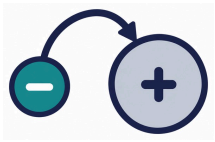
Haloalkanes Summary Map

OCR A Level Chemistry A · 4.2.2 Haloalkanes

1 Reactions and attackers

4.1.1, 4.2.2(b)

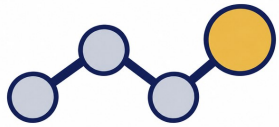
- Addition, elimination, **substitution**, hydrolysis
- **Nucleophile**: electron-pair donor
- Heterolytic fission: both electrons to X
- Polar C–X: δ+ C attracts nucleophiles



2 Names and classes

4.1.1(a), 4.1.1(b)

- Halogen as a **prefix**: 2-bromobutane
- Lowest numbers; alphabetical prefixes
- Carbons on C–X: **1° 2° 3°**
- Skeletal: halogen always written

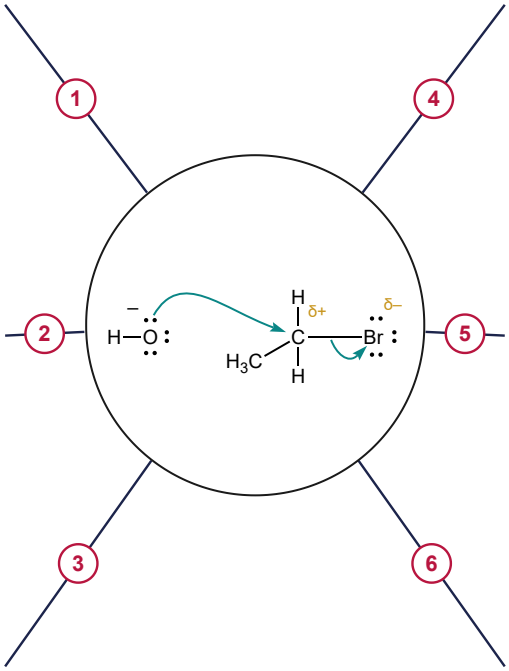


3 Hydroxide and water

4.2.2(a), 4.2.2(c)

- **NaOH(aq), warm**: alcohol
- Lone pair on O → δ+ C; C–X pair → X
- Water: weaker nucleophile, no charge
- $AgNO_3$ in ethanol: AgX precipitate

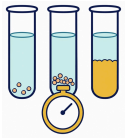




4 Rates of hydrolysis

4.2.2(a), 4.2.2(d)

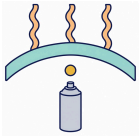
- Water + $AgNO_3$ in ethanol, 50 °C
- Time to the precipitate: rate ∝ 1/t
- C–I weakest: **iodo fastest**
- Bond enthalpy, not polarity



5 CFCs and UV

4.2.2(e)

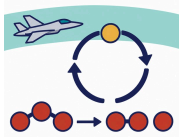
- O_3 absorbs harmful **UV**
- CFCs: unreactive, reach the stratosphere
- UV breaks C–Cl, not C–F
- $CCl_2F_2 \rightarrow {\bullet}CClF_2$ + **Cl•**



6 Ozone breakdown

4.2.2(e)

- $Cl{\bullet} + O_3 \rightarrow ClO{\bullet} + O_2$
- $ClO{\bullet} + O \rightarrow Cl{\bullet} + O_2$
- Cl• regenerated: a **catalyst**
- **•NO** does the same



The silver nitrate test

$AgNO_3(aq)$ in ethanol at 50 °C: water hydrolyses C–X, then $Ag^+ + X^- \rightarrow AgX(s)$

Haloalkane	C–X / kJ mol⁻¹	Precipitate	Rate
1-chlorobutane	346	AgCl, white	slowest
1-bromobutane	290	AgBr, cream	middle
1-iodobutane	228	AgI, yellow	fastest
a fluoroalkane	467	none seen	hardly at all

Worked examples

Name and class

- $(CH_3)_3CBr$
- 2-bromo-2-methylpropane
- C–Br carbon has 3 C: **tertiary**

A CFC in UV

- CCl_3F in the stratosphere
- C–Cl breaks, not C–F
- $CCl_3F \rightarrow {\bullet}CCl_2F + Cl{\bullet}$

Which is faster?

- 1-iodo- or 1-chloropropane
- C–I 228, C–Cl 346 kJ mol⁻¹
- **iodo**: weaker bond

Haloalkanes link alkanes (4.1.2) and alkenes (4.1.3) to alcohols (4.2.1); amines and nitriles follow at A level (6.2).

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