

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 $\text{C}-\text{Cl}$ bond is very weak
 - ☐ the halogen's lone pair overlaps the ring, strengthening the $\text{C}-\text{Cl}$ 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 $\text{C}-\text{halogen}$ 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 $\text{C}-\text{Cl}$ 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

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.