31. Halogen compounds

Starter Quiz ·

A-Level Chemistry Name: _____ Score: _____

1. A halogenoarene is made by reacting an arene with a halogen and:
   - ☐ a reducing agent
   - ☐ an $AlCl_3$ (or $AlBr_3$) catalyst, by electrophilic substitution
   - ☐ aqueous NaOH
   - ☐ UV light only

2. A halogenoarene is unreactive towards nucleophiles partly because:
   - ☐ the C–Cl bond is very weak
   - ☐ the halogen's lone pair overlaps the ring, strengthening the C–Cl bond
   - ☐ it has no halogen
   - ☐ the ring attracts nucleophiles

3. The second reason a halogenoarene resists nucleophiles is that the ring:
   - ☐ is electron-poor
   - ☐ is positively charged
   - ☐ has no electrons
   - ☐ is electron-rich and repels the approaching nucleophile

4. Under normal conditions, with OH^-:
   - ☐ only chlorobenzene reacts
   - ☐ both react quickly
   - ☐ chloroethane reacts but chlorobenzene does not
   - ☐ neither reacts

5. The C–halogen bond in a halogenoarene is more reactive than in a halogenoalkane.
   ☐ True ☐ False

6. Benzene reacts with Cl_2 using the catalyst $AlCl_3$ to form _____.

   _____

7. Lone-pair overlap with the ring makes the C–Cl bond in chlorobenzene easier to break.
   ☐ True ☐ False

8. Which is more readily hydrolysed by aqueous OH^- under usual laboratory conditions?
   - ☐ Chlorobenzene
   - ☐ Chloroethane
   - ☐ They react equally readily

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Answers ·

A-Level Chemistry

1. **an $AlCl_3$ (or $AlBr_3$) catalyst, by electrophilic substitution**

   The halogen-carrier catalyst enables electrophilic substitution of a ring hydrogen.

2. **the halogen's lone pair overlaps the ring, strengthening the C–Cl bond**

   The lone-pair overlap gives partial double-bond character, making C–Cl shorter and stronger.

3. **is electron-rich and repels the approaching nucleophile**

   The delocalised, electron-rich ring repels electron-rich nucleophiles.

4. **chloroethane reacts but chlorobenzene does not**

   The halogenoalkane (chloroethane) undergoes nucleophilic substitution; the halogenoarene (chlorobenzene) does not.

5. **False**

   False. It is less reactive: a lone pair on the halogen overlaps with the ring's delocalised electrons, strengthening the C–X bond.

6. **chlorobenzene**

   Electrophilic substitution replaces a ring hydrogen with chlorine.

7. **False**

   Overlap gives partial double-bond character, so the bond is shorter and stronger.

8. **Chloroethane**

   Chloroethane undergoes nucleophilic substitution. The aryl C–Cl bond is strengthened by overlap with the ring.