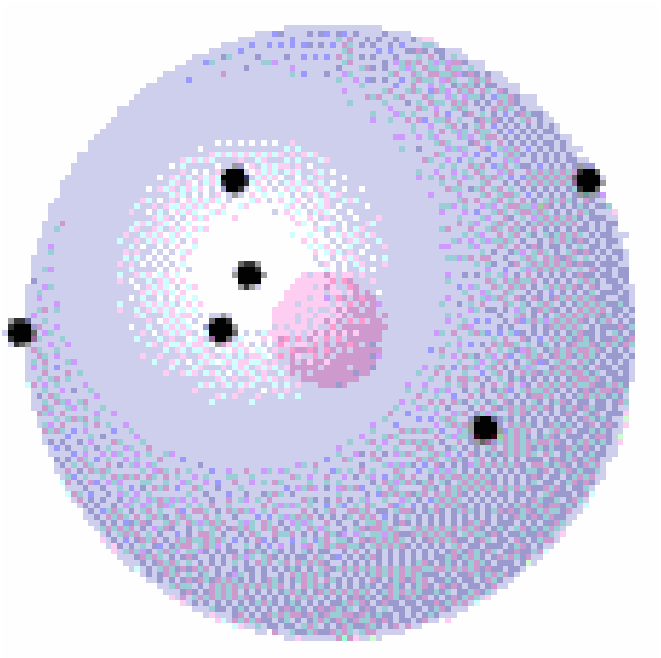
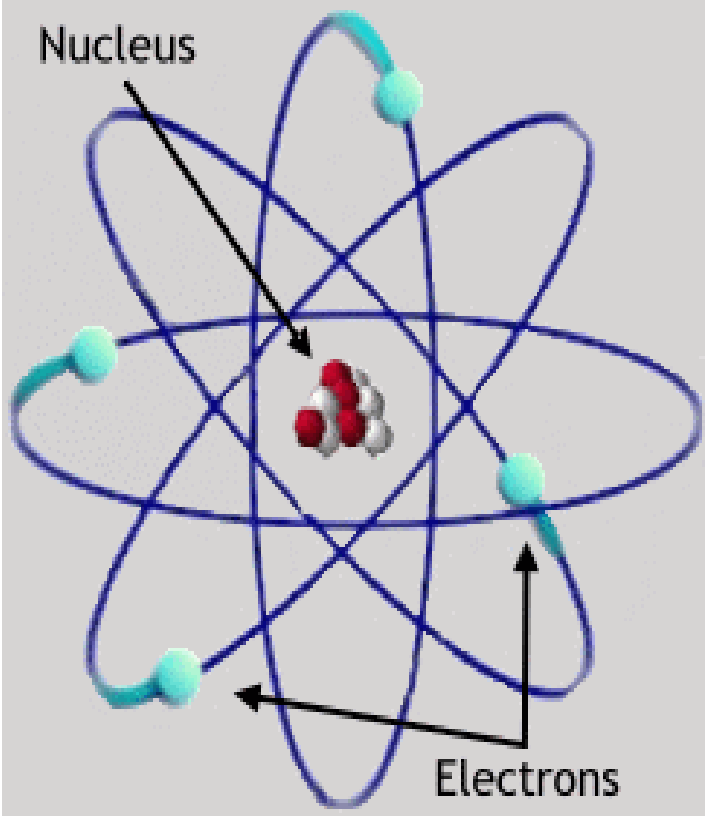
ATOMS AND ATOMIC STRUCTURE

Atom Nucleus Proton Neutron Electron

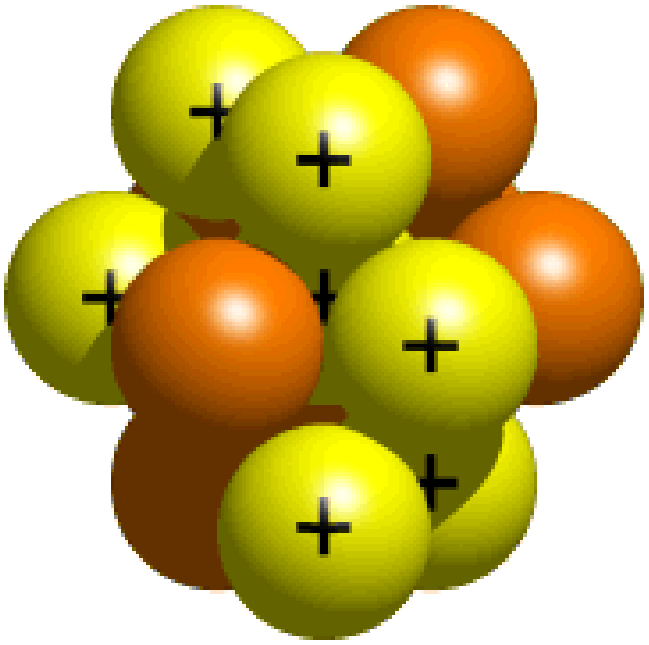


WHAT IS AN ATOM?

- **The smallest unit of an element.**
- **Consists of a central nucleus surrounded by one or more electrons.**



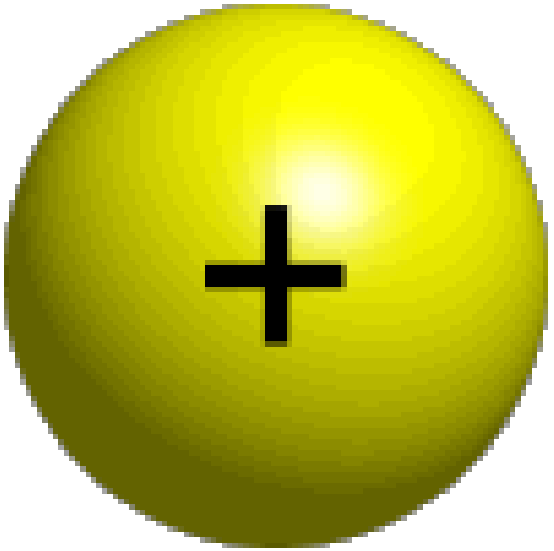
WHAT IS THE NUCLEUS?



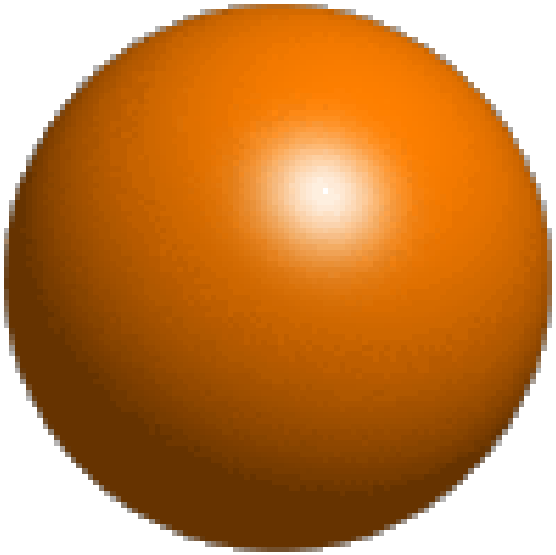
- The central part of an atom.
- Composed of protons and neutrons.
- Contains most of an atom's mass.

WHAT IS A PROTON?

- **Positively charged particle.**
- **Found within an atomic nucleus.**



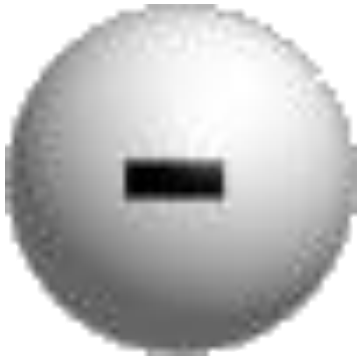
WHAT IS A NEUTRON?

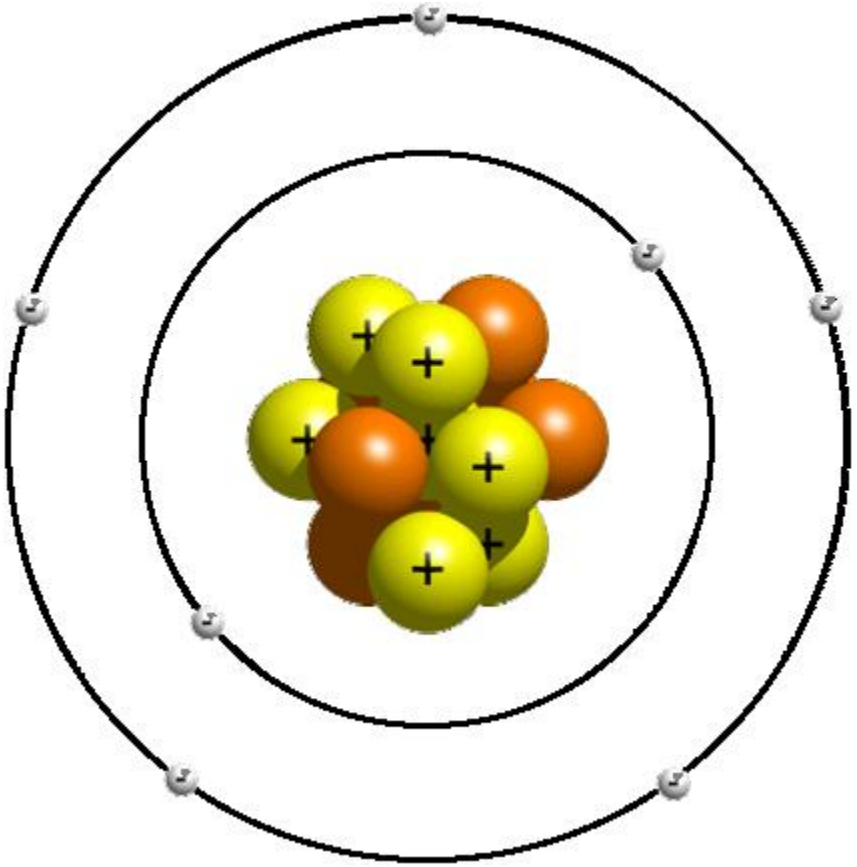


- **Uncharged particle.**
- **Found within an atomic nucleus.**

WHAT IS AN ELECTRON?

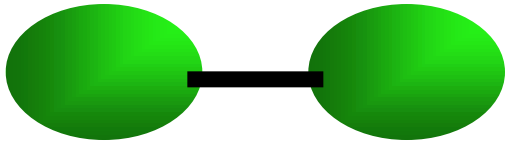
- **Negatively charged particle.**
- **Located in shells that surround an atom's nucleus.**



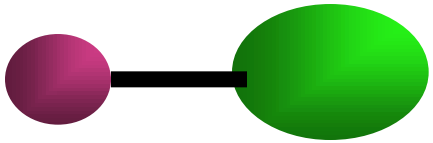


Welcome to MATTERVILLE !!!

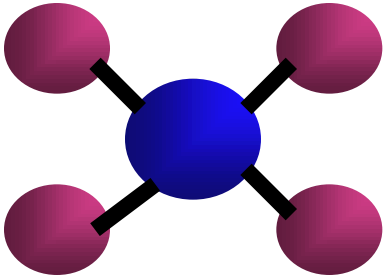
Draw a line between the molecule and its name.



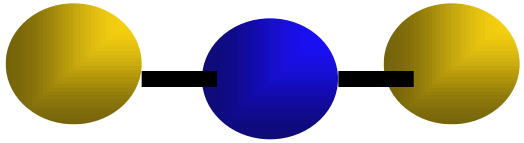
Hydrogen chloride HCl



Chlorine Cl_2

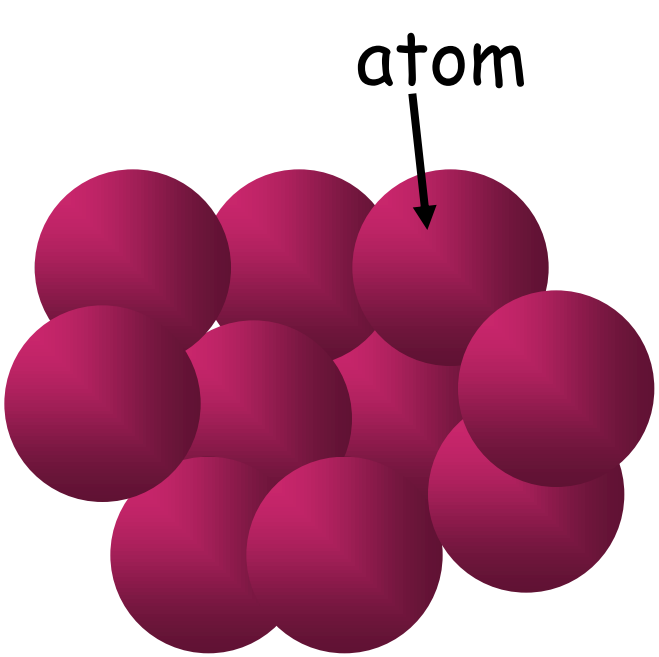


Carbon dioxide CO_2

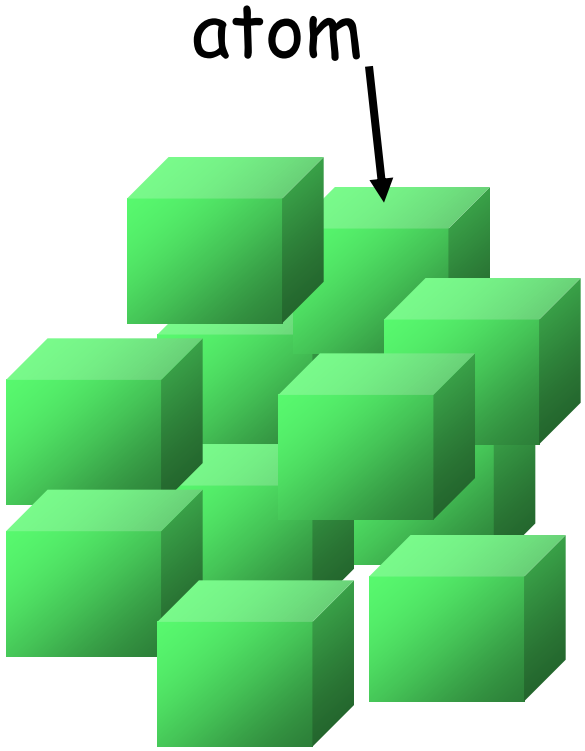


Methane CH_4

An element is a substance that is made from one kind of atom only. It <u>cannot</u> be broken down into simpler substances.

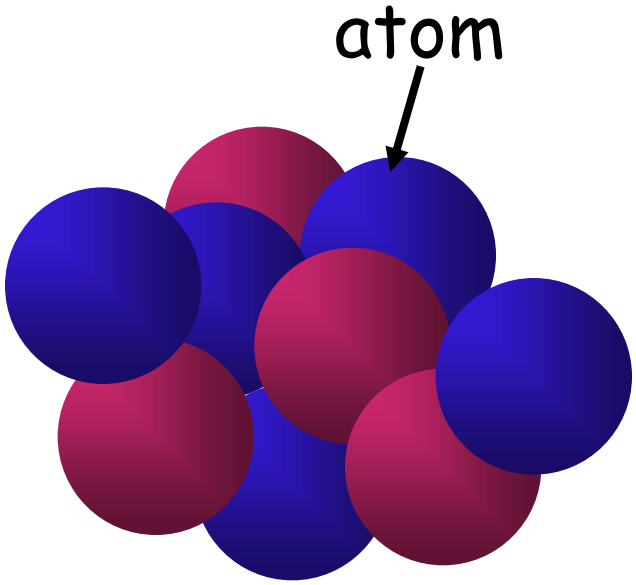


An element

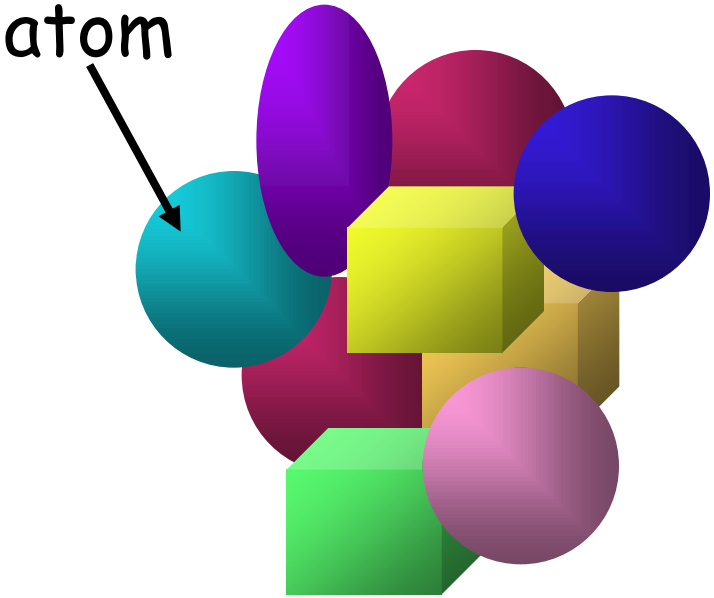


An element

A compound is a substance that is made from more than one element.

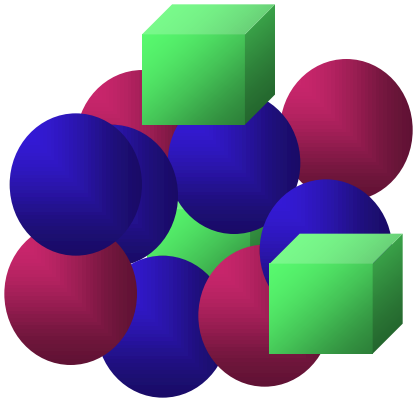


A compound made up of 2 different elements



A compound made up of 7 different elements

A compound can be broken down into elements



A compound made up of 3 different elements

An element

An element

An element

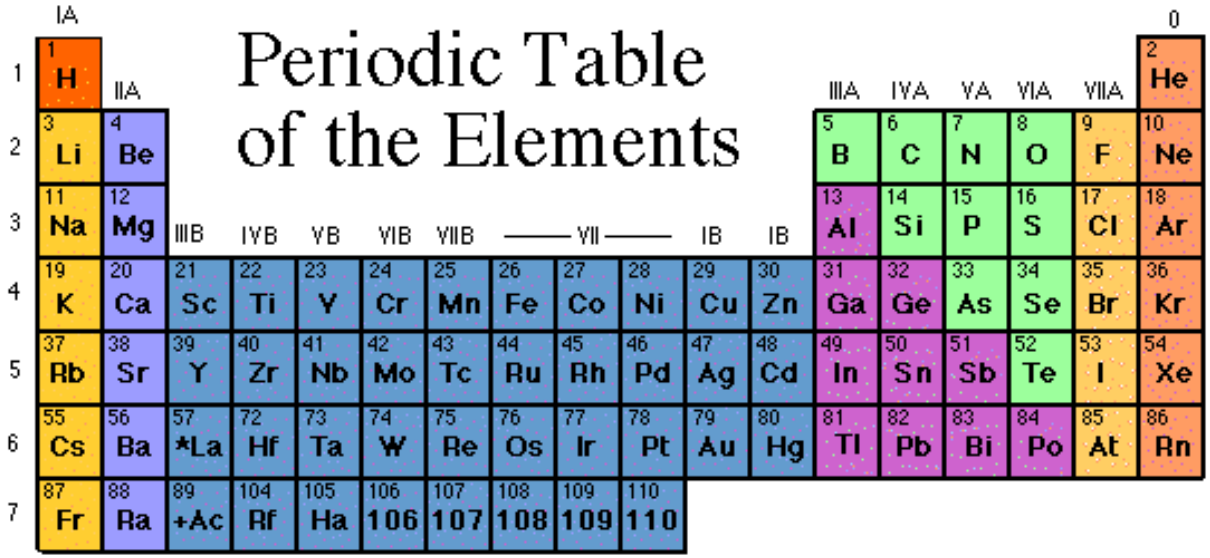
Material	Made up of:	Element or compound
Water	Hydrogen and Oxygen	
Coal	Carbon	
Carbon dioxide	Carbon and Oxygen	
Oxygen	Oxygen	
Chalk	Calcium, Carbon & Oxygen	
Wax	Carbon & Hydrogen	
Table salt	Sodium & Chlorine	
Caffeine	Carbon, Hydrogen, Nitrogen & Oxygen	

Material	Element or compound
Water	Compound
Coal	Element
Carbon dioxide	Compound
Oxygen	Element
Chalk	Compound
Wax	Compound
Table salt	Compound
Caffeine	Compound

The Periodic Table

Objective:

To learn the symbols and properties of 20 elements in the periodic table.



The Periodic Table is a useful way to arrange elements.

The vertical columns are called groups.

The horizontal rows are called periods.

Elements in the same group have similar properties.

Three quarters of the elements are metals.

One quarter of the elements are non-metals.

Rules for chemical symbols in the periodic table:

1. The symbol is usually the first one or two letters of the name.

2. Sometimes the old (Latin) name is used .

3. The first letter of a symbol id always a capital letter.

4. The second letter of a symbol is always a small letter.

5. Every element has a different symbol.

Now look in your periodic table and find the symbols of the following elements, then find out if it is a metal or a non-metal:

Copper ……..

Iron ……..

Magnesium ……..

Chlorine ……..

Carbon ……

Sodium …….

Lead …….

Gold ……

Calcium ……..

Fluorine …….

Now look in your periodic table and find name that corresponds to the following symbol:

Fe ……..

Mg ……..

Ag ……..

K ……..

C ……

Ca …….

Na …….

N ……

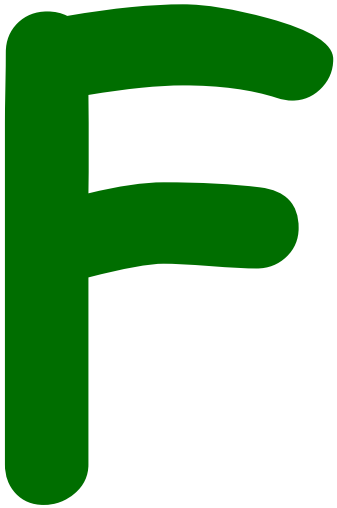
Ne …….

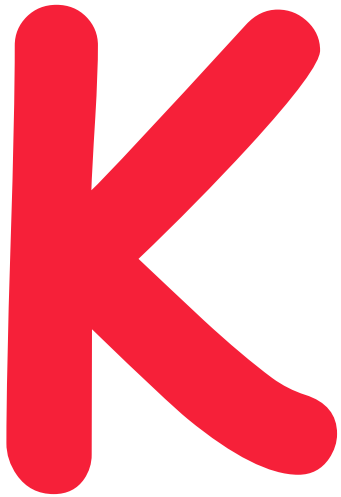
Pb …….


Fe

Cu

N





Zn

Li

AI

o

The Periodic Table

Q1. The symbol of Nitrogen is:

a. Na **b.** N **c.** Ni

Q2. Hg is the symbol of:

a. Hydrogen **b.** Helium **c.** Mercury

Q3. The percentage of metals in the periodic table is:

a. 75% **b.** 50% **c.** 25%

Q4. Water is not in the periodic table because:

a. It is a liquid substance **b.** It is a natural substance

c. It is a compound not an element

The Periodic Table

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Q1. Name a metal in group 1 that is in the same period as Magnesium.

Q2. Name a metal in group 2 that in the same period as Lithium.

Q3. Name a non-metal in the same group as Nitrogen.

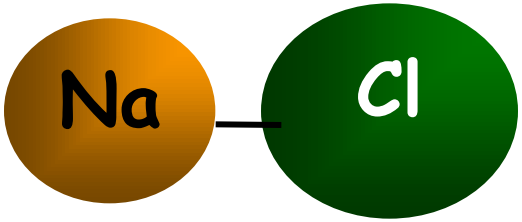
Q4. Name a noble gas in the same period as Oxygen.

Q5. Name a gas in group 7 that is in the same period as Aluminium.

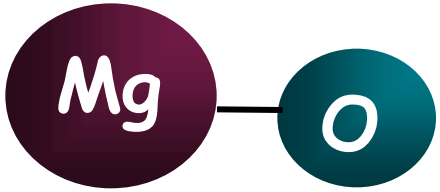
Rule 1: When two elements combine the ending is usually " ……ide".

metal goes first

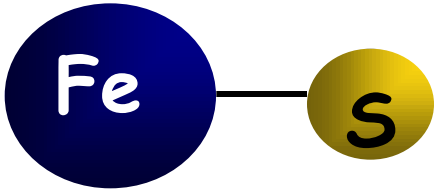
Sodium Chlor**ide**



Magnesium Ox**ide**



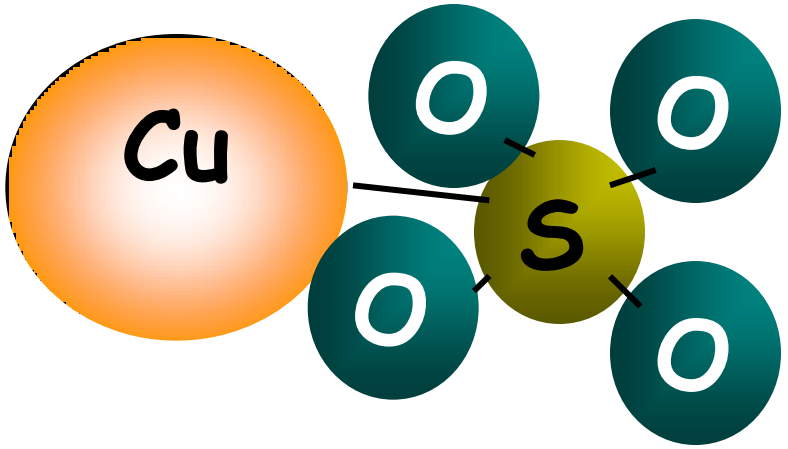
Iron Sulph**ide**



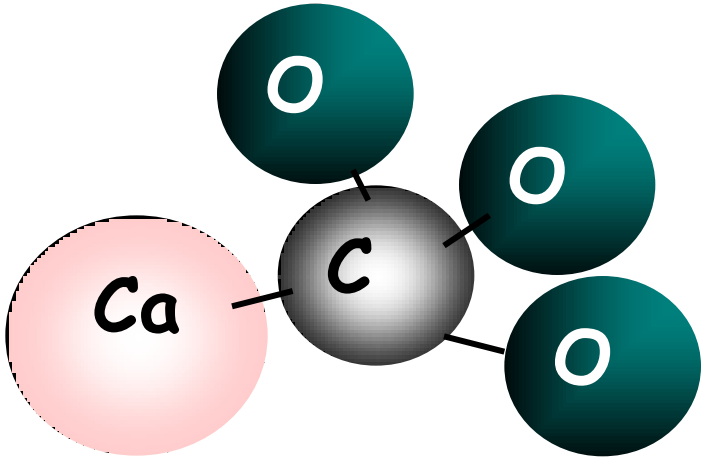
Rule 2: When three or more different elements combine and one of them is Oxygen, the ending will be "……ate".

metal goes first

Copper Sulphate



Calcium Carbonate



Rule 3: When two identical elements combine, the name does not change.

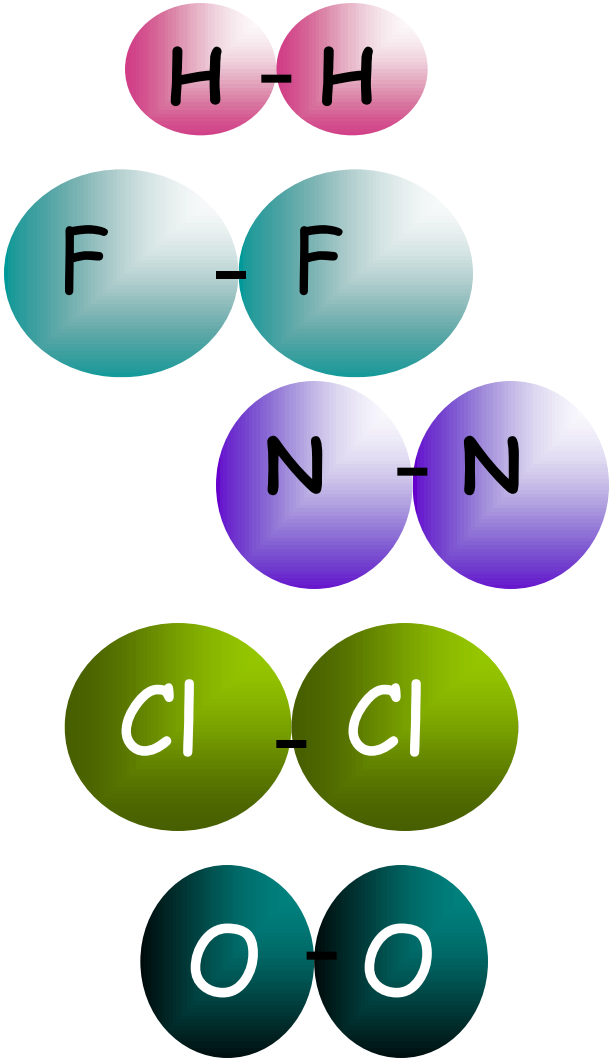
H_2 = Hydrogen

F_2 = Fluorine

N_2 = Nitrogen

Cl_2 = Chlorine

O_2 = Oxygen



Name the following compound

Na_2O

Name the following compound

$CuSO_4$

Name the following compound

$MgSO_4$

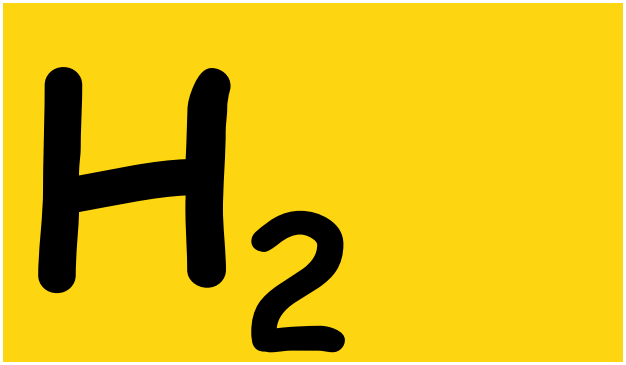
Name the following compound

ZnO

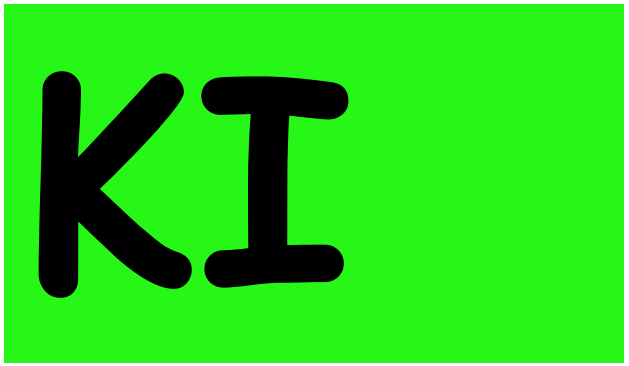
Name the following compound

$MgCl_2$

Name the following molecule



Name the following compound



Name the following compound

$AgNO_3$

Fill in the blanks:

Magnesium + ... → Magnesium oxide

..... + Iodine → Hydrogen .....

..... + Oxygen → Iron oxide

Copper oxide + Carbon → ..... + Carbon dioxide

Objectives:

1. In all chemical equations the reactants turn into products and we have an arrow between the two as shown here:

Reactants  Products

The THERMIT Reaction

The thermit reaction is used by the railway engineers to mend cracked iron rail.

It is a very useful reaction between Aluminium and Iron oxide to produce Aluminium oxide and Iron.

Aluminium + Iron oxide ⟶ Aluminium oxide + Iron

The reaction gives out a lot of heat, enough heat to melt the Iron produced which can be therefore poured into the gaps in the rails.

Copy down the following equations in your book. Underline the reactants and circle the products in each of the equations:

Magnesium + Oxygen → Magnesium oxide

Iron + Oxygen → Iron oxide

1. When you react Magnesium with Oxygen you get:

a. Oxygen magnesimide b. Magnesium oxygen

c. Magnesium oxide d. Magnesium oxate

2. One of the products of the thermit reaction is:

a. Iron oxide b. Aluminium c. Carbon d. Iron

3. Sodium is in the same group as:

a. Magnesium b. Aluminium c. Potassium d. Neon

4. The colour of Magnesium oxide is:

a. White b. Black c. Silver d. Brown

5. Calcium Carbonate does not contain:

a. Hydrogen b. Oxygen c. Carbon d. Calcium

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Copy down the following equations in your book. Underline the reactants and circle the products in each of the equations:

Magnesium + Oxygen → Magnesium oxide

Calcium carbonate → Calcium Oxide + Carbon dioxide

Iron + Bromine → Iron bromide

Aluminium + Chlorine → Aluminium Chloride

Iron + Oxygen → Iron oxide

Lead oxide + Carbon → Lead + Carbon dioxide

1. What is the name of the reaction used by the railway engineers to mend cracked iron rails?
2. What are the reactants of that reaction?
3. What are the products of that reaction?

Chemical Reactions

Objectives:

1. The formula of a compound shows the number and the type of atoms in it.

2. A small number after the symbol for each element in a compound shows how many atoms each molecule contain.

Draw a line between the compound and its name:

Magnesium Carbonate	$MgCl_2$
Zinc Fluoride	NaCl
Magnesium Chloride	$Pb(NO_3)_2$
Iron sulphide	FeS
Lead nitrate	$CaCO_3$
Copper sulphate	$CuSO_4$
Potassium Iodide	ZnF_2
Sodium Chloride	$MgCO_3$
Calcium Carbonate	KI

1. How many atoms of Hydrogen in one molecule of Methane CH_4 ?

2. How many atoms of Nitrogen in one molecule of Lead nitrate $Pb(NO_3)_2$?

3. Sodium oxide has two atoms of sodium for every atom of oxygen. What is the formula for sodium oxide?

4. Magnesium chloride has one atom of Magnesium for every two atoms of chlorine. What is the formula for Magnesium chloride?

5. How many atoms of Nitrogen in one molecule of Ammonia NH_3 ?

1. How many atoms of Oxygen is there is <u>two</u> molecules of $CuSO_4$?

a. 1 b. 4 c. 6 d. 8

2. Oxygen will:

- turn limewater milk b. relight a glowing splint

c. burn with a squeaky pop d. put out a glowing splint

3. How many atoms are there altogether in one molecule of $MgCl_2$?

- 2 b. 3 c. 4 d. 6

Chemical Reactions

Objectives:

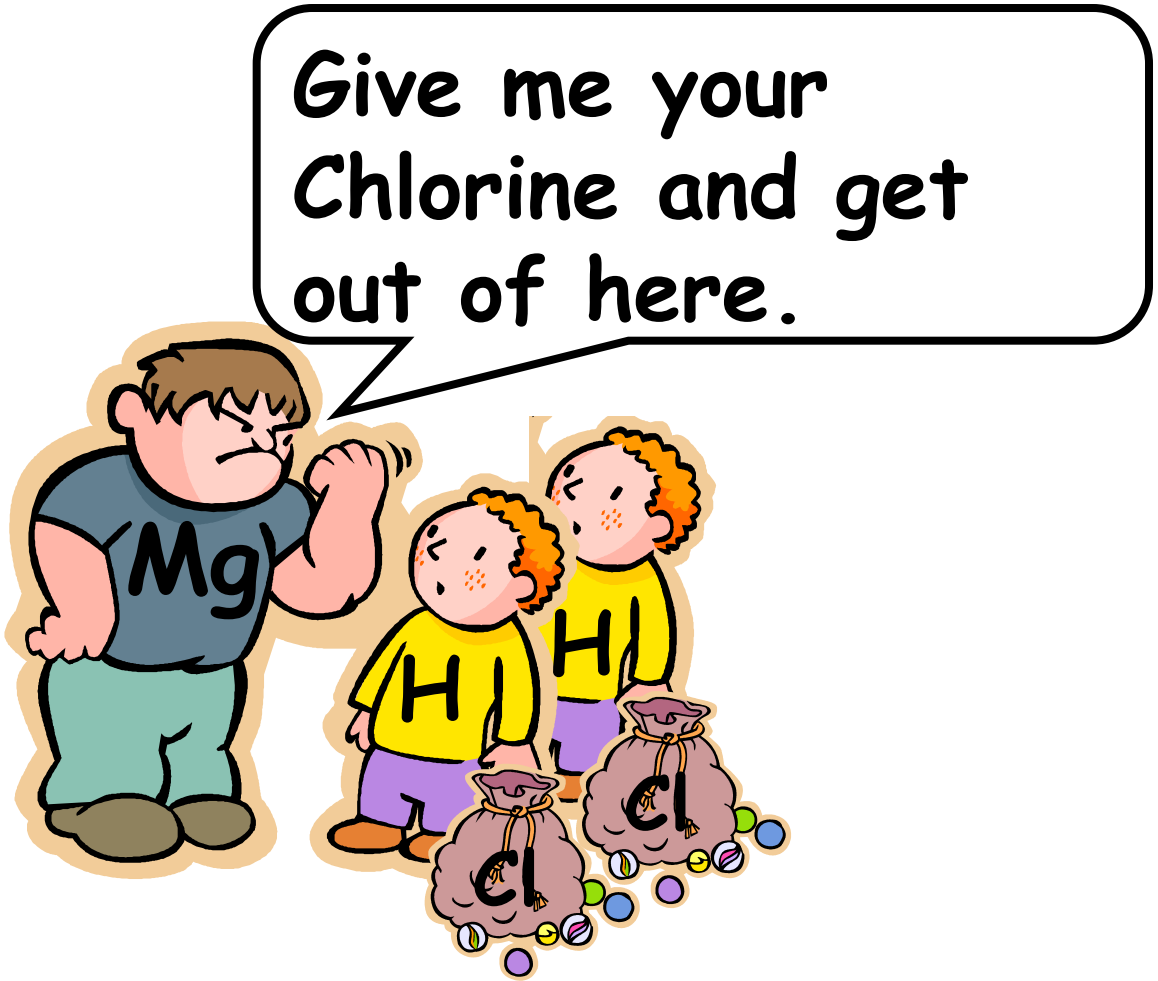
1. The number of atoms in the reactants are equal to the number of atoms in the products.

$$Mg + 2\,HCl \longrightarrow MgCl_2 + H_2$$

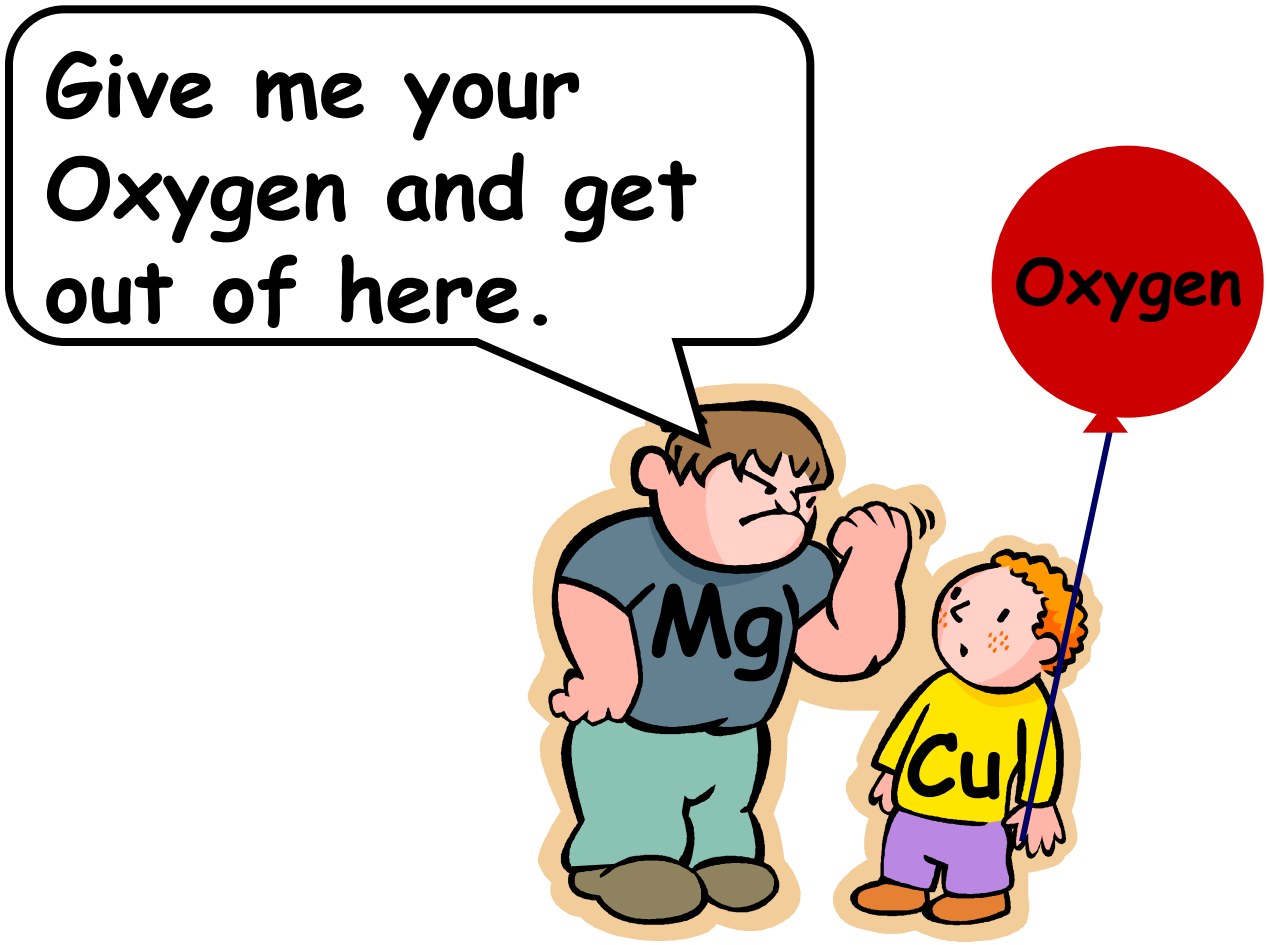
What are the reactants of the above reaction?

What are the products?

$$Mg + 2\,HCl \longrightarrow MgCl_2 + H_2$$



$$Mg + CuO \longrightarrow MgO + Cu$$



Thermal Decomposition

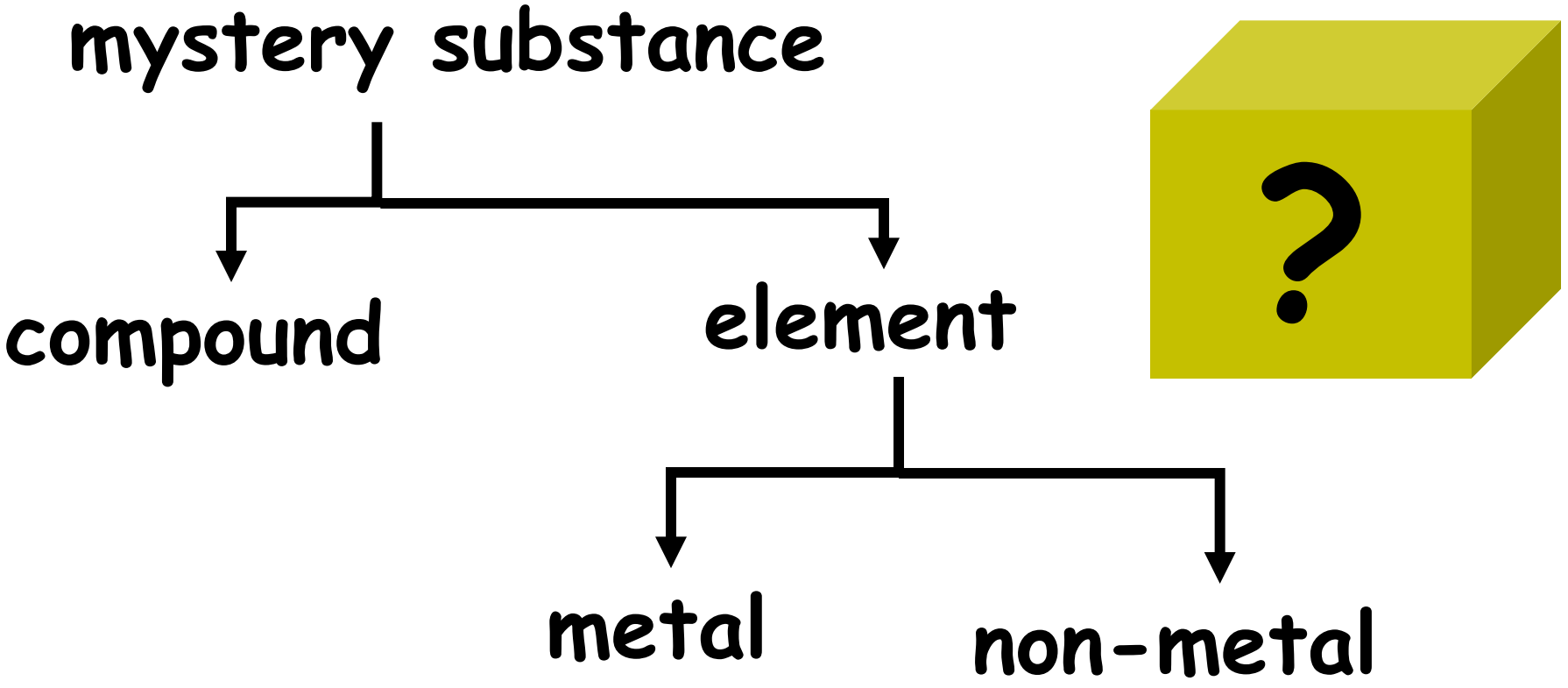
Objective: Compounds can be broken down into smaller substances using heat.

Test for gases

Draw a line between the name of the gas and the method to test for it.

Carbon dioxide	relights a glowing splint
Oxygen	burns with a squeaky pop
Hydrogen	turns limewater cloudy

Investigating whether a mystery substance is an element or a compound.



What do you think the mystery substance is ???