

Atoms and Molecules

Atoms and Bonding

- Molecules consist of component atoms in many different combinations of type and number
- Atoms therefore are the distinct "building blocks" of the molecule
- Atoms themselves consist of three smaller particles; protons, neutrons and electrons

Types of Bonds

- Ionic bonds occur between atoms with different charges (+ve and -ve). Atoms exchange electrons, as in the previous example with sodium and chlorine
 - Ionic bonds are weak bonds, meaning the atoms can be broken apart easily
- Covalent bonds occur when atoms create more stable outer shells by sharing electrons
- Hydrogen bond- the most common example of this type of bond is the loose connection that molecules of water make amongst themselves
 - This means the molecule has a charge imbalance..it is a "polar" molecule
 - As a consequence, when there are a lot of water molecules around the "+ve ends" of an H₂O molecule attract the "-ve middle regions" of other H₂O molecules

Hydrophilic and hydrophobic substances

- Because water has this "polar" property, other substances that also have a charge will like water
- They are called hydrophilic (e.g. NaCl, or salt, which will dissolve in water)
- Substances that don't have a charge, such as molecules of fat (they are covalently bonded, with no free electrons) DISLIKE water and are called hydrophobic
- The reason why hydrophilic substances such as NaCl dissolve well in water is because water acts as a solvent (it dissolves things)

Acids and bases

- Hydrogen ion (just "a proton" with a neutron)
- The lone hydrogen 'proton' is called an ACID
- The remaining hydroxide ion is called a base
- In water, for every "acid" (a lone hydrogen) there is a "base" (the remaining hydroxide ion)
- In combination there is no net charge, so water is "neutral"

Molecules of the human body

Carbon

- Biological molecules contain the atom carbon
- Carbon is a versatile atom that bonds with many other types of atoms
- (e.g. it bonds with hydrogen to make a "hydrocarbon")
- Carbon and hydrogen combine through covalent bonding

Functional Groups

- Sometimes atoms connected to the carbon "frame" are different to just hydrogen
- For example, a mix of carbon, oxygen and hydrogen, known as an aldehyde group, can be attached to the carbon "frame"

Carbon Rings

- Carbon atoms can also join each other to form "rings"