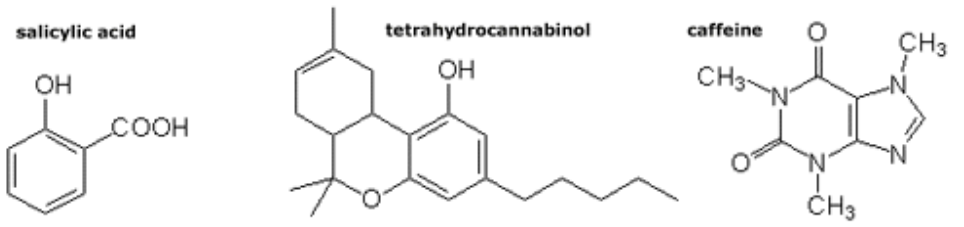
E25 ISOLATION OF A BIOLOGICALLY ACTIVE COMPOUND

The isolation of caffeine from tea leaves

The overwhelming majority of biologically active molecules are organic compounds; for example, ethanol, salicylic acid and tetrahydrocannabinol (THC). Naturally occurring organic amines are called alkaloids and are amongst the most interesting and widely varied of all naturally occurring compounds.



Caffeine is an alkaloid that occurs in tea, coffee and several carbonated soft-drinks. It is one of the alkaloids easiest to isolate and, in this practical exercise, is extracted from tea leaves by treating them with dichloromethane. Sodium hydroxide is added to the tea leaves during the extraction process to neutralise the tannic acids that would otherwise be difficult to separate from the caffeine.

After evaporation of the dichloromethane solvent, the crude caffeine is purified by chromatography. The impure sample is *adsorbed* onto a column of alumina (Al_2O_3). A solvent is passed through the column and the loosely bound, caffeine is readily washed off or *eluted*. The coloured impurities, which are relatively polar, remain adsorbed on the alumina.

Final purification of an organic solid is nearly always accomplished by recrystallisation (see E24 for more information concerning this procedure).