CHAPTER EIGHT

METALS, ALLOYS AND RUSTING,

- Even though there are different types of metals, they all have or share certain common properties.

SOME PROPERTIES OF METALS:

(1) They are solids at room temperature (i.e. when the temperature is about 26^0C).
(2) They have high melting points.
(3) They conduct heat and electricity i.e. heat and electricity can pass through them.
(4) Most metals are lustrous or have shiny surfaces.
(5) They are malleable (i.e. an hammer can be used to hammer them into various shapes or forms).
(6) They have high density.

NON METALS:

- They are gases at room temperature.

PROPERTIES:

(1) They are poor conductors of heat and electricity.
(2) They have low densities.
(3) They are not lustrous.
(4) They are not malleable.

REACTIVE AND NON REACTIVE METALS:

- A metal which can easily react or combine with oxygen, water or acid is said to be a reactive metal.
- On the other hand a metal which does not easily react or combine with oxygen, water or acid, is said to be a non reactive metal.

DIFFERENCES BETWEEN METALS AND NON METALS:

Metal	NON METAL
High density	Low density
Malleable	Non malleable

Good conductors of heat and electricity	Bad conductors of electricity
High melting point	Low melting point
Lustrous	Not lustrous

USES OF CERTAIN METALS AND NON METALS:

METALS:

- Copper is used in making electrical wire and ornament.
- Aluminum is used in the making of cooking utensils, roofing sheets and window frames.
- Gold is used for jewelry and ornament.

NON METAL:

- Chlorine is use in the purification of water.
- Oxygen is used for respiration and welding.
- Phosphorus is used for the manufacture of fertilizer.

CORROSION:

- This is the process in which a metal wastes away, when it is exposed to the right conditions such as air and water.
- When iron is exposed to moist air , the iron combines with oxygen to form a brown material called hydrates iron (III) oxide (Fe_2O_3).
- It is this brown hydrated iron (III) oxide which is commonly referred to as rust.

N/B: The conditions which are necessary for corrosion to occur are the presence of oxygen and water, and in the absence of these, corrosion can not occur.

PREVENTION OF CORROSION OR RUSTING.

(1) Painting or greasing:

- For a metal to rust, both water (moisture) and air (oxygen) must come into contact with it.

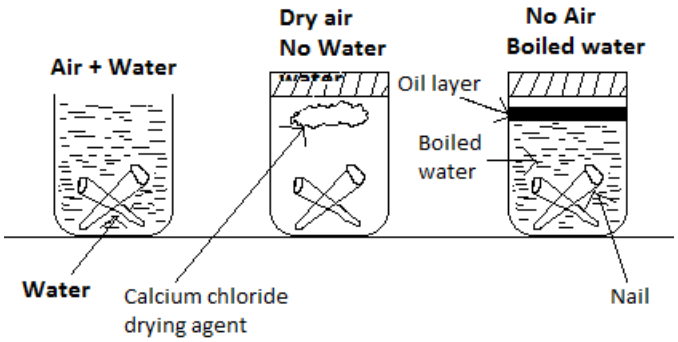
- When a metal such as iron is painted or covered with grease, corrosion or rusting does not occurs, since the paint or the grease will prevent air, moisture or water from coming into contact with the metal.

(2) Plating :

- This is the process in which a light coat of one metal is used to cover another metal.

- Plating a metal which corrodes with another metal can also prevent corrosion or rusting.

<u>An experiment to investigate the rusting of iron(metal), or the conditions necessary for rusting:</u>



- Three test tubes are taken and water and nails are placed in the first one.
- The nails in this case are exposed to water, as well as air.
- Nails are then placed in the second test tube without water.
- A drying agent in the form of calcium chloride is then placed inside the test tube.
- The entrance to the test tube is then blocked so as to prevent air from entering it.
- The calcium chloride will remove any moisture found in the air, trapped within the test tube.
- The nails within this test tube are therefore exposed to only air.
- In the third test tube, water is first boiled in order to remove the air it contains,before it isplaced in the test tube together with the nails.
- A layer of oil is then placed on top of the boiled water, in order to prevent air from entering the water.
- The entrance to the test tube is then blocked to prevent the entry of air.
- The experimental set up is then left to stand for about five days.

<u>Observation:</u>

- After the fifth day, it will be noticed that it is only the nails within the first test tube which has gotten rusted, since they were exposed to both air and water.
- The nails within the other two test tubes which were not exposed to both air and water, did not rust.
- This proves that both air and water are needed for the rusting of metals to occur.

SEMI CONDUCTORS:

- These are a group of materials which are also referred to as semi metals.
- They are neither good conductors nor good insulators.
- Under certain conditions they act as conductors, and under other conditions they act as insulators.

Use:

- They are used in making electronic devices such transistor, diode and rectifier.

The Periodic Table

Period 1			1 H Hydrogen					2 He Helium
	Group 1	**Group 2**	**Group 3**	**Group 4**	**Group 5**	**Group 6**	**Group 7**	**Group 8**
Period 2	3 Li Lithium	4 Be Beryllium	5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 N Neon
Period 3	11 Na Sodium	12 Mg Magnesium	13 Al Aluminum	14 Si Silicon	15 P Phosphorus	16 S Sulphur	17 Cl Chlorine	18 Ar Argon
Period 4	19 K Potassium	20 Ca Calcium						

Atomic number
Chemical symbol
Name of element

Note the following carefully:

1. Modern periodic tables are arranged in order of increasing atomic number.
2. Moving from left to right across each period, the elements change from metals to non-metals.

- This arranges the elements in horizontal rows called periods, according to their atomic numbers and vertical columns called groups.
- Each vertical column or group in the periodic table, is made up of elements with the same valiancy or the same number of electrons within their last orbitals.