3.3.14 Organic Synthesis

★ A-LEVEL ONLY — not examined at AS level

3.3.14	*Multi-step organic synthesis (up to 4 steps). Green chemistry principles.*

You must know all reactions in the specification and chain them together for multi-step synthesis.

Key routes to remember:

Alkene → alcohol (hydration or oxymercuration/reduction)

Alcohol → halogenoalkane (HBr or PCl3/PCl5)

Halogenoalkane → nitrile (KCN/ethanol, reflux) → carboxylic acid (hydrolysis)

Halogenoalkane → amine (excess NH3, sealed tube)

Primary alcohol → aldehyde → carboxylic acid (oxidation)

Ketone/aldehyde → alcohol (reduction, NaBH4)

Green chemistry principles:

Fewer steps = less waste, lower cost, higher overall yield.

High atom economy (addition reactions > substitution reactions).

Avoid hazardous solvents and reagents.

Use renewable feedstocks where possible.