

Solutions

Each answer shows the steps, then the **result**.

2.1

- aqueous sodium hydroxide, NaOH(aq); and heat

2.2

- a nitrile

3.1 B

- NaOH in ethanol with heat favours elimination

3.2 C

- The C–I bond is weakest, so the iodoalkane reacts fastest

3.3

(a)

- the OH[−] nucleophile attacks the $\delta+$ carbon (curly arrow from the lone pair); at the same time the C–Br bond breaks, with both electrons going to Br; passing through a transition state with both half-bonded, giving ethanol and Br[−]

(b)

- the tertiary carbocation is stabilised by three electron-pushing alkyl groups, so the C–X bond breaks first to form it (S_N1)

3.4

- the C–I bond is weaker (lower bond energy) than C–Cl, so it breaks more easily, making the substitution faster