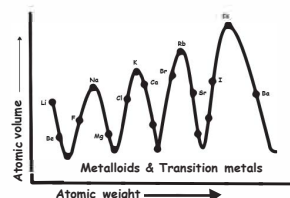


- Law of Triads: Johann Dobereiner (1829)
- Law of Octaves: John Alexander Newlands (1865)
- Lothar Meyer plotted a graph between atomic volume and atomic weight. Elements with similar properties occupied the similar positions on the graph.
- Periodic Law: Dimitri Mendeleev and Lothar Meyer.  
It states that the properties of the elements are periodic function of their atomic weights.
- Modern Periodic Law: Henry Moseley (1913)  
It states that the physical and chemical properties of the elements are periodic functions of their atomic numbers. ; Horizontal rows - Periods, Vertical columns - Groups are numbered from 1 to 18.



To ease out difficulty in studying individually the chemistry of all the elements and their compounds.

- Electronic Configuration is the distribution of electrons into subshells of an atom.
- In periods: Number of elements in each period is twice the number of atomic orbitals available in the energy level that is being filled.
- Group wise: Elements in same group have similar valence shell electronic configurations, hence same number of electrons in outer orbit and similar properties. These are classified into four blocks i.e., s-block, p-block, d-block and f-block.

Derived from the atomic number of element using numerical roots for 0 and numbers 1-9 and "ium" is added at the end.

IUPAC Nomenclature of elements with atomic no. > 100

## Classification of Elements and Periodicity in Properties

Properties	Down the Group	Period (Left to Right)
(a) Atomic Radius : Distance from the centre of the nucleus to the outermost shell containing electrons.	Increases	Decreases
(b) Electron Gain Enthalpy : Energy released when a neutral isolated gaseous atom accepts an electron to form anion.	Becomes less negative	Becomes more negative
(c) Ionization Energy: The minimum amount of energy required to remove the electron from the outermost orbit of an isolated atom in gaseous state.	Decreases	Increases
(d) Electro-negativity: Tendency of an atom to attract the shared pair of electrons towards itself.	Decreases	Increases
(e) Electron Affinity	Decreases	Increases
(f) Valency: Number of univalent atoms which combine with an atom of given element	No Change	Increase from 1 to 4 and then decrease from 4 to 0.
(g) Metallic Character	Increases	Decreases
(h) Non-Metallic Character	Decreases	Increases

Genesis of periodic classification

Purpose

Periodic table classification based on electronic configuration

Periodic trends in properties of elements

Periodic table classification based on types of elements

### Isoelectronic species

Atoms and ions with same number of electrons  
eg:  $O^{2-}$ ,  $F^-$ ,  $Na^+$ ,  $Mg^{2+}$  have same number of electrons

Size  $\propto \frac{1}{(+ve \text{ charge})}$   $\propto (-ve \text{ charge})$

Q) The increasing order of the ionic radii of the given isoelectronic species is:

- (a)  $S^{2-}$ ,  $Cl^-$ ,  $Ca^{2+}$ ,  $K^+$  (b)  $Ca^{2+}$ ,  $K^+$ ,  $Cl^-$ ,  $S^{2-}$   
(c)  $K^+$ ,  $S^{2-}$ ,  $Ca^{2+}$ ,  $Cl^-$  (d)  $Cl^-$ ,  $Ca^{2+}$ ,  $K^+$ ,  $S^{2-}$

Q) Which of the following statements is not correct?

- (a) Ionisation energy increases on going down a group in the periodic table.  
(b) Among alkaline earth metals, reducing character increases down the group.  
(c) Fluorine is the most electronegative element.  
(d) Metallic character increases on going down a group in the periodic table.

### s-Block Elements

- Group 1 (alkali metals) and Group 2 (alkaline earth metals)
- Outermost configuration is  $ns^1$  or  $ns^2$
- Reactive with low IE.
- Metallic character and reactivity increases down the group

### d-Block Elements

- Group 3-12
- Outer configuration is  $(n-1) d^{1-10} ns^{0-2}$
- Forms coloured ions.
- Exhibit variable valence, paramagnetism.
- Also called as Transition elements.
- Some are used as catalysts.

### p-Block Elements

- Group 13 to 18.
- Also called as representatives or main group elements
- Outermost configuration varies from  $ns^2 np^1$  to  $ns^2 np^6$
- At the end of period are low reactive noble gases.
- Halogens and Chalcogens have high negative electron gain enthalpies.
- Metallic character increases down the group

### f-Block Elements

- Also called as Inner Transition Elements.
- Contains Lanthanoids and Actinoids.
- Outer configuration is  $(n-2) f^{1-14} (n-1) d^{0-1} ns^{0-2}$
- All are metals.
- Actinoids are radioactive.

Q) In the long form of the periodic table, the valence shell electronic configuration of  $5s^2 5p^4$  corresponds to the element present in

- (a) Group 16 and period 6  
(b) Group 17 and period 5  
(a) Group 16 and period 5  
(b) Group 17 and period 6



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