Tahira yasin raja
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Understanding the considerations of solubility and solvents on the use and action of drugs in the pharmaceutical industry

A solvent is a liquid or gas that dissolves a solid, liquid, or gaseous solute, resulting in a solution.Solubility is the physical property describing the ability the solute, to dissolve in a solvent.

The factors that affect the solubility are

1) The polarity of the substance and the polarity of the solvent.
2) The temperature of the solvent.
3) The size of the particles.

Temperature

Solubility generally increases with the rise in temperature and usually decreases with the fall of the temperature but this does not always happen in endothermic reaction solubility increases with the increase in temperature.

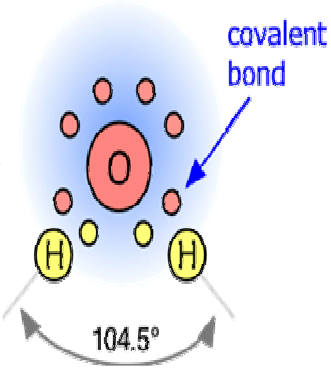
But in an exothermic reaction solubility decreases with the increase in the temperature

Polarity of substance

Solubility of a solute in a solvent purely depends on the nature of both solute and solvent. A polar solute dissolved in polar solvent. Solubility of a non-polar solute in a solvent is large. A polar solute has low solubility or insoluble in a non-polar solvent.

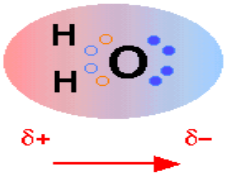
The structure of water

In H_2O, only two of the six outer-shell electrons of oxygen are used leaving four electrons which are organized into two non-bonding pairs. The four electron pairs surrounding the oxygen tend to arrange themselves as far from each other as possible in order to minimize repulsions between these clouds of negative charge this would make the bon angle 109.5 but because the two non-bonding pairs remain closer to the oxygen atom, these exert a stronger repulsion against the two covalent bonding pairs, pushing the two hydrogen atoms closer together. The result is a distorted tetrahedral arrangement in which the H—O—H angle is 104.5°.



The opposite charges attract so the partially-positive hydrogen atom on one water molecule is attracted to the partially-negative oxygen on an other molecule. This process is called **hydrogen bonding**.

The compound has to be soluble in water for it to be transported within the body



To make a substance soluble in water by adding a heteroatom which is an element other then carbon nitrogen and oxygen are added this is because the nitrogen and oxygen are electronegative they have the lone pair of electrons so when they are mixed with water hydrogen bonds are broken in the water and they dissolve with the water. They can also soluble in water if a salt is made

Acid + alkali = salt

The substance can also be soluble by making amines which make hydrogen chloride salts to transport a drug like aspirin it also has to be fat soluble for it to get through permeable membranes sodium salts are made that improve solubility. Carbon is added which is insoluble in water but soluble in fat as an organic dissolves in an organic molecule so for the drug to be transported it has to be fat soluble and water soluble.

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How aspirin reaches the target area?

The aspirin molecule has to pass through the digestive system which is a tube going from the mouth to the anus it generally filters molecules which enter it according to the size after this the aspirin molecule enters the liver the liver tends to remove one of the groups of the aspirin and leave it formed a painkiller .this painkiller is transported around the body by the pumping action of the heart due to which the aspirin molecule finally passes through the left ventricle into the aorta.

What negative affect a aspirin can have

Because an aspirin tablet is made up with lots of other substances
When it hits the stomach it needs to dissolve to free the aspirin. Because the stomach is acid the aspirin itself won't dissolve. The aspirin on the carboxyl group has a Neutral charge. This is much less soluble than the ionized form. While the neutral form is actually the form that can be absorbed through the membrane the surface area of the stomach is extremely small compared to the intestine this also makes it less soluble and is not that well supplied with blood so little aspirin is absorbed in the stomach. Once aspirin passes through the stomach into the small intestine the pH rises at this pH most of the aspirin doesn't work and becomes ionized and becomes very soluble. But there is still a small amount that passes through the membrane and then be absorbed by the portal vein into the blood from whence it goes directly to the liver. Since this movement across the membrane removes neutral aspirin from the intestine. Now that aspirin is in the circulation of blood some of it will reach the stomach and there will inhibit the enzyme and limit the amount of acid that can be secreted into the stomach when the body gets any appropriate stimulus. This means there's A lot more acid in your stomach than there should be. This can lead to Ulcers which is indirectly the result of aspirin acting on the stomach.