

IONIC SOLIDS (e.g. NaCl)

Particles

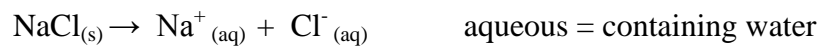
- Ions (positive cations and negative anions)

Forces between Particles

- Particles (ions) are held together by **strong ionic bonds**. These are very strong **electrostatic attractions** between oppositely charged ions
- Solid exists as a regular **3-D lattice** of positive and negative ions
- Ions cannot move until ionic bonds are broken (when the solid melts / is molten)

Properties

- **Electrical Conductivity:** Ionic solids exist as a regular **3-D lattice** of positive and negative ions held together by very strong electrostatic attractions. There are no free ions to carry an electrical current. Ions must be free to move to conduct. Therefore, ionic solids only conduct when melted / molten / dissolved as ions are free to move and carry a current
- **Melting points:** Ionic solids exist as a regular **3-D lattice** of positive and negative ions held together by very strong electrostatic attractions. This requires high amounts of heat energy to be broken to melt– therefore they have very high melting points
- **Solubility:** Ionic solids are soluble in polar solvents only
 - Ionic solids will dissolve in water because of attractions to the dipoles in water. The water molecules will separate an ion from the ionic lattice and completely surround it.
 - Positive ions are attracted to the slightly negatively charged oxygen atom.
 - Negative ions are attracted to the slightly positively charged hydrogen atoms.



The attraction of ions for water molecules is stronger than both the strong electrostatic attraction between ions and the weak intermolecular forces between water molecules. Therefore ionic solids are soluble in water.

- **Hard but Brittle:** When an ionic solid receives an impact, like charges will line up. This causes repulsion between ions/like charges causing the solid to shatter.