

*Describe and explain the role of chemists*

A **target molecule** is the desired compound which has a biological effect. This target molecule must be synthesised from **readily available, cheap starting materials** (e.g. short chain hydrocarbons).

Chemists will begin the process by looking at the functional groups on the target molecule, then **working backwards** in a series of steps to find suitable starting materials – this is **retrosynthesis**.

The chemist will find a **suitable disconnection** in a molecule – a bond which can be broken to give **two useful fragments** which can make the target molecule (known as **synthons**). This work is **theoretical**, as synthons rarely exist in a stable state. Instead a **synthetic equivalent** (actual **compounds which contain the synthons** in a stable state) is used in a series of steps to produce the target molecule.

There are many different routes which can be taken to produce the target molecule. Often chemists choose the one with fewest steps, however other factors should also be taken into account e.g. yield, time taken, disposal of waste materials etc...

Sometimes **various isomers of the same product** will be created in a reaction, which **reduces the yield of useful product**. These isomers can be removed using **fractional crystallisation** or **chromatography**.

Computer modelling can be used, instead of testing on animals or humans, to ethically test the effectiveness of developing pharmacological medicines.

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Page 5 of 5