Periodic Classification of Elements
Periodic properties

PERIODIC PROPERTIES:

The properties which are directly or indirectly related to their electronic configuration and show gradual change when we move from left to right in a period or from top to bottom in a group are called **periodic properties.**

(a) Atomic volume, atomic size, melting point, boiling point and density are important physical properties which show periodicity.

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(b) Some important chemical properties that exhibit periodicity are electronic configuration, ionisation energy, electron affinity, electronegativity, metallic character, nature of oxides, oxidation state and reducting character etc.

(c) Specific heat, refractive index etc. are not periodic properties.

Some trends in Modern Periodc Table

(A) VALENCY

Valency may be defined as combining capacity of an element.

The Valency of an element is usually determined by the number of electrons in the outermost shell of its atoms. This is because the outer electrons are largely responsible for the chemical behaviour as these electron usually participate in chemical bonding.

(i)Variation of valency in a period. On moving from left to right in each short period, the valency of the elements first increases from 1 to 4 and then decreases and becomes 0 (zero). The trend for the elements of third period is shown below in table.

Variation of Valency of Element of Third Period

Element	Na	Mg	Al	Si	P	S	Cl	Ar
Valency	1	2	3	4	3	2	1	0

(ii) Variation of Valency in a Group. On moving down a group, the number of valence electrons remains the same and due to this all the elements in a particular group have the same valency. For example,

All elements of group 1 shows a **valency** of 1
All elements of group 2 shows a **valency** of 2
All elements of group 13 shows a **valency** of 3
All elements of group 14 shows a **valency** of 4
All elements of group 15 shows a **valency** of 3
All elements of group 16 shows a **valency** of 2
All elements of group 17 shows a **valency** of 1
All elements of group 18 shows a **valency** of 0

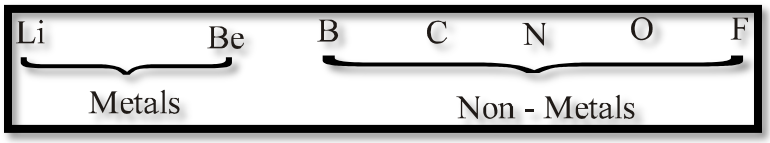
(B) METALLIC AND NON-METALLIC CHARACTER.

Generally, **Metals** posses 1, 2 or 3 electrons in their respective valence shells and thus have a strong tendency to lose these electrons to form positive ions. Therefore, metals are also called **electropositive elements** and the metallic character is also called **Electropositive Character.**

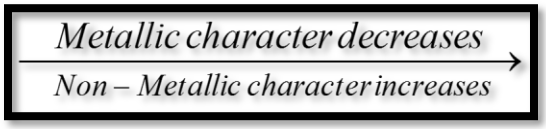
Non-Metals, on the other hand, generally have 4 to 8 electrons in their respective outermost shells and thus have a tendency to gain electrons to form negative ions. Therefore non-metals are also called **Electronegative elements** and the non metallic character is also called **electronegative character.**

Variation in a period: On moving from left to right in a period, the metallic character decreases while the non-metallic character increases.

Second period elements



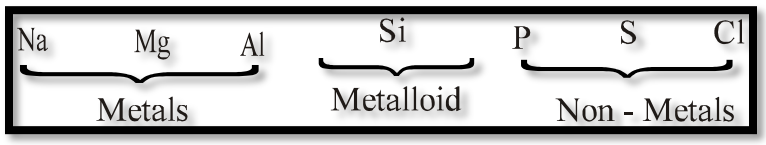
Nature of elements



Thus in the second period, lithium is the most metallic element followed by beryllium. The non metallic character starts with boron and keeps on increasing. Thus fluorine is the most non metallic element of the second period.

The change from metallic to non metallic character is more striking among the elements of the third period as shown below :

Third period elements



In general, the most metallic element lies on the extreme left hand side while most non metallic element lies on the extreme right hand side of any period.

Variation in a group. On moving down in a group, the metallic character or electropositive character increases.

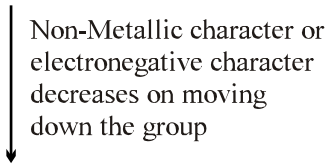
Elements of Group 1

Element	**Symbol**	**Metallic character**
Lithium	Li	Least metallic element
		↓ Metallic character increases down the group
Sodium	Na	
Potassium	K	
Rubidium	Rb	
Cesium	Cs	
Francium	Fr	Most metallic element

Conversely, on moving down a group, the non metallic character or electronegative character decreases.

Elements of Group 2

Element	**Symbol**	**Metallic character**
Fluorine	F	Most non metallic element



Chlorine	Cl	
Bromine	Br	
Iodine	I	
Astatine	At	Least non-metallic element

Division of elements into Metals and Non-metals:

In the long form of the periodic table, the elements have been broadly divided into metals and non metals by the zig-zag line funning diagonally across the periodic table. Those elements which lie on the left hand side of this line are Metals and those which lie on the right hand side of this line are non **metallic**. However, the elements silicon, germanium, arsenicm, antimony and tellurium which lie along the border of this line show the properties of both metals and non metals. These elements are called semi metals or **metalloids**.

The metallic/non metallic character also helps us to predict the nature of oxides formed by the elements. In general, the oxides of metals are basic while those of non metals are acidic in nature.

An element behaves as a metal or a non-metal is directly related to its ionization energy. The elements having low values of ionization energies are metals whereas elements having high values of ionization energies are non-metals.