7. d & f BLOCK ELEMENTS , COORDINATION COMPOUNDS

IMPORTANT POINTS

1. d-block elements are called transition elements as they have incompletely filled (n–1)d subshells.
f-block elements are called inner transition elements.

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2. In this chapter, we study
i) Properties of first row transition elements
ii) Lanthanides– chemical reactivity, Lanthanide contraction
iii) Coordination compounds– Werner's theory, Shapes, IUPAC nomenclature, Bonding, Isomerism, EAN rule.

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3. Properties of Transition elements:

- Transition elements lie in between s- and p- block elements.
- **Elements of 3d series :**
  Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu and Zn
- **Elements of 4d series :**
  Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag and Cd
- **Elements of 5d series :**
  La, Hf, Ta, W, Re, Os, Ir, Pt, Au and Hg.
- The outer electronic configuration of transition elements is $(n-1)d^{1-9}\ ns^{1-2}$.
- Transition elements exhibit variable oxidation states.
- Atomic sizes, ionic radii, covalent radii, and atomic volumes decrease from left to right in each series. But at the end of each series the values increases.
- In any group of transition elements, the sizes of 3d-elements are relatively smaller than 4d-elements. But due to lanthanide contraction, the increase from 4d to 5d elements is not as expected.
- Transition elements are less electropositive than s-block elements & more electropositive than p-block elements.
- Transition elements are good conductors of heat and electricity.
- The ionization energy values of transition elements are high when compared with s-block elements and less when compared with p-block elements.
- Most of the transition elements and their ions show paramagnetism.
- Some metals Fe, Co, Ni show ferromagnetism.

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4. In **lanthanide series**, the differentiating electron enter into 4f subshell.

- Common oxidation state of lanthanides is +3. Other oxidation states shown by them are +2 &+4.
- The decrease in the size of lanthanides due to 'poor 4f–electrons screening' is known as **lanthanide contraction.**
- Lanthanides are chemically reactive and are effected by air, H_2O; forming M_2O_3 and $M(OH)_3$

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5. **Complex compounds** contain coordinate covalent bonds. Hence they are known as **Coordination compounds.**

- Shapes of the complex species can be predicted from the co-ordination number of the central metal atom/ ion.
- The first satisfactory explanation about complexes is given by Werner's theory.
- VBT gives an explanation of complex formation by overlapping of hybrid orbitals of central atom and lignad orbitals. The shapes and characteristics are explained by VBT.
- The total number of electrons in the central metal in complex possesses after co-ordination is **EAN [Effective Atomic Number]** of the metal.

d & f BLOCK
CHEM BEATS!

- **d-Block:** It's the **SOLID MALE** Metal Block
- It's the **Most Colourful CCC Block:** Catalysts, Coloured, Complexes!
- It's the Medal Block: Gold Medal Metal Au(79); Silver Medal Metal Ag(47); Bronze Medal Alloy Cu(29)

ఈ మూడు కూడా **d-Block** లోని **11th Group** లో ఒకదానికింద ఉండటం ఎంత అద్భుతమో??

- It's the 'Most Premium Block' : Costliest Metals Platinum, Gold, Silver ఇవన్నీ ఇందులోనే....
- It's the 'Heavy Weight Metal Block' : పెద్దపెద్ద Bridges, Trains, Skyscrapers లలో వాడే Steel Alloy.....

- **f-Block- FOOT** Block

ఇందులోని Special Elements:

Most **Useful Nuclear Fuel** Element **Uranium (92)** ,

World Famous and Favourite Scientist **Einstein** పేరుగల **Einstenium Es (99)**,

Most Popular, Perfect Angel Number 100 **Fermium(Fm)**

సమస్త భూమండలాన్ని నాశనం చేయగలిగేంత **Powerful Atom Bomb** లో వాడే **Plutonium, Uranium** లు **f-Block** లో ఉన్నాయి.