Groups 13-15 - Other Metals - solid with a high density. Examples of them are tin, aluminum and lead. Metalliods - have metal and non-metal properties. Some are semi-conductors (can carry an electrical charge under special conditions), great for computers and calculators.

Group 14-16 - Non-Metals - can't conduct heat or electricity very well and are brittle. At room temperature, they turn into gasses and solids.

Group 17 - Halogens - "Halogen" means "salt former" so compounds that contain halogen are called "salts." At room temperature, they are in three states of matter: solid, liquid and gas.

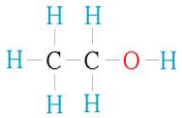
Group 18 - Noble Gases - don't react with other elements. All of these elements have the maximum number of electrons possible in their outer shell, making them stable. Helium, neon and krypton are noble gases.

Compounds

Each element in the periodic table has a chemical name. The combination of elements to form **compounds** have a **chemical name** and a **chemical formula**. The formula identifies which elements and how many of each are in the compound.

For example:

ethanol (C_2H_6O)
2 carbon atoms,
6 hydrogen atoms
1 oxygen atom



Guyton de Morveau developed a chemical naming system in 1787.

IUPAC (*International Union of Pure and Applied Chemistry*) is responsible for determining the appropriate name for each compound today.

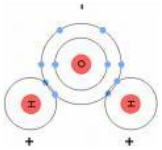
Rules for naming compounds:

1. The chemical name of the metal or positive ion goes first, followed by the name of the non-metal or negative ion.
2. The name of the non-metal negative ion changes its ending to **ide**.

Some ions are called **polyatomic ions** (meaning "*many*").

***Polyatomic ions** are a group of atoms acting as one.*
Eg. calcium carbonate, or limestone

Generally, elements in a group all have the same ion charge



Ionic Compounds pure substances formed as a result of the attraction between particles of opposite charges, called **ions**.	**Molecular Compounds** combined ***non-metals*** producing a pure substance called a **molecule**
compound contains a metal	compound doesn't contain a metal
high melting/boiling points	low melting/boiling points
distinct crystal shapes solids	solids, liquids, or gases
good electrical conductivity	good electrical insulators
table salt (NaCl) metal name is always first	sugar ($C_{12}H_{22}O_{11(s)}$) acetylene, water

Chemical Reactions

Occurs when two or more substances combine to form new substances.
Types: *combination*, *decomposition*, *displacement* and *exchange*

Substances at the beginning of the reaction are called **reactants**.
New materials produced by the reaction are called **products**.

Chemical reactions can be written as **word equations** which gives the names of all the reactants (separated by a "plus' sign +) followed by an arrow which points to the names of all the products (separated by a 'plus' sign +)
eg. (***iron + oxygen + water ---» rust***)
(*Iron plus oxygen plus water produces rust*)

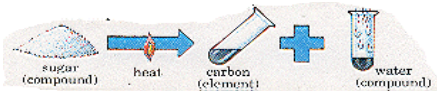
Evidence of Chemical Change

A **chemical change** results from a chemical reaction. Evidence that a chemical change has occurred include:

- A change on colour
- The formation of an odour
- The formation of a solid or a gas (bubbles)
- The release or absorption of energy

A chemical change, which **releases** energy, is called **EXOTHERMIC.**

A chemical change, which **absorbs** energy, is called **ENDOTHERMIC**



Types of Chemical Reactions

Combustion is a chemical reaction that occurs when oxygen reacts with a substance to form a new substance and gives off energy.

Corrosion is a slow chemical change that occurs when oxygen in the air reacts with a metal. Corrosion is a chemical reaction in which the metal is decomposed (eaten away), when it reacts with other substances in the environment.

Cellular Respiration is a chemical reaction that takes place in the cells in your body.

Law of Conservation of Mass

In a chemical reaction, the total mass of the reactants, are always equal to the total mass of the products.

This law goes well with the atomic theory
Atoms (matter) are never created or destroyed
In a chemical reaction the atoms and molecules are simply rearranged.

This law of conservation of mass does not apply to nuclear reactions, because there Is some loss of mass: *the mass is changed into energy*. This was first suggested by Albert Einstein in his famous equation:

$$E = MC^2$$

(E Is Energy, M is Mass, C^2 is a large number)
A very tiny amount of mass is equal to a very large amount of energy
In an open system some of the mass seems to disappear, when it is in the form of a gas.

Reaction Rate

The speed of a chemical reaction is called the reaction rate. Factors affecting the reaction rate include:

Temperature -The higher the temperature the faster the reaction rate

Surface Area -The more surface in contact, the faster the reaction rate

Concentration - The higher the concentration, the faster the reaction

Catalysts - The presence of a catalyst (substances that help a reaction proceed faster) also affects the reaction rate. Catalysts are not consumed in the reaction. Types of reactions involving catalysts can be found in living and non-living things.

Enzymes in the body speed up reactions, which break down food. They also help to rid the body of poison.