

Cambridge (CIE) A Level Chemistry



Your notes

Alcohols

Contents

* Alcohols & Acyl Chlorides



Reaction of Alcohols With Acyl Chlorides

- **Acyl chlorides** are **reactive** organic compounds with a **-COCl** functional group
- The carbonyl carbon is **electron-deficient** and has a **partial positive charge**
- It is therefore susceptible to **nucleophilic attack**
- The carbon-chlorine bond breaks and **white fumes** of **hydrogen chloride**, HCl, are formed

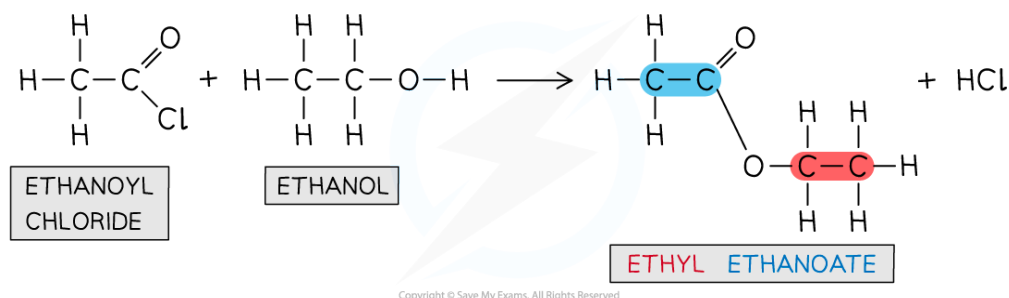
Reaction with alcohols and phenols

- Acyl chlorides react with alcohols and phenols to form esters via an **addition-elimination** mechanism
- The -OH group acts as a **nucleophile** and attacks the carbonyl carbon to **substitute** the chlorine atom
- Forming esters from acyl chlorides rather than carboxylic acids is **more effective** because:
 - Acyl chlorides are more **reactive** (so they produce the ester faster)
 - Acyl chloride reactions go to **completion** (so more of the ester is produced)

Reaction with alcohols

- The reaction of acyl chlorides with alcohols is **vigorous** and white fumes of HCl gas are formed

Esterification of an aliphatic alcohol using an acyl chloride

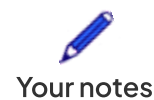


Acyl chlorides react vigorously with alcohols to form esters

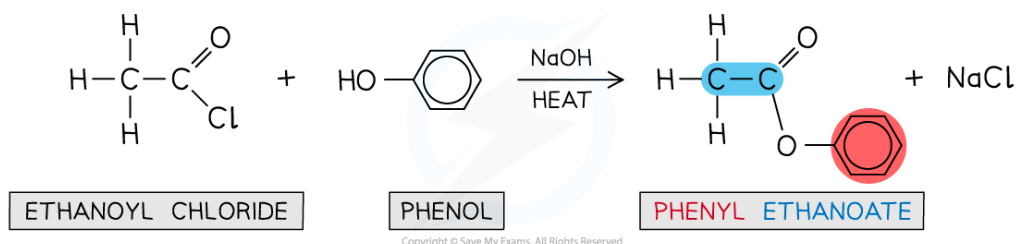
Reaction with phenols

- For the reaction of acyl chlorides with phenols to occur, **heat** and a **base** are required

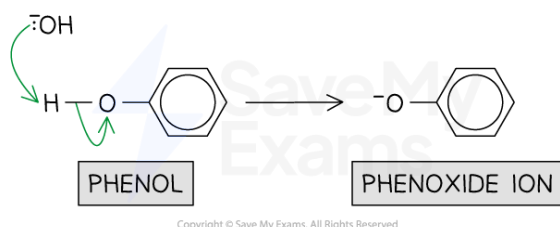
- The base is needed to deprotonate the phenol and form a **phenoxide ion**
- The phenoxide ion is a better nucleophile than the original phenol molecule and will be able to attack the carbonyl carbon



Esterification of phenol using an acyl chloride



Acyl chlorides react with phenols when heated and in the presence of a base to form esters



A base is needed to form a phenoxide ion which is a better nucleophile than phenol; now, nucleophilic attack on the carbonyl carbon can more readily occur