

## Metallic Solids

---

### Particles

- Metal atoms in a sea of delocalised valence electrons

### Forces between particles

- Strong Metallic Bonds (needs to be broken to melt)

### Structure

- A regular 3D lattice / array of metal atoms with loosely held valence electrons. The positive nucleus of one metal atom is strongly attracted to the valence electrons of neighbouring metal atoms. This bond is non-directional (has no fixed direction)

### Properties

- **Electrical Conductivity:** mobile valence electrons (charged particles) between metal atoms mean that metals are excellent electrical conductors
- **Melting & Boiling points:** Metallic bonds are strong due to the structure described above— metals have **high melting points** as it takes a lot of heat energy to break these bonds.
- **Solubility:** Solvents are not strong enough to break the metallic bonds between metal atoms. Metals generally do not dissolve in any solvents
- **Malleable and Ductile:** Metals consist of metal atoms held together in a 3-D lattice by metallic bonding, in which valence electrons are attracted to the positive nuclei of neighbouring atoms. As this is a non-directional force, layers of atoms can slide over each other without breaking the metallic bond and disrupting the structure and breaking the metal.