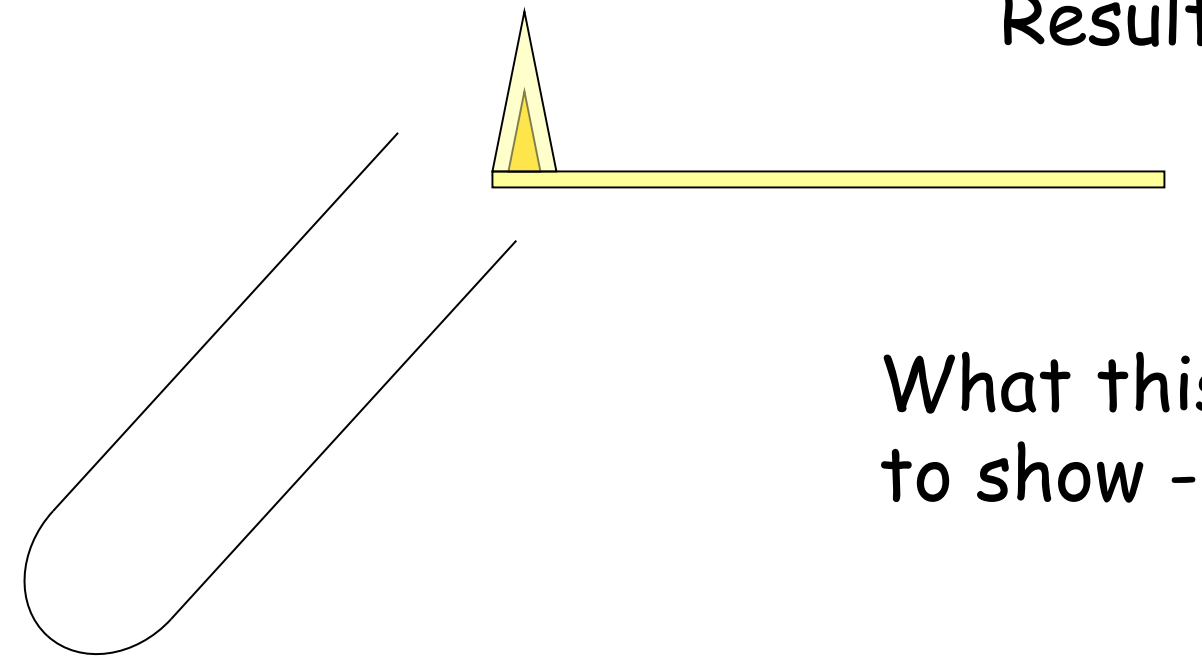


What this was trying to show -

-------- gas

Aim -

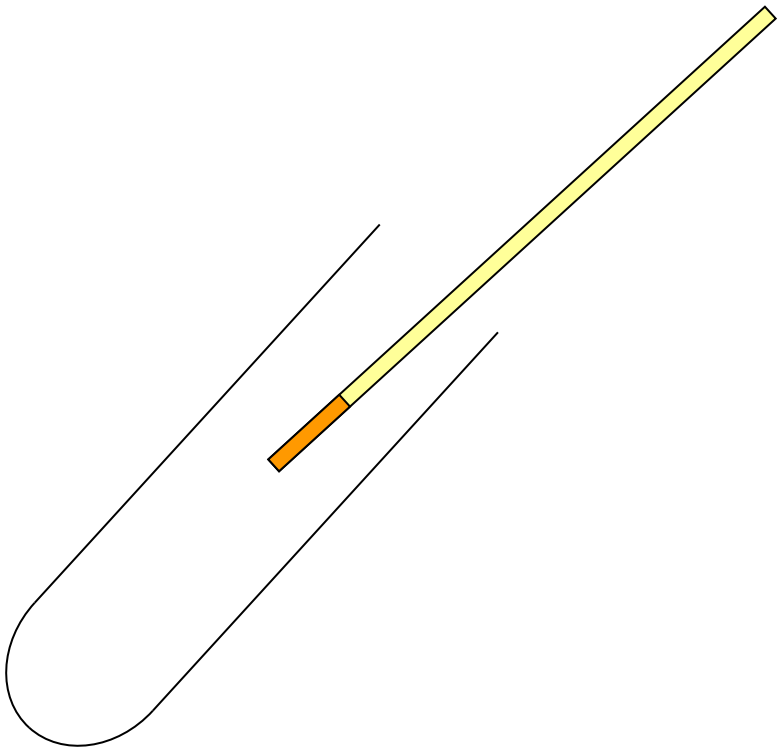
Result -



What this was trying to show -

-------- gas

Aim -



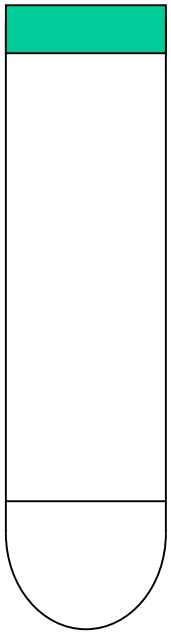
Result -

What this was trying to show -

-------- gas

Aim –

Result –



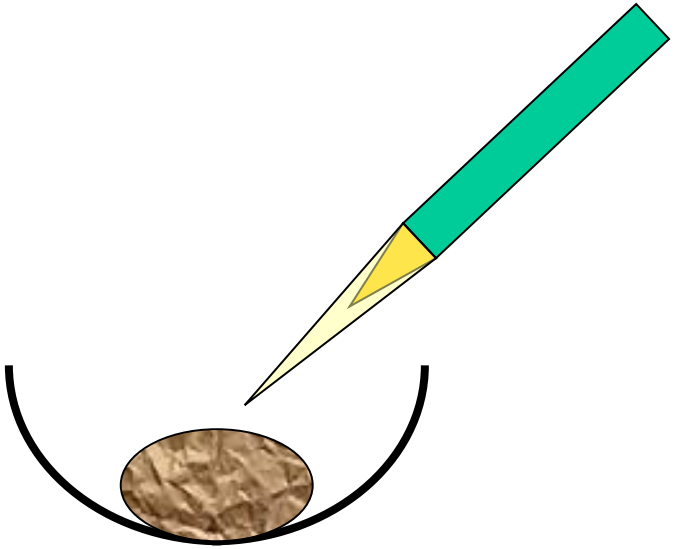
Lime water

What this was trying to show -

-------- gas

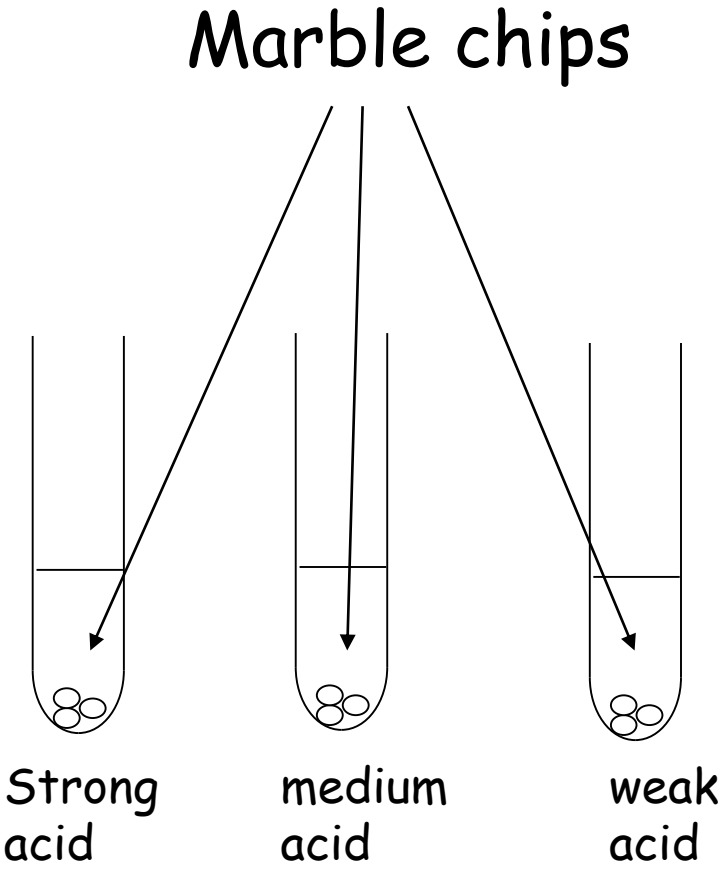
Aim -

Result -



Wood samples

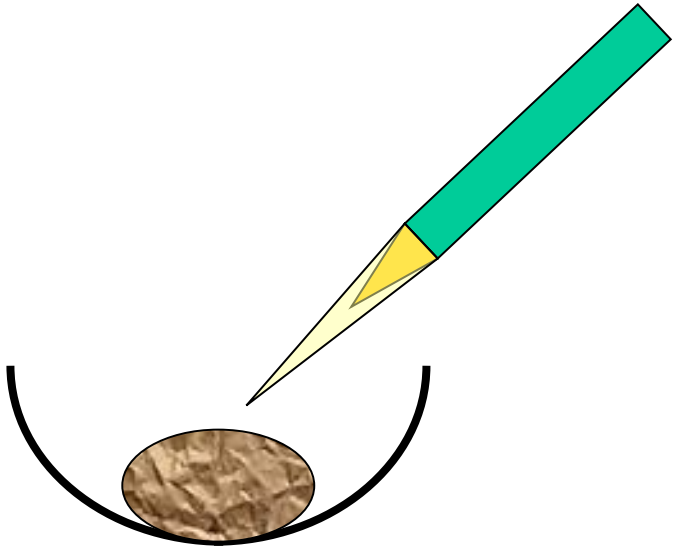
What this was trying to show -



Aim -

Result -

What this was trying to show -

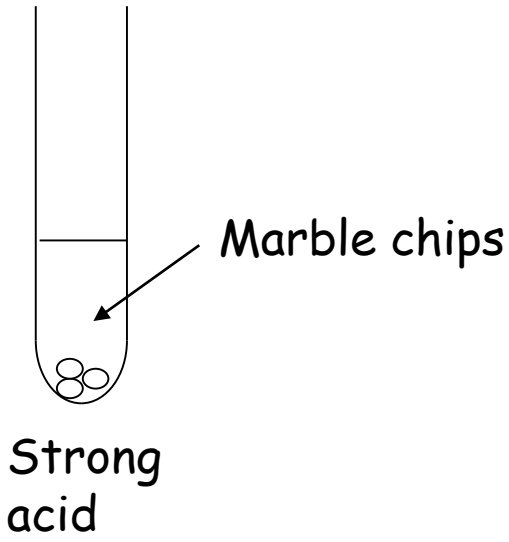


Sam did the experiment with sawdust, wood shavings and a wooden block. He timed how long it took for them to burn completely.

Type of wood	Time to burn (min)
sawdust	3
shavings	8
block	10

Draw a bar graph to show the results.

Write a conclusion for the experiment.



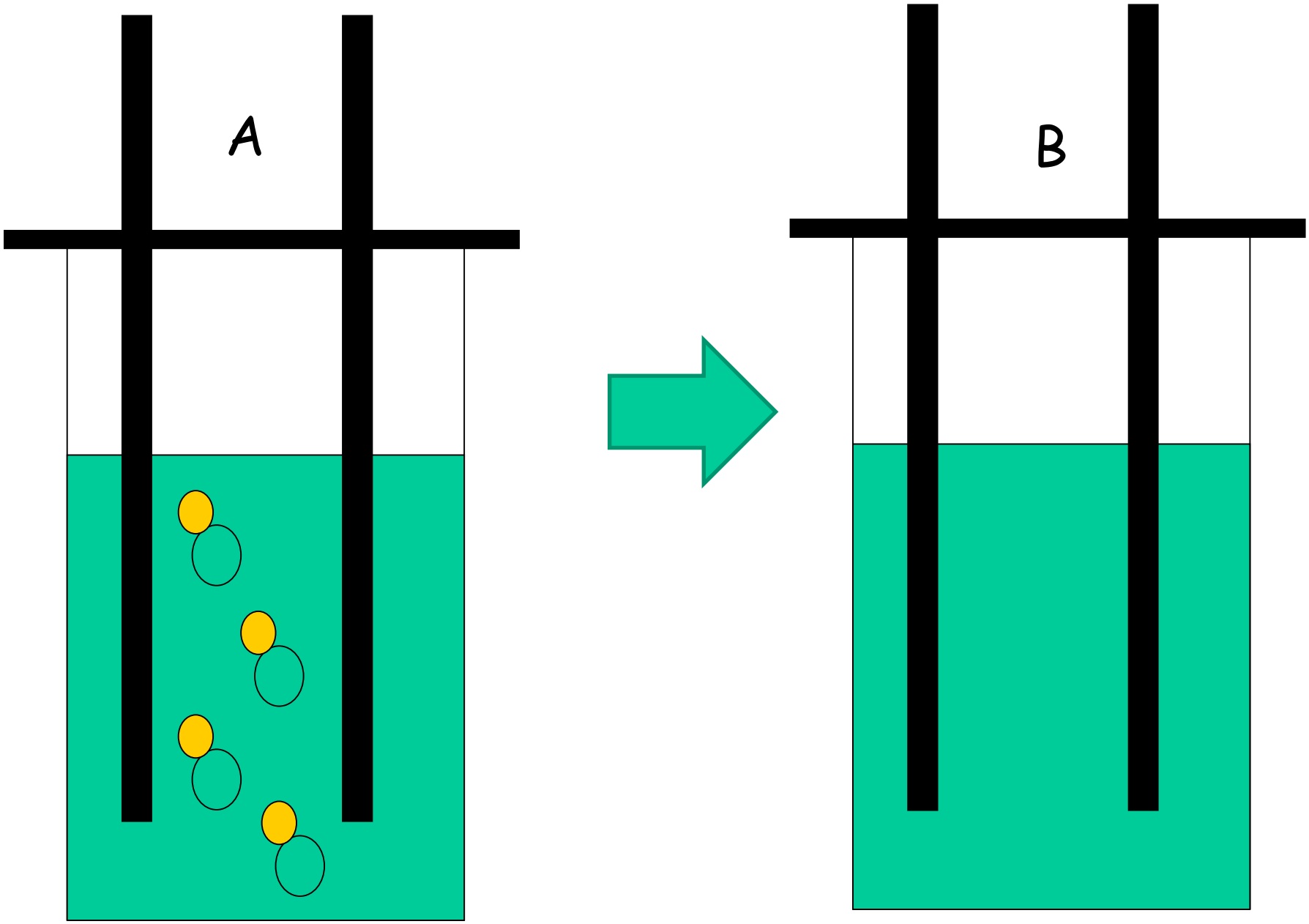
Jo did the experiment at different temperatures. She measured the time for the fizzing to stop.

Temperature oC	Time (min)
10	15
20	12
30	8
40	4
50	2
60	1

Show the results on a line graph

Write a conclusion for the experiment

Electrolysis of copper chloride



A – **label** the parts of the apparatus
Name the atoms.

B – What **physical changes** do you see?
What happens at the **two different rods**?
Draw on the **atoms** as they would be arranged now
Label the atoms

Write a note to explain –
- Why electricity was needed
- How you knew you had copper
- How you knew you had chlorine
- What has happened to the atoms of copper and chlorine