

15 Halogenoalkanes – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
halogenoalkanes	卤代烷	_____
polar	极性	_____
nucleophile	亲核试剂	_____
primary	伯	_____
secondary	仲	_____
tertiary	叔	_____
nucleophilic substitution	亲核取代	_____
alcohol	醇	_____
nitrile	腈	_____
amine	胺	_____
silver nitrate	硝酸银	_____
precipitate	沉淀	_____

Recall

You met **halogenoalkanes** 卤代烷 when an alkane or alkene reacts with a halogen. A halogenoalkane has a **C–X bond** (X = a halogen) in place of a C–H bond.

- The C–X bond is **polar** 极性, so the carbon is slightly positive ($\delta+$).
- This $\delta+$ carbon is open to attack by a **nucleophile** 亲核试剂.

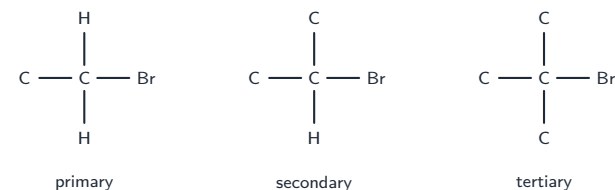
Nothing here is harder than IGCSE — it just adds the reactions.

New ideas

Read these first, then do the Practice.

■ 1 Three classes

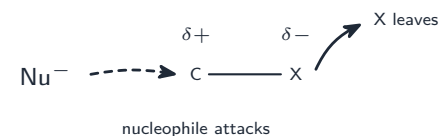
A halogenoalkane is **primary** 伯, **secondary** 仲 or **tertiary** 叔, set by how many carbons are joined to the carbon holding the halogen (one, two or three).



■ 2 Nucleophilic substitution

A **nucleophile** 亲核试剂 (a lone-pair species) attacks the $\delta+$ carbon and replaces the halogen — a **nucleophilic substitution** 亲核取代:

Reagent	Product
NaOH(aq), heat	an alcohol 醇
KCN in ethanol	a nitrile 腈 (adds a carbon)
NH ₃ in ethanol	an amine 胺



■ 3 Identifying the halogen

Warm with **silver nitrate** 硝酸银 in ethanol; the silver halide **precipitate** 沉淀 colour shows which halogen (white AgCl, cream AgBr, yellow AgI).

Watch out: primary/secondary/tertiary is decided by how many *carbons* are joined to the carbon holding the halogen — not by the number of halogen atoms. The nucleophile always attacks that $\delta+$ carbon.

Practice

Try these in order.

15.1 What is a halogenoalkane? [1]

15.2 What decides whether a halogenoalkane is primary, secondary or tertiary? [1]

15.3 Why is the carbon of the C–X bond open to attack by a nucleophile? [2]

15.4 Name the product when a halogenoalkane reacts with (a) NaOH(aq), (b) NH₃ in ethanol. [2]

15.5 Describe how you would identify the halogen in a halogenoalkane. [2]

15.6 Challenge. A halogenoalkane is warmed with KCN (a source of CN[−]) in ethanol. Name the type of reaction, and explain why the product has one *more* carbon than the halogenoalkane. [2]