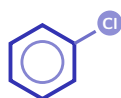


Halogen Compounds

A-Level Chemistry ■ Topic 31

A-Level Chemistry



Halogen Compounds

What we will cover

- 1 Making halogenoarenes
- 2 Why they are unreactive



many pesticides are
halogenoarenes

1

Halogenoarenes

Halogen Compounds

└ Halogenoarenes

Making halogenoarenes



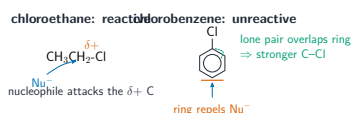
A **halogenoarene** 卤代芳烃 forms when an arene reacts with Cl_2 or Br_2 with an AlCl_3 **catalyst** 催化剂.

This is **electrophilic substitution** 亲电取代 – the halogen replaces an H on the ring (benzene → chlorobenzene).

Halogen Compounds

└ Halogenoarenes

Why they are unreactive



A halogenoarene resists **nucleophilic substitution** 亲核取代 (unlike a halogenoalkane):

- the Cl **lone pair** 孤对电子 overlaps the ring, strengthening the C–Cl bond
- the electron-rich ring **repels** a nucleophile

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Recap

Worked example – why won't chlorobenzene react?

Explain why chlorobenzene does not hydrolyse with aqueous NaOH but chloroethane does.

- In chlorobenzene a Cl lone pair overlaps with the ring's delocalised π system.
- That gives the C–Cl bond partial double-bond character: shorter and stronger.
- The ring's π electrons also repel the approaching OH^- nucleophile.
- In chloroethane C–Cl is a plain polar single bond $\Rightarrow$ hydrolyses on reflux.

Delocalisation into the ring strengthens C–Cl. The same reason phenol's C–O will not substitute either.

Topic 31 – key takeaways

1 Making

electrophilic substitution with AlCl_3

2 Halogenoalkane

reacts by nucleophilic substitution

3 Halogenoarene

the lone pair strengthens the C–Cl bond

4 Ring

electron-rich ring repels nucleophiles

Check yourself

- What catalyst makes a halogenoarene?
- Which mechanism makes a halogenoarene?
- Why is the C–Cl bond stronger in chlorobenzene?
- Does chlorobenzene react with OH^- normally?



Answers 1. AlCl_3 2. electrophilic substitution 3. the Cl lone pair overlaps the ring 4. no