

# PERIODIC CLASSIFICATION OF ELEMENTS

Initial Attempts made by chemists to classify the elements.

## DOBEREINER'S TRIADS (1817)

Law of Triads : If Elements having similar chemical properties are arranged in set of three elements (triad), in increasing order of atomic masses, the atomic mass of middle element is roughly average of atomic mass of other two.

Limitation: Only three triads could be identified amongst the elements available at that time.

## NEWLAND'S LAW OF OCTAVES (1866)

When elements are arranged in order of increasing atomic masses, the properties of eighth element are repetition of properties of first element just like the eighth note on a musical scale.

Limitation: This law worked well with lighter elements only.

## MENDELEEV'S PERIODIC TABLE (1872)

According to Mendeleev's periodic Law, Properties of elements are periodic functions of their atomic masses.

Criteria : Atomic mass ( Physical Property) and Formulae of hydrides and oxides (Chemical Property).

### ACHIEVEMENTS

- 1) He left some gaps and predicted the properties of undiscovered elements to be filled there.
- 2) Noble gases could be placed in a separate group when discovered.

### LIMITATIONS

- 1) Hydrogen wasn't assigned a fixed position.
- 2) Positioning of isotopes was a challenge.
- 3) Wrong order of some elements could not be explained.

## HENRY MOSELEY(1913)

He reformed the Mendeleev's periodic table by stating the fact that atomic number of an element is a more fundamental property than its atomic mass.

This was the basis that led to the build-up of the modern periodic table.

Modern Classification of elements followed till date.



MODERN PERIODIC LAW

According to this law, the properties of elements are periodic functions of their atomic number.



SALIENT FEATURES OF THE MODERN i.e. LONG FORM OF PERIODIC TABLE

There are seven horizontal rows that are known as periods.

- Elements with same no. of shells are in the same period.
- Period 1 is the shortest period with two elements.
- Period 2 and 3 are short periods with eight elements each.
- Period 4 and 5 are long periods with eighteen elements each.
- Period 6 and 7 are very long periods with 32 elements each,

There are eighteen vertical columns known as the groups.

- Elements with same no. of valence electrons are in the same group.
- Group 1 is called as the alkali metal groups.
- Group 2 is called the alkaline earth metals, group.
- Group 17 is known as the Halogen family group.
- Group 18 is known as the Noble or Inert gas family group.

A zig zag line of borderline separates metals from non-metals. These elements are B, Si, Ge, As, Sb, Te and Po. They are called semi metals or metalloids.

By knowing the electronic configuration of an element, we can predict the position i.e. the group number and period number of an element.



TRENDS IN MODERN PERIODIC TABLE

| TRENDS                  | WHILE MOVING FROM LEFT TO RIGHT ACROSS A PERIOD   | WHILE MOVING FROM TOP TO BOTTOM DOWN A GROUP |
|-------------------------|---------------------------------------------------|----------------------------------------------|
| VALENCE ELECTRONS       | Increases from 1 to 8.                            | Remains same.                                |
| VALENCY                 | Increases from 1 to 4 and then decreases to zero. | Remains same                                 |
| ATOMIC SIZE             | Decreases along the period.                       | Increases down the group.                    |
| METALLIC CHARACTER      | Decreases along the period.                       | Increases down the group.                    |
| NON- METALLIC CHARACTER | Increases along the period.                       | Decreases down the group.                    |