

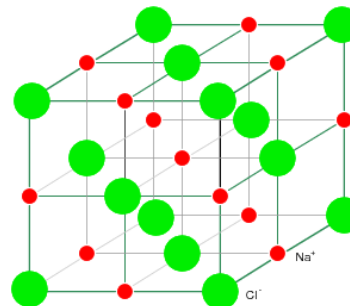
SL & HL Answers to Ionic bonding & structure questions

1.
 - i. (sodium carbonate) Na_2CO_3
 - ii. (aluminium phosphate) AlPO_4
 - iii. (calcium hydrogencarbonate) $\text{Ca}(\text{HCO}_3)_2$
 - iv. (chromium(III) hydroxide) $\text{Cr}(\text{OH})_3$
 - v. (copper(I) nitrate) CuNO_3
 - vi. (ammonium sulfate) $(\text{NH}_4)_2\text{SO}_4$
 - vii. (caesium iodide) CsI

2.
 - (a) $\text{Fe}(\text{NO}_3)_2$
 - (b) FeCl_2

3. Sulfur has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^4$. By gaining two electrons to form the S^{2-} ion it obtains a full outer energy level of electrons with an electron configuration similar to a noble gas (argon). It forms ionic compounds with positive ions.

4. In the crystal structure of sodium chloride each sodium ion is surrounded by six chloride ions and each chloride ion is surrounded by six sodium ions to give a cubic structure. The ionic bond is the sum of all the attractive forces between oppositely charged ions and the sum of all the repulsive forces between similarly charged ions.



5. Sodium is an electropositive metal on the left of the periodic table and forms an ionic bond with the highly electronegative non-metallic element oxygen which is on the right of the periodic table. Oxygen and chlorine are both non-metals on the right of the periodic table with similar electronegativity values so share electrons to form covalent bonds.

6. Chlorine is less electronegative than oxygen or fluorine. The difference in electronegativity between aluminium and chlorine is therefore less than it is for aluminium and oxygen or fluorine and is not enough for electron transfer to occur so electrons are shared to form aluminium chloride.