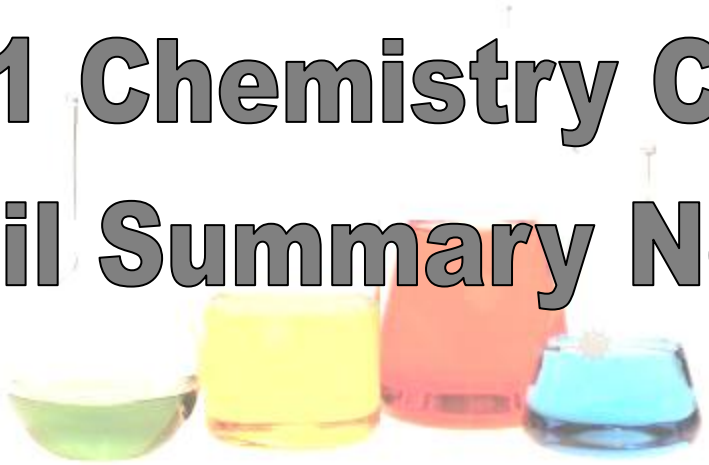
S1 Chemistry CfE
Pupil Summary Notes



Gleniffer High School

Name:_____

Building Blocks – What is Matter Made of?

Scientists believe that everything in the universe is made up of tiny particles called atoms. Often, **atoms** join together to form groups of atoms called molecules. An atom (or molecule) is so small that it cannot be seen, even with a powerful microscope.

Atoms are so small, that even a single grain of sand contains many billions of atoms!

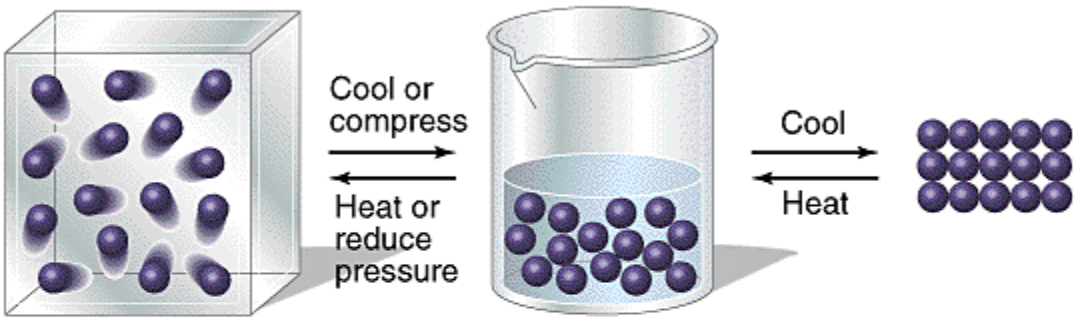
There are three states of matter: **solid**, **liquid** and **gas**. In each state The atoms are organized in a very particular way.

In a **solid**, the particles are **very close together**. When the solid is compressed the atoms cannot move any closer so the volume does not change.

In a **liquid** the particles are **close together**. When the liquid is compressed the particles cannot move close together so the volume does not change.

In a **gas** the particles are very **far apart**. When the gas is compressed, the particles can move around so the volume can change.

States of matter.



Gas	Liquid	Crystalline solid
Total disorder; much empty space; particles have complete freedom of motion; particles far apart.	Disorder; particles or clusters of particles are free to move relative to each other; particles close together.	Ordered arrangement; particles are essentially in fixed positions; particles close together.

Changing state of matter

We now know hat there are three states of matter (solid, liquid and gas).

We also know that all of these are made of particles that have different spaces between them.

By heating a solid, we are giving the particles more energy. This means that they will move around more and spread out turning into a liquid. If we heat the liquid, it will turn into a gas.

When a substance changes state from a solid to a liquid we call this melting .

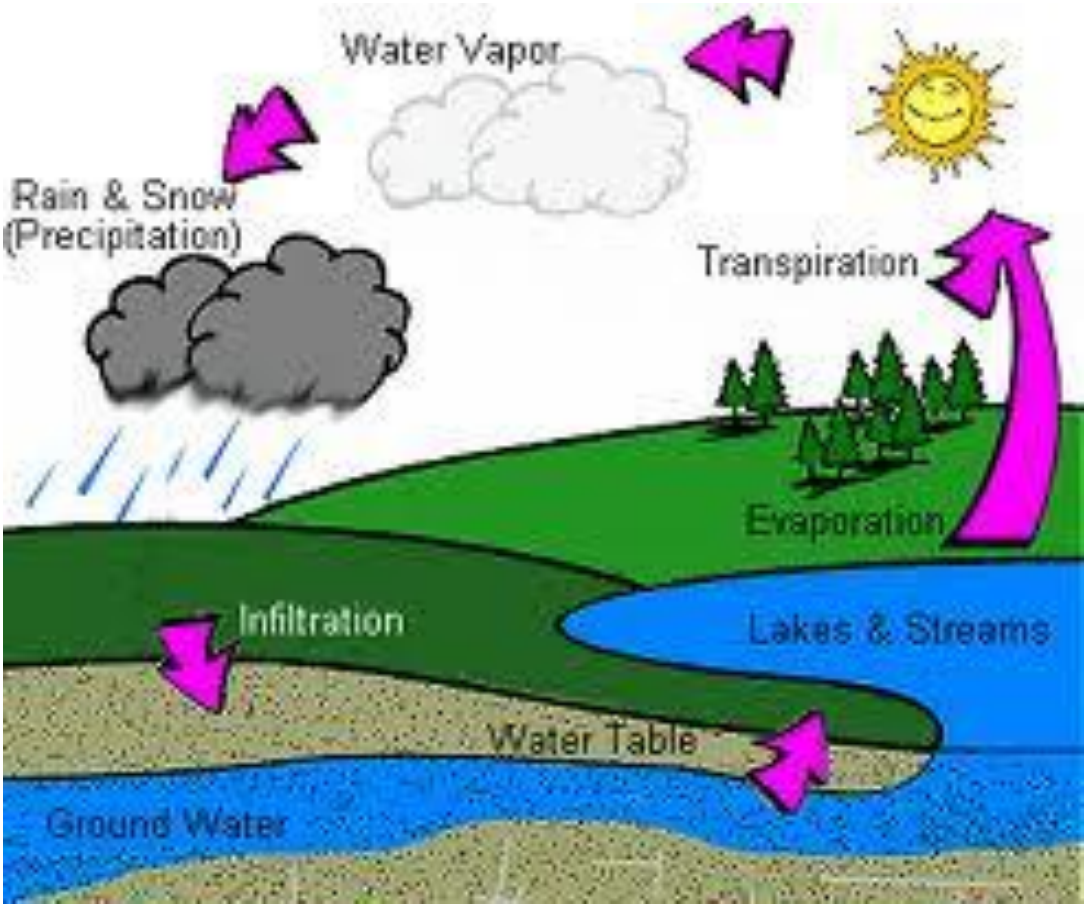
When a substance changes state from a liquid to a gas we call this evaporation .
In both of these cases it uses energy in the form of heat. This energy helps the particles move about faster and allows them to move further apart.

When a substance changes state from a liquid to a solid we call this freezing .

When a substance changes state from a gas to a liquid we call this condensation .

In both of these cases heat energy is given out. The particles move about less and become closer together.

The water cycle

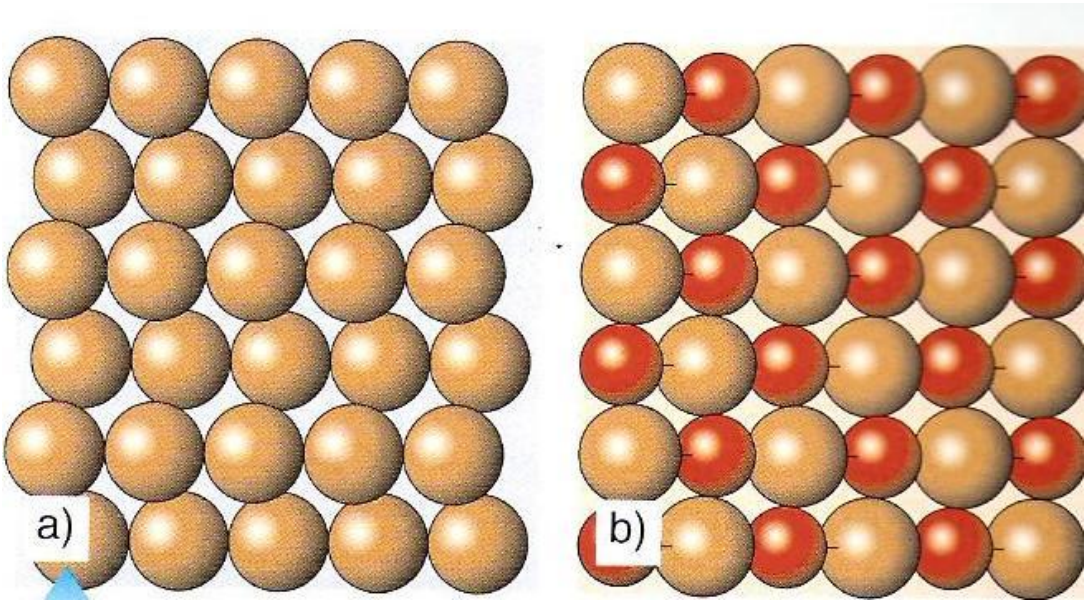


- **Liquid (water) evaporates to form a gas (water vapour).**
- **Gas (water vapour) condenses to form a liquid (rain)'**
- **Liquid (water) freezes to form a solid (ice).**
- **Solids (ice) melts to form a liquid (water)**

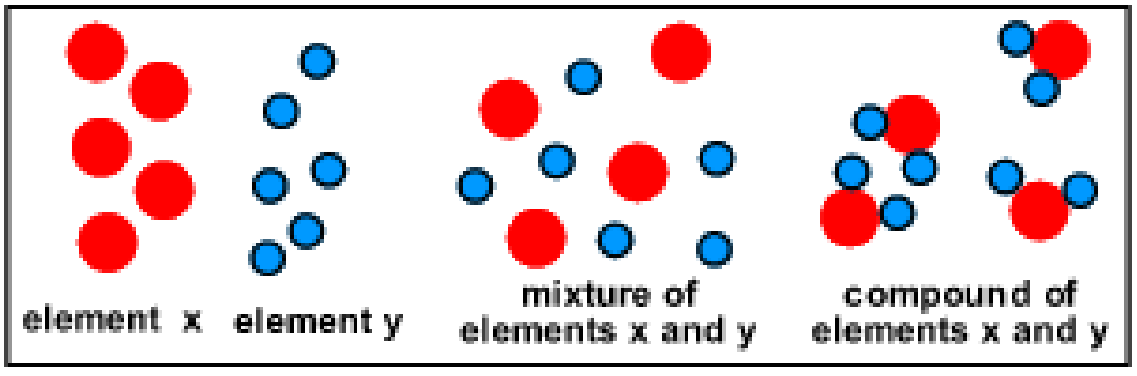
Elements and compounds

An element is a substance that contains only one kind of atom. Carbon is an element since it contains only carbon atoms

A compound is a substance that is made up of different types of atoms joined together.

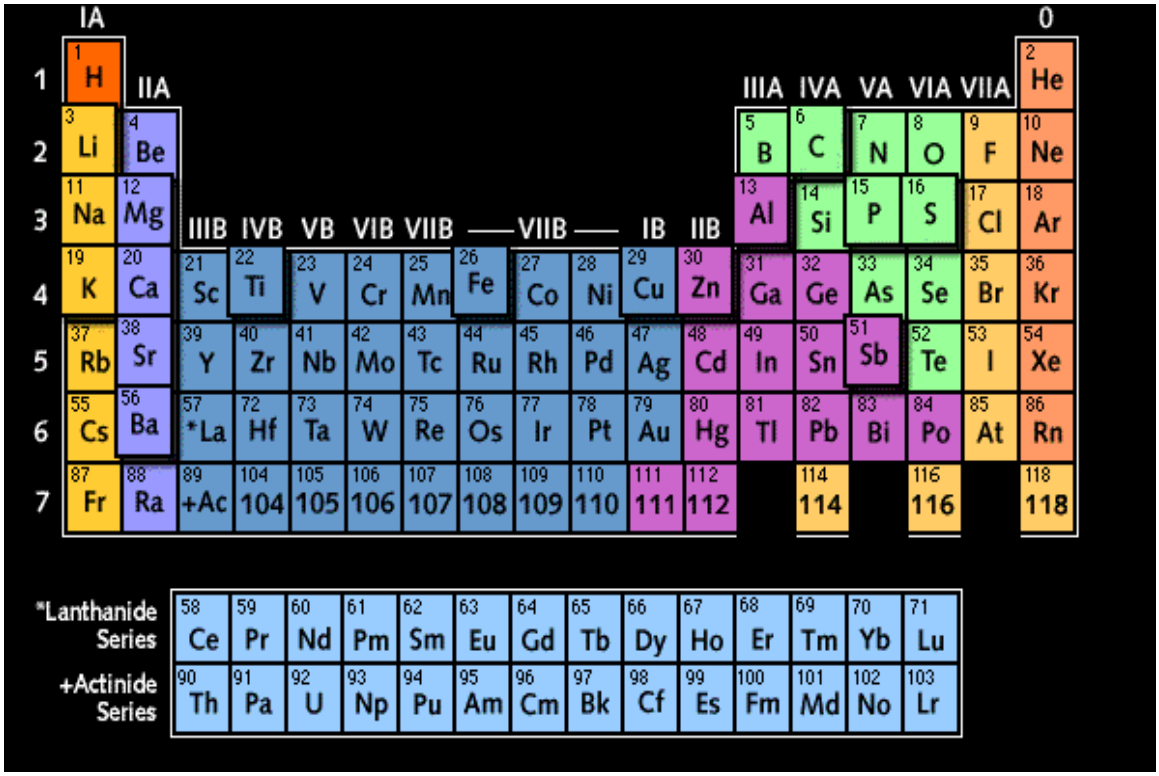


a) This is an **element**. All of the atoms are the **same**
b) This is a **compound**. It has **two different types** of atom



The Periodic Table

The periodic table is a list of all the **elements** found on Earth.
Each element has a unique **symbol**.
Each element has a unique number called the **atomic number**.
Each element has a unique **mass**.
These values are included on the **periodic table**.

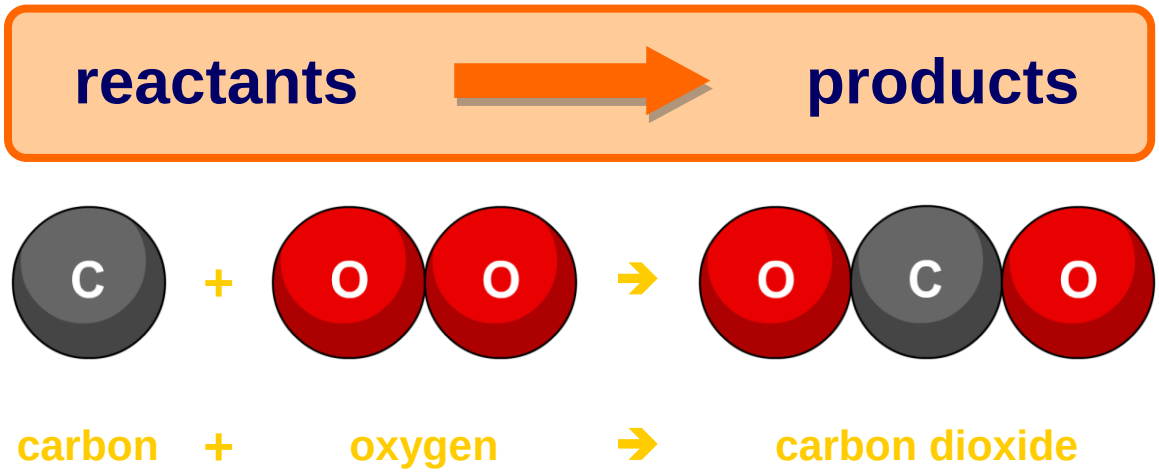


Elements can be classified as **metal** or **non metal**. About two thirds of all elements in the periodic table are **metals**. Metals have distinctive properties. This allows us to use them in different ways. All **metals** can **conduct** electricity and heat. Copper is a very good conductor of electricity and heat. It is used in pots to allow heat to pass through and warm our food.

Chemical Reactions

Elements react with other **elements** to produce **compounds.**
When the atoms in different elements **join** together to form compounds, a **chemical reaction** has taken place.

A **product** is the substance formed. The **reactants** are the starting substances , and the process is called a reaction.



A reaction has taken place when a new substance is produced and cannot be changed back.

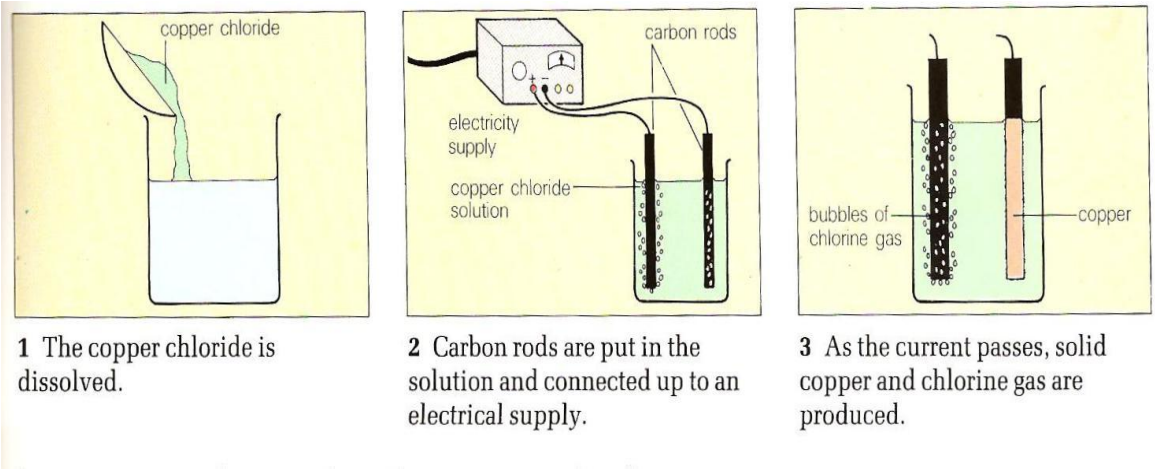
The signs that a chemical reaction has taken place include:

- √ change of appearance
- √ change in the state of matter
- √ change of properties
- √ heat given out

Reactions in everyday life include burning matches, cooking, rusting and rotting food.

The products of a chemical reaction are different from the reactants. For example hydrogen is a gas and burns well, oxygen is a gas that helps things burn. When combined, hydrogen oxide is formed. This is called water and it puts out fires.

To separate a compound energy must be put in. A process called electrolysis uses electrical energy to separate a compound into it's elements.



1 The copper chloride is dissolved.

2 Carbon rods are put in the solution and connected up to an electrical supply.

3 As the current passes, solid copper and chlorine gas are produced.

It is easy to separate mixtures. This is because a reaction has not taken place and the atoms have not joined together.

Temperature and solubility

When we talk about the mixing of two or more substances together in a **solution** we must consider **solubility**. Simply defined, it is a measure of how much **solute** will dissolve in the **solvent**. Not all substances will dissolve in all solvents.

Solute A solute is any substance which is dissolved in a liquid.

Solvent A solvent is a liquid which can cause a substance to dissolve.

Solution When a solute dissolves in a solvent

Examples of everyday solutions include:

- √ **Fizzy cola**
- √ **Sugary tea**

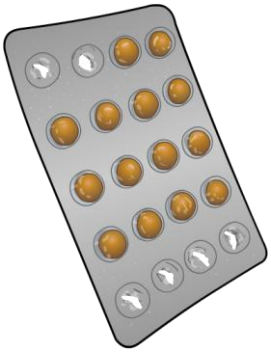
Increasing the temperature of a solvent increases the **solubility** of the solution allowing more solute to dissolve.

Acids and alkalis

All chemicals can be put into a category according to how acid or alkali they are. An acid is a chemical that is the opposite of an alkali. An alkali is a chemical that is the opposite of an acid.
Something that is not an acid or an alkali is said to be neutral.

Acids are found in household items such as food and drink, and skincare products. Citric acid and acetic acid are examples of common acids. They are present in juice and vinegar.

Alkalis are found in many soaps and other materials used for cleaning. They are also used in antacids to treat heartburn, because they neutralize stomach acid.

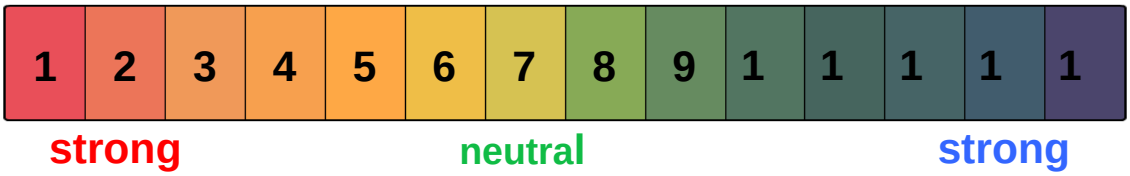


It is generally safe to handle these types of weak alkalis, which can feel soapy, although care must be taken with strong alkalis like oven cleaner.

Common acids that you might use in the lab are sulfuric acid, hydrochloric acid and nitric acid. These acids can be very dangerous. However, even acids that are commonly found around the home, like those in car batteries and bleach based toilet cleaners need to be handled with care. This is because concentrated acids can damage other materials, wearing them away. They are said to be **corrosive.**

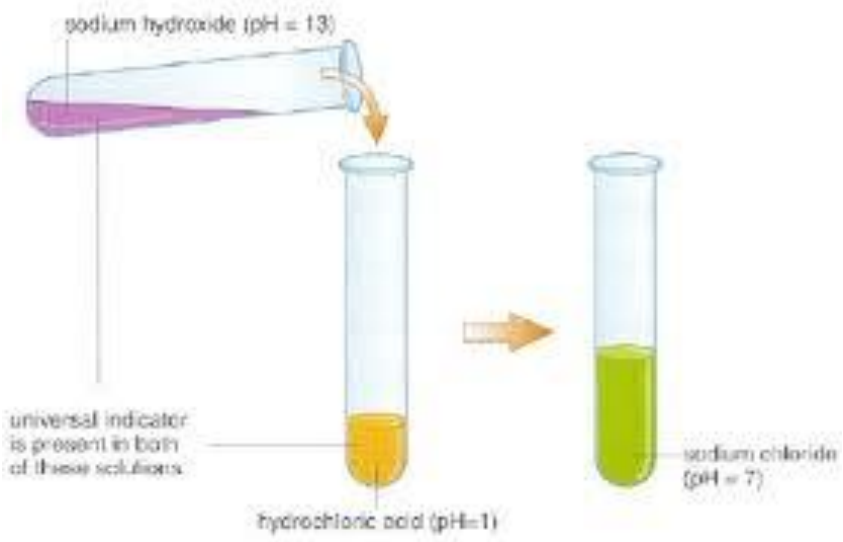
We can find out if a substance is an acid or alkali by using pH indicator such as **universal indicator**. This changes colour depending on whether a substance is acidic or alkali.

We also need to use a pH scale which lets us know whether a chemical is a weak or strong acid or alkali,



Neutralisation

When acid is added to alkali, the pH of the new substance moves closer to pH 7
The acid and alkali have combined to make a solution which is neutral
This is called a **neutralisation** reaction



An example of an everyday neutralisation reaction is **putting vinegar on a bee sting.**