

Transition Metals (d-Block Elements)

They have incomplete d-subshell either in neutral atom or in their ions

The outer electronic configuration is $(n-1)d^{1-10}ns^{1-2}$

Zn, Cd and Hg have fully filled d orbital (d^{10}), so they are not regarded as transition metals

Atomic number 21 to 30

3d Series

Outer electronic configuration
 $3d^{1-10}4s^{1-2}$

Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn

Cr - $3d^54s^1$, Cu - $3d^{10}4s^1$

Inner Transition Metals (f-Block Elements)

Lanthanoids - 4f Cerium (at. no. 58) to lutetium (at. no. 71)

Actinoids - Thorium (at. no. 90) to lawrencium (at. no. 103)

Outer electronic configuration:
 $(n-2)f^{1-14} (n-1)d^{0-1} ns^2$

Complex Compounds

The metal ions bind to number of anions or neutral molecules

The transition metals have tendency to form complex compounds due to the smaller sizes, high ionic charges and the availability of d orbitals for bond formation

Transition Metal with Catalytic Property

V₂O₅ - Contact Process

Fe - Haber's process

Ni - Hydrogenation

Potassium Dichromate K₂Cr₂O₇

Orange in colour

Strong oxidising agent

Dichromate ion consists of two tetrahedra connected with Cr-O-Cr bond with an angle of 126°

Potassium
Permanganate
 KMnO_4

Purple in colour, manganate is green in colour

Permanganate ion is diamagnetic, whereas manganate is paramagnetic

Strong oxidising agent

Lanthanoid
Contraction

It refers to the steady decrease in atomic and ionic radii from lanthanum to lutetium

It causes the radii of the second (4d) series of the transition elements similar to the corresponding members of third (5d) series

Lanthanoids

Cerium (Ce), Praseodymium (Pr), Neodymium (Nd), Promethium (Pm), Samarium (Sm), Europium (Eu), Gadolinium (Gd), Terbium (Tb), Dysprosium (Dy), Holmium (Ho), Erbium (Er), Thulium (Tm), Ytterbium (Yb), Lutetium (Lu)

Actinoids

Thorium (Th), Protactinium (Pa),
Uranium (U), Neptunium (Np),
Plutonium (Pu),
Americium (Am), Curium (Cm),
Berkelium (Bk), Californium
(Cf), Einsteinium (Es), Fermium
(Fm), Mendelevium (Md),
Nobelium (No), Lawrencium (Lr)

