Effect of dissolution medium on aspirin solubility

Solutions consist of a single phase comprising of two or more parts. These parts are dispersed at a molecular level in the single phase mixture. The main part of the solution is the solvent and this is where the solutes are molecularly dispersed.

When a material becomes dissolved or molecularly dispersed from its solid state, it is known as dissolution and the extent to which the dissolution takes place is known as solubility. The highest concentration of a material is the solubility of that material in a solvent, in the soluble state at a specified temperature. At this particular state the solution is known to be saturated and if any more solid was to be added, it would result in precipitation. Sometimes, solubility is identified as the amount of solvent needed to dissolve a fraction of a drug at a given temperature.

Aim

The aim of this experiment is to investigate the solubility of aspirin in an aqueous media and investigate the effects of adding a surfactant within the dissolution medium on the solubility of aspirin.

(Dosage Forms 1 – Practical Schedule (PJ1101), Module leader – Mike Taylor, Date accessed – 12/02/10)

Method

Weigh 0. 2g of aspirin in a clean 5ml tube

Add 3ml of the dissolution medium and stopper the tube

Label the tube with your name and the dissolution medium

Place the tube onto a mechanical rotary shaker and let it mix for 45 minutes

Take the tube from the shaker and filter the contents with filter paper

Collect the filtrate in a 10ml volumetric flask

Using the dissolution medium, make up the filtrate to 10ml

Extract 0. 5ml of the solution and place it in a 25ml volumetric flask

Make the solution up to the 25ml mark using fresh dissolution medium (same type)

Using a UV spectrophotometer, measure the absorbance twice at 229nm

Determine the concentration of aspirin against a standard calibration curve made using drug concentrations between 0-80mg/L

Calculate the solubility

Dissolution media:

Water

Sodium dodecyl sulphate (SDS) (0. 1% w/w %)

Sodium dodecyl sulphate (SDS) (1% w/w %)

Sodium dodecyl sulphate (SDS) (4% w/w %)

Discussion

After conducting the experiment and obtaining the results I was able to produce graphs which all show positive correlation. We can see from Table 5

that as the concentration of surfactant increases, so does the solubility of aspirin. This is also proven by the graph which shows the relationship between surfactant concentration and drug solubility.

I also found that although it’s true that as the concentration of surfactant increases so does the drug solubility, once I had to calculate the classification of drug solubility according to BP, they all fell into the same category which was ‘ slightly soluble’.

I would expect aspirin to be located in the inner core of the micelles of SDS. The reason for this is because the aromatic ring of aspirin is hydrophobic and therefore it would rather be in non aqueous environments. As proven by the experiment conducted, as the concentration of SDS increased, so did the solubility of aspirin. This was because as the concentration of the SDS increased, so did the formation of the micelles so that it could prevent the aspirin from revealing itself to the aqueous media.

Conclusion

In conclusion, I found that as the concentration of the surfactant increased, so did the solubility of aspirin. This was because as the concentration of surfactant increases, the number of micelles in the media also increases.