

U.G.SEMESTER-IV

MJC-5 (T)

Inorganic Chemistry: s-, p-, d- and f- block elements

Unit-I : Periodic Table and Periodicity of Elements

Topic- s-, p-, d- and f- block elements and Long form of Periodic Table

(PART - 2)

DR. JASMINE SINGH

ASSISTANT PROFESSOR

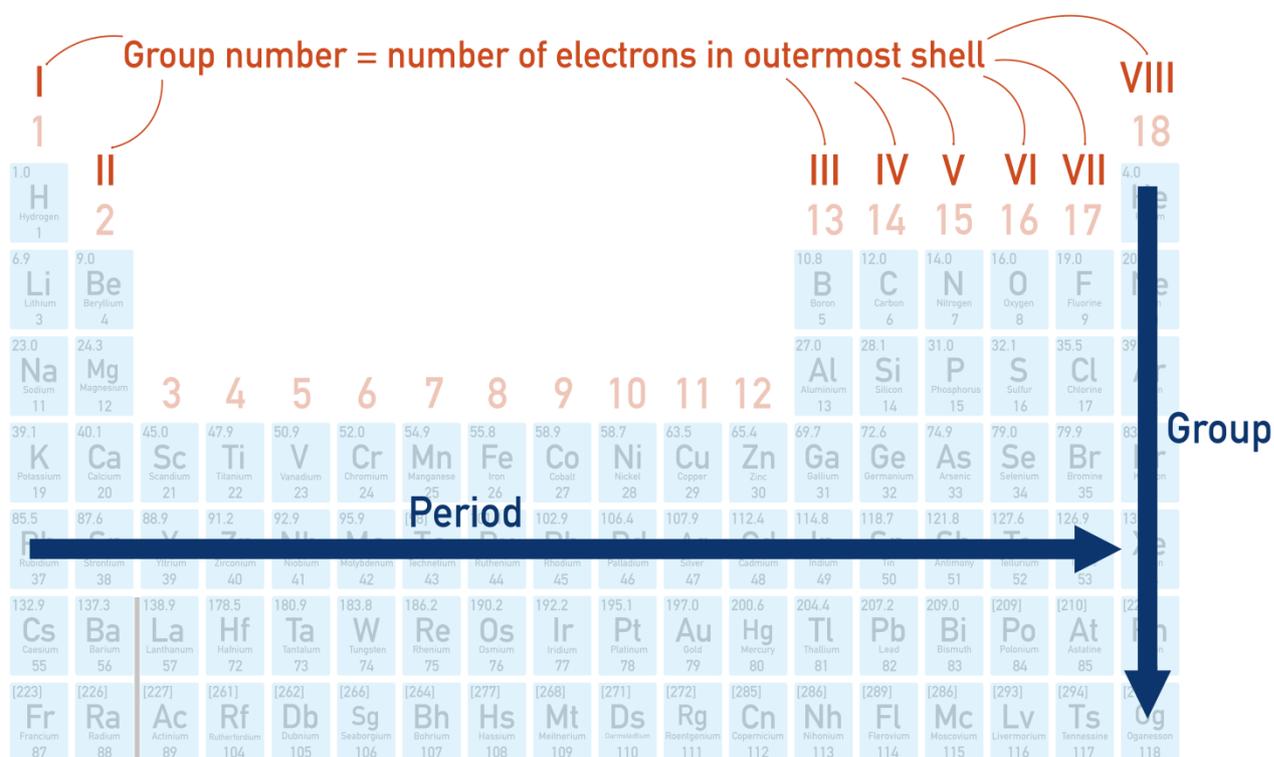
DEPARTMENT OF CHEMISTRY

M.B.R.R.V.PD. SINGH COLLEGE

(MAHARAJA COLLEGE)

ARA

The present (long-form) table is arranged into **periods** (rows) and **groups** (columns). Each new period corresponds to the start of filling a new principal energy level n .



Lanthanides	140.1 Ce 58	140.9 Pr 59	144.2 Nd 60	144.9 Pm 61	150.4 Sm 62	152.0 Eu 63	157.2 Gd 64	158.9 Tb 65	162.5 Dy 66	164.9 Ho 67	167.3 Er 68	168.9 Tm 69	173.0 Yb 70	175.0 Lu 71
Actinides	232.0 Th 90	[231] Pa 91	238.1 U 92	[237] Np 93	[242] Pu 94	[243] Am 95	[247] Cm 96	[245] Bk 97	[251] Cf 98	[254] Es 99	[253] Fm 100	[256] Md 101	[254] No 102	[257] Lr 103

Horizontal Rows → Periods

- Total of **7 periods**.
- Each period begins with the filling of a new principal energy level (n).
- The length of a period reflects the number of available orbitals being filled.

Period	Number of Elements
1st	2 (H, He)
2nd & 3rd	8
4th & 5th	18
6th	32
7th	Incomplete (also 32)

Vertical Columns → Groups

- **18 groups** in total.
- Elements in the same group share similar **valence-shell electron configurations**, so they show related chemical properties.
- **Group 1:** Alkali metals | **Group 2:** Alkaline earth metals
- **Groups 3–12:** Transition metals
- **Group 17:** Halogens | **Group 18:** Noble gases

Classification Based on Electron Configuration (Blocks)

The periodic table can also be classified into blocks, depending on the type of orbital being filled:

Block	Description	Examples
s-block	Groups 1 & 2, including helium	H, Na, Mg
p-block	Groups 13–18	B, C, N, O, F, Ne
d-block	Transition elements (Groups 3–12)	Fe, Cu, Zn
f-block	Inner transition elements (lanthanides and actinides)	Ce, U

The s- and **p-block** elements are often called **representative elements**. The **d-block** elements are the **transition elements**, and the **f-block** (lanthanides and actinides) is placed separately below the main table for clarity and compactness.

Significance of Modern Classification

- Arranging by **atomic number** aligns perfectly with electronic configurations and periodic trends.
- Resolves mass-based anomalies and places **isotopes** correctly within the same element.
- Accurately predicts chemical behaviour across periods and down groups.
- Provides a logical framework for **new/synthetic elements** and for studying trends (atomic size, ionization enthalpy, electronegativity, etc.).

Summary

- Moseley's work established **atomic number** as the basis of periodicity.
 - The modern table has **7 periods** and **18 groups**, arranged by increasing Z.
 - Block classification (s, p, d, f) reflects valence orbital filling and explains trends.
 - Modern classification is predictive, resolves earlier anomalies, and underpins periodic trends
-
- The modern periodic table consists of **18** vertical columns, called the **groups(1-18)** and **7** Horizontal rows, called **periods**.
 - The first period contains **two elements**, Hydrogen and Helium.
 - The second period contains **eight elements**, from Lithium to Neon.
 - The third period contains **eight elements**, from Sodium to Argon.
 - The fourth period contains **eighteen elements**, from Potassium to Krypton.
 - The fifth period contains **eighteen elements**, from Rubidium to Xenon.
 - The sixth period contains **thirty-two elements**.
 - The seventh period is incomplete.
 - On the basis of electronic configuration, elements are classified into **four Blocks** known as **s, p, d and f- blocks**.
 - 1st and 2nd group elements are called **s-block** elements. The general electronic configuration is **ns^{1-2}** .
 - 13th to 18th group elements are called **p-block** elements. The general electronic configuration is **$ns^2 np^{1-6}$** .
 - 3rd to 10th group elements are called **d-block** elements. The general electronic configuration is **$(n-1)d^{1-10} ns^{1-2}$** .
 - Lanthanides and actinides elements are called **f-block** elements. The general electronic configuration is **$(n-2)f^{1-14} (n-1)d^{0-1} ns^2$** .