LONG FORM OF PERIODIC TABLE:

- It is based on modern periodic law or Mosley's periodic law. It states that "the physical and chemical properties of elements are the periodic functions of their atomic numbers or electronic configuration.
- The properties are repeated after regular intervals of time when the elements are arranged in the increasing order of their atomic numbers.
- Neil's Bohr constructed the modern periodic table based on the electronic configuration of the elements.
- It is a graphical representation of Aufbau principle.
- The vertical columns are called groups and the horizontal rows are called periods.
- There are altogether 18 groups and 7 periods in the long form (or) extended form of periodic table.
- Elements are arranged in the increasing order of their atomic numbers.
- From left to right the atomic number increases by one unit.
- The electron which differentiates an element from the preceding element is called the differentiating electron.
- The differentiating electron is the last coming electron of that element.
- In each period, in the first element the differentiating electron enters into s-orbital and in the last element the differentiating electron enters into p-orbital.
- The last element of the period completes the octet by attaining the stable electronic configuration
  $ns^2\ np^6$.
- Thus every period start with the filling of valence s-orbital and ends with the complete filling of s and p-orbitals of valence shell.
- First period contains only two elements H($1s^1$) and He($1s^2$) and it is called very short period.
- Second period contains 8 elements and it is called 1^{st} short period.
- Third period also contains 8 elements and it is called 2^{nd} short period.
- The first 3 periods are discontinuous periods.
- 4^{th} period contains 18 elements and it is called 1^{st} long period.
- 5^{th} period also contains 18 elements and it is called 2^{nd} long period.
- Sixth period is the longest period containing 32 elements.
- Elements do not exhibit horizontal similarities as they differ in the configuration.
- Some periods are broken and some periods are extended to accommodate transition elements.
- 14 elements each of 6^{th} and 7^{th} periods have been separately placed at the bottom of table to maintain uniformity and effectiveness.

- 2^{nd} period elements are Bridge elements due to their diagonal relationship.
- 3^{rd} period elements are called typical elements as they represent the properties of below elements in the respective groups.

GROUPS :

- There are 18 groups.
- They are designated as group A and Group B except VIII and '0' groups.
- VIII group consists of 3 vertical rows or 3 groups.
- '0' group consists of Noble gases.
- Groups 'A' consists of representative elements and groups 'B' and VIII group consists of transition elements.

- Elements belonging to group will exhibit similar properties due to similar valence shell configuration.
- The elements which exhibit both vertical and horizontal similarities are transition elements.
- The number of electrons in valence shell is equal to the group number.
- The seventh period is incomplete and has about 20 elements.

CLASSIFICATION OF ELEMENTS INTO 4 BLOCKS:

Period	First element	Electronic configuration	Last element	Electronic Configuration
1	H	$1s^1$	He	$1s^2$
2	Li	[He] $2s^1$	Ne	[He] $2s^2$ $2p^6$
3	Na	[Ne] $3s^1$	Ar	[Ne] $3s^2$ $3p^6$
4	K	[Ar] $4s^1$	Kr	[Ar] $3d^{10}$ $4s^2$ $4p^6$
5	Rb	[Kr] $5s^1$	Xe	[Kr] $4d^{10}$ $5s^2$ $5p^6$
6	Cs	[Xe] $6s^1$	Rn	[Xe] $4f^{14}$ $5d^{10}$ $6s^2$ $6p^6$
7	Fr	[Rn] $7s^1$	–	–

- The elements are classified into four blocks as s-block, p-block, d-block and f-block based on the orbital into which differentiating electron enters.
- This classification is based on electronic configuration.
- s-block contains 2 groups, p-block contains 6 groups, d-block contains 10 groups and f-block contains 14 groups.

- s-block is at the extreme left and p-block is at the extreme right of the periodic table.
- d-block is kept in between s-block and p-block.
- f-block is separately placed below the main body of the table.

s-block :

- Differentiating electron enters into s-orbitals of valence shell.
- It consists of I -A and II - A groups namely alkali and alkaline earth metals.
- They are
  1) Most reactive metals.
  2) Most electropositive metals.
  3) Strongly reducing in nature.
  4) Strong tendency to lose electrons.
- The S-block element placed in P-block is He.
- They exhibit only positive oxidation states.

p-block:

- Differentiating electron enters into p-orbitals of valence shell.
- It consists of III-A to VII-A and '0' group.
- Electronic configuration is $ns^2\ np^1$ to $ns^2\ np^5$ and $ns^2\ np^6$.
- It consists of all types of elements i.e. metals, non-metals, metalloids.
- These are more electronegative than s-block elements.
- Most electronegative elements are present in this block.
- They are also reactive elements except 'O' group.
- They exhibit positive and negative oxidation states.

d – block :

- Differentiating electron enters into d-orbitals of (n – 1) shell.
- It consists of all groups – B and VIII group. (total ten groups)
- Electronic configuration: ns^2, $(n-1)d^{1-10}$
- All d-block elements are metals.
- These are placed in 4^{th}, 5^{th}, 6^{th} and 7^{th} periods.
- They are hard metals with high M.P.'s and B.P's.

f – block :

- Differentiating electron enters into f-orbitals of (n–2) shell.
- Electronic configuration: ns^2, $(n-1)d^{(0\ or\ 1)}$, $(n-2)f^{1-14}$.

- They are present in two horizontal rows at the bottom of periodic table namely lanthanides and actinides.
- They belong to 6^{th} and 7^{th} periods.
- They belong to III-B group.
- Many of them are artificially prepared and do not occur in nature.
- They are all metals.

Classification of elements into 4 types:

- This is based on properties of elements.
- Elements are further classified as

  1) Inert gases

  2) Representative elements

  3) Transition elements

  4) Inner transition elements.

INERT GASES :

- Inert gas elements have all completed shells.
- They belong to '0' group in the periodic table.
- Helium, Neon, Argon, Krypton, Xenon, Radon are called noble gases or rare gases or inert gases (or) aerogens
- These are monoatomic gases.
- They are chemically inactive.
- They are placed at the extreme right of the periodic table.

REPRESENTATIVE ELEMENTS:

- s-block or p-block elements except '0' group are called representative elements.
- They have only one incomplete outer shell.
- These elements attain the nearest inert gas configuration by losing or gaining or sharing electrons.
- They are chemically active.
- A few metals and metalloids are found in representative elements.
- Because of their reactivity and frequent occurrence they are called representative elements.
- They include most reactive metals and most reactive non-metals.

TRANSITION ELEMENTS:

- These are d-block elements.
- They have two incomplete outer shells ultimate and penultimate.
- Their general electronic configuration is

  $(n-1)d^{1-10}\ ns^{1-2}$.

- Neutral atoms or Ions having incomplete
- d-orbitals are called transition elements.
- Zn, Cd and Hg are not considered to be transition elements as their atoms and Ions have completed d-orbitals.
- Small atomic size, high nuclear charge, and unpaired d-electrons give characteristic properties to transition elements.
- Transition elements are hard and dense metals.
- They have high melting and boiling points.
- They are good conductors of heat and electricity.
- They show variable oxidation states.
- They form coloured compounds.
- They form complexes or co-ordinate covalent compounds.
- They readily form alloys like brass, bronze, german silver etc.

INNER TRANSITION ELEMENTS:

- The f-block elements are called inner transition elements as they bring about transition among transition metals.
- The differentiating electron enters into the
- f-orbital of anti penultimate shell.
- These elements have three incomplete outer shells.
- The general electronic configuration of these elements is $(n-2)f^{1-14}\ (n-1)d^{0-1}ns^2$.
- These elements show similar properties due to the similar electronic configuration in the last two shells.
- They exhibit the common oxidation state + 3.
- All the inner transition elements belong to the same group (i.e. IIIB)