Definitions

- **Disconnection**: An analytical operation, which breaks a bond and converts a molecule into a possible starting material. The reverse of a chemical reaction. Symbol $\Rightarrow$ and a curved line drawn through the bond being broken.

- **FGI**: Functional Group Interconversion: The operation of writing one functional group for another so that disconnection becomes possible. The reverse of a chemical reaction. Symbol $\Rightarrow$ with FGI written over it.

- **Reagent**: A compound which reacts to give an intermediate in the planned synthesis or to give the target molecule itself. The synthetic equivalent of a synthon.

- **Synthetic equivalent**: A reagent carrying out the function of a synthon which cannot itself be used, often because it is too unstable.

- **Synthon**: A generalized fragment, usually an ion, produced by a disconnection. (some people also use synthon for a synthetic equivalent).

- **Target Molecule**: The molecule whose synthesis is being planned.

Retrosynthesis

Retrosynthesis is the process of “deconstructing” a target molecule into readily available starting materials by means of

- imaginary breaking of bonds (disconnections) and by the conversion of one functional group into another (functional group interconversions).

The following factors need be taken into consideration:

Efficiency, e.g. the “arithmetic demon”:

“The arithmetic demon dictates one of the major axioms of synthesis: Get the most done in the fewest steps and in the highest yield.” (R. E. Ireland)
The Synthetic Route to a Target Molecule


- Apply one- and two-group disconnections ("1,n-relationships), pericyclic reactions, etc.

Example:

Retrosynthesis 1:

Summary of retrosynthetic approaches: