

31. Halogen compounds

A-Level Chemistry

Name: _____ Score: _____

1. A halogenoarene is made by reacting an arene with a halogen and:
☐ an AlCl_3 (or AlBr_3) catalyst, by electrophilic substitution
☐ UV light only
☐ aqueous NaOH
☐ a reducing agent
2. A halogenoarene is unreactive towards nucleophiles partly because:
☐ the halogen's lone pair overlaps the ring, strengthening the $\text{C}-\text{Cl}$ bond
☐ the $\text{C}-\text{Cl}$ bond is very weak
☐ the ring attracts nucleophiles
☐ it has no halogen
3. The second reason a halogenoarene resists nucleophiles is that the ring:
☐ is electron-rich and repels the approaching nucleophile
☐ is electron-poor
☐ is positively charged
☐ has no electrons
4. Under normal conditions, with OH^- :
☐ chloroethane reacts but chlorobenzene does not
☐ both react quickly
☐ neither reacts
☐ only chlorobenzene reacts
5. The $\text{C}-\text{halogen}$ bond in a halogenoarene is less 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

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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 $\text{C}-\text{Cl}$ bond**
The lone-pair overlap gives partial double-bond character, making $\text{C}-\text{Cl}$ 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. **True**
The ring's delocalised electrons strengthen the 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 $\text{C}-\text{Cl}$ bond is strengthened by overlap with the ring.