METALLIC BONDS

- The "electron sea" model of metallic bonding proposes that all the metal atoms in the sample contribute their valence electrons to form an "electron sea" that is delocalized throughout the metal

- The nuclei, with their core (inner shell) electrons are submerged within the sea of electrons in an orderly manner.

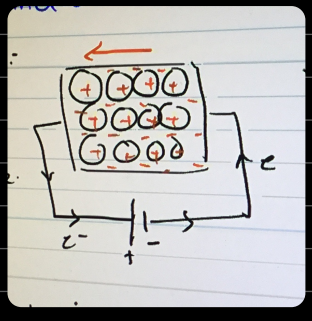
- The valence electrons are shared amongst all the atoms in the substance and the piece of metal is held together by mutual attractions of the metal cations for the highly delocalised mobile electrons

Structure
- Giant metallic lattice

PROPERTIES:

① High tensile strength
- The attraction between the delocalized electrons and the cations is responsible for the strength of metals
  ↳ A lot of energy has to be put in to break the strong metallic bond

② Electrical Conductivity
  ↳ is due to the mobile delocalized electrons
- The movement of electrons is called an electrical current.



③ Good conductors of heat
- The delocalised electrons in the metal conduct heat away from a human hand much faster than the localised electrons in covalent bonds in wood
  ↳ Thus, wood does not seem cool to touch
- Heat energy → kinetic energy of movement of electron

④ High melting + boiling point

- Melting points are moderately high because the electrostatic forces of attraction between the delocalised electrons and the cations have to broken, which requires a large amount of energy

- Boiling a metal requires even more energy as <u>all</u> forces of attraction have to be completely broken

$$Na(s) \longrightarrow Na(l) \longrightarrow Na(g)$$

Na(s)	Na(l)	Na(g)
solid	molten	gas
regular	less regular	random gaseous atoms

⑤ Malleability / Ductility

- Metals are malleable and ductile due to the fact that the cations are arranged in a regular manner surrounded by the sea of electrons.

- The regular layers can slide over each other without shattering the metal