

31 Why halogenoarenes are unreactive – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary

*Write each word three times.***English****Write it 3 times** (English)

halogenoalkane

lone pair

delocalised

nucleophile

nucleophilic sub-
stitution

Recall

A **halogenoalkane** reacts easily with nucleophiles, but a halogenoarene hardly reacts at all.

New ideas

Read these first, then do the Practice.

■ 1 Why it is unreactive



C–Cl is shorter and stronger, so hard to break

A **lone pair** on the chlorine overlaps the **delocalised** ring, giving the C–Cl bond partial double-bond character – shorter and stronger, so hard to break. The electron-rich ring also repels a **nucleophile**.

■ 2 The comparison

chloroethane
reacts with nucleophiles
(substitution)

chlorobenzene
does *not* react
with nucleophiles

So chloroethane reacts by **nucleophilic substitution**, but chlorobenzene does not under normal conditions.

Watch out: a halogenoarene (Cl on the ring) is far *less* reactive to nucleophiles than a halogenoalkane – the chlorine's lone pair strengthens the C–Cl bond, and the electron-rich ring repels the nucleophile.

Practice

Try these in order.

31.6 What does a *halogenoalkane* react with easily? [1]

31.7 What does the chlorine's *lone pair* do in a halogenoarene? [1]

31.8 What does that do to the C–Cl bond? [1]

31.9 Why else does the ring resist a nucleophile? [1]

31.10 Does chlorobenzene react with OH^- under normal conditions? [1]

31.11 Challenge. Chloroethane reacts readily with hot aqueous NaOH , but chlorobenzene does not. Give *two* reasons chlorobenzene is so unreactive. [2]
