

Class — U.G Sem.-IV

Subject — Chemistry

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PERIODIC TABLE AND PERIODICITY OF ELEMENT:

The periodic table is a tabular arrangement of various elements, organised on the basis of their atomic numbers, electronic configuration and recurring chemical properties. Elements are presented in order of increasing atomic number, which is typically listed with the chemical symbol in each box. The long form of periodic table consists of 18 vertical columns and 7 horizontal rows, with double rows below that. The table can also be deconstructed into four blocks: s-block to the left, the p-block to the right, the d-block in the middle and the f-block below that.

The rows of the table are called Periods, and the columns are called Groups.

The modern periodic law was developed by Moseley. According to this law physical and chemical properties of the elements are periodic function of their atomic numbers. The elements with similar properties are repeated after certain regular interval 2, 8, 18, and 32 are the magic numbers by which periodicity of elements repeated.

CLASSIFICATION OF ELEMENTS:

The periodic table is a systematic arrangement of the elements in such a manner that elements possessing similar properties are grouped together. It is classified into four blocks:

- i) s – block elements
- ii) p – block elements
- iii) d – block elements
- iv) f – block elements

i) s – Block Elements:

s – block elements are those elements in which the last electron enters the s – orbital of their respective outermost shells is called s – block elements. Since s – subshell has only one orbital which can accommodate only two electrons, therefore, there are only two groups of s – block elements. Thus, elements of group - 1, group – 2 and helium comprise s- block element. The general electronic configuration of s- block elements are – $ns^{1 \text{ or } 2}$.

General characteristics of s – block elements:

- i) These elements are highly reactive metals.
- ii) They have low ionization energies and are highly electropositive.
- iii) They are soft metals with low melting and boiling points. As an example, Na metal can be easily cut by knife.
- iv) All are good conductor of heat and electricity.
- v) Most of the metals of this block have characteristic colour of flame.
- vi) These elements are strong reducing agents.

- vii) These elements form ionic compounds by losing one or two valence electrons and thus show oxidation states of +1 or +2.

P – Block Elements:

These elements in which the last electron enters any one of the three p -orbitals of their respective outermost shell are called p – block element. Since a p – subshell has three degenerate p – orbitals, each one of which can accommodate two elements, therefore, there are six groups as one moves from group 13 to 18. General electronic configuration of the p- block elements is ns^2np^1 to ns^2np^6 as we move from group 13 to 18.

GENERAL PROPERTIES OF P-BLOCK ELEMENTS:

- I) P-block elements include both metals, nonmetals and metalloids. However, the number of non - metal is much higher than that of metals. Further the metallic character increases from top to bottom in a group and non – metallic character increases along a period in this block.
- II) Their ionization enthalpies are relatively higher as compared to those of s-block elements.
- III) Their oxidising character increases from left to right in a period and reducing character increases from top to bottom in a group. As such F_2 is the strongest known oxidising agent.
- IV) Some of them show more than one oxidation states in their compounds due to inert pair effect.