Contents

Crystal Field Splitting

Definition

- **Crystal Field Splitting** is the phenomenon
- of *splitting* of $d-$ orbital into **energy levels**
- The **energy levels** are e_g, t_{2g} followed by the **arrangement** of **electrons** in these **orbitals**
- based on their **pairing energy** and **crystal field splitting energy**

Mechanism of crystal field splitting

- **A central metal** atom is **surrounded** by *ligands* from all sides.
- The *electrons* of **ligands** and **metal** atom interact.
- **The** $d-$ orbital of **metal** atom breaks into two energy levels.
  - e_g
  - t_{2g}
  - e_g has two **orbitals**
  - t_{2g} has **three** *orbitals* .
  - e_g has **higher** energy level.
  - t_{2g} has **lower** energy level.
- **Electrons** fill up at the **lower** energy level.
- The remaining **electron** have two choices:
  - **pair** up with t_{2g}
  - **move** to e_g
- **Electrons** move to e_g if,
  - **Pairing Energy** $>$ **Crystal Field Splitting Energy**
  - This case has **high spin complex**.
- **Electrons** pair at t_{2g} if,
  - **Crystal Field Splitting Energy** $>$ **Pairing Energy**
  - This case has **low spin complex**

Strength of Ligands

- **Weak field ligands** have **less** gap between e_g and t_{2g} .
- **Strong field ligands** have **more** gap between e_g and t_{2g} .