

## Topic 3 Periodicity (SL)

### Syllabus:

#### 3.1 Periodic Table

Periodic table is arranged into four blocks associated with four sub-levels (s, p, d and f).

Groups – Vertical columns, Periods – Horizontal rows

Period number (n) is the outer energy level occupied by electrons

The positions of metals, non-metals and metalloids

#### 3.2 Periodic trends

Vertical and horizontal trends in the periodic table exist for atomic radius, ionic radius, ionization energy, electron affinity and electronegativity.

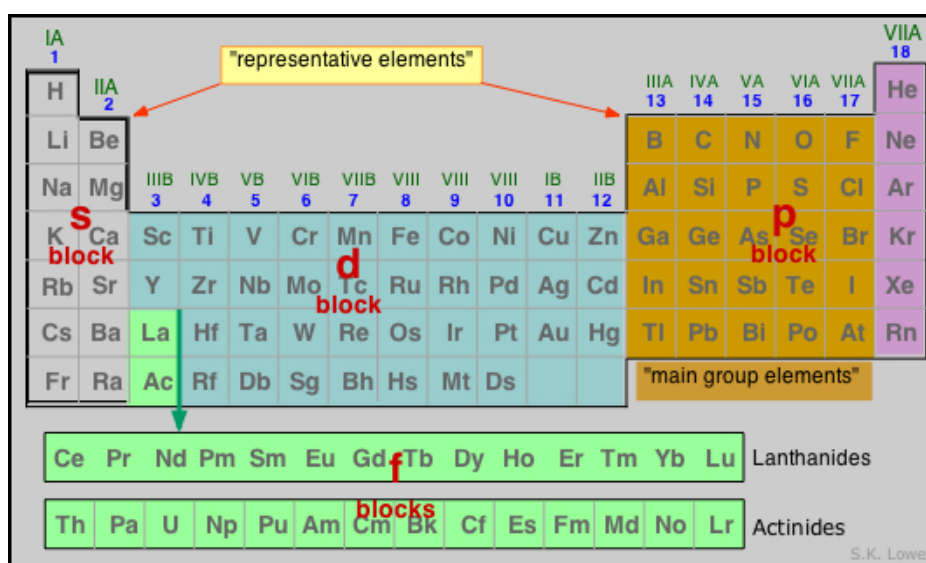
Trends in metallic and non-metallic behavior are due to the trends above.

Oxides change from basic through amphoteric to acidic across a period.

### 3.1 Periodic Table

#### (A) The arrangement of elements in the periodic table

- Elements in the periodic table are arranged in an order of increasing **atomic number (Z)**.



- There is a division between **metals** and **non-metals**.
- Metals are on the left and non-metals are on the right.
- Metals tend to have a smaller number of electrons in their outer shell.
- The periodic table is assigned into four blocks associated with four sub-levels – **s, p, d, f**
- d-block metal is transition metals
- Elements in period 6 are called **lanthanides**, after element La.
- Elements in period 7 are called **actinides**, after element Ac.

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### **(B) Period and Group**

- **Group** – Vertical column
- Group number = numbers of valence electron
- Group I to VII, Nobel gas is Group 8.
- Alkali metal (Group I), Alkali earth metal (Group II), Halogen (Group VII)
- Group 3 to 6 have both metals and non-metals.
- B, Si, Ge, As, Sb, Te, Po are metalloids which have the characteristic of both metal and non-metal.
  
- **Period** – Horizontal row
- Period number = numbers of occupied energy level
- Elements of the same period have the same number of occupied electron shells.

### **(C) Relationship between electron arrangement and their position of periodic table**

- Elements in the same group have the same number of electrons in outer shell.
- Group number is the same as the number of electrons in the outer shell.
- Elements in the same period have same number of occupied electron shell.
- Period number is the same as the number electron shells in the atom.
  
- For example,  
Sulphur is group 6 and period 3  
Its electron arrangement is 2, 8, 6 (6 outer electrons and 3 electron shells)