

Organic synthesis

A-Level Chemistry 9701 · Topic 21 revision notes

Everything from the 1 lessons of this topic on a few pages: the key idea of each lesson, the diagram to remember, the points to learn and the traps examiners set. Read it, cover it, test yourself.

1. Organic synthesis and reaction pathways

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1 Organic synthesis and reaction pathways

Syllabus 21.1

Organic synthesis means making a target molecule from a starting material by a sequence of known reactions. First **identify the functional groups** present, because each group has its own reactions and tests. Then work **backwards from the target**: compare the carbon skeleton and functional group of the target with the starting material. If the number of carbon atoms goes up by one, a **cyanide step** is needed (KCN on a halogenoalkane, or HCN with KCN on a carbonyl compound). Halogenoalkanes and alcohols are the key **intermediates** that connect most AS routes. For every step give the **reagent, conditions and type of reaction** (substitution, addition, elimination, oxidation, reduction, hydrolysis, condensation), and remember that the overall yield is the product of the step yields.

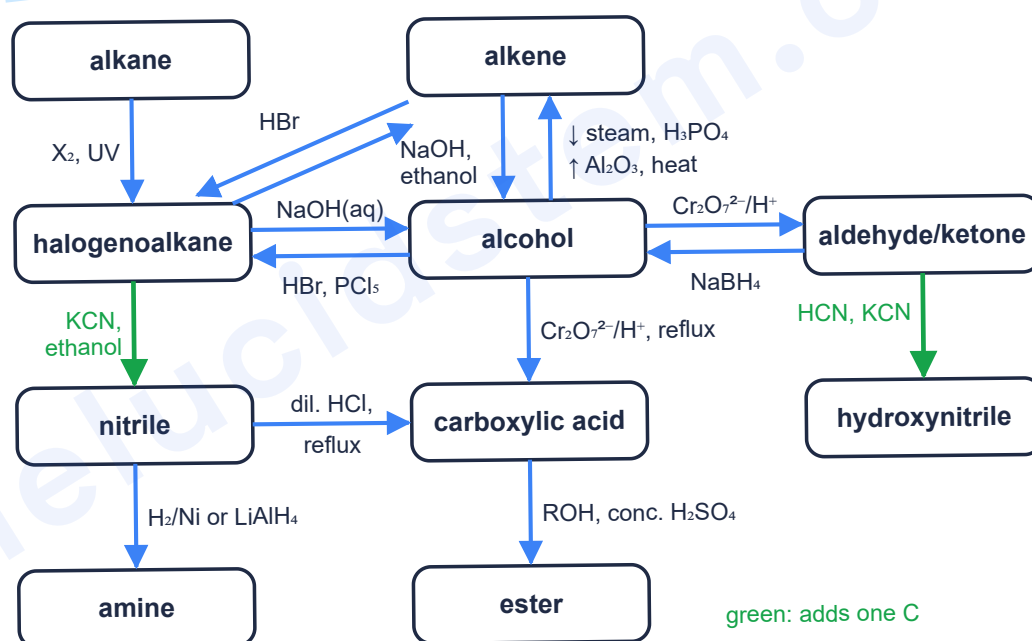


Fig. 1: the AS reaction map. Halogenoalkanes and alcohols link most routes; green steps add one carbon atom.

Groups, carbons, reagents, conditions.

- ✓ **Groups first:** name every functional group, then predict its reactions.
- ✓ **Count carbons:** one more carbon means a CN^- step.
- ✓ **Every step:** reagent, conditions and type of reaction.
- ✓ **Overall yield:** multiply the step yields.

Watch out!

Do not try to **oxidise straight from an alkane or alkene** to an acid at AS: go through the halogenoalkane or alcohol. Give **conditions** as well as reagents: NaOH(aq) gives an alcohol but NaOH in ethanol gives an alkene; distilling gives an aldehyde but reflux gives a carboxylic acid. Use KCN in **ethanol** on a halogenoalkane, but HCN with a KCN **catalyst** on a carbonyl. And the overall yield is the **product** of the step yields, not their average or the lowest one.