3.3.12 Polymers

★ A-LEVEL ONLY — not examined at AS level

3.3.12.1 *Condensation polymers: polyesters (Terylene), polyamides (nylon, Kevlar), amino acids. Repeat units.*

Condensation polymerisation: monomers join with loss of a small molecule (H2O or HCl).

Polyesters (e.g. Terylene/PET): dicarboxylic acid + diol → ester linkage (–COO–) + H2O.

Polyamides (e.g. nylon-6,6, Kevlar): dicarboxylic acid + diamine → amide linkage (–CONH–) + H2O.

From amino acids: self-condensation → polypeptide with peptide bonds (–CONH–).

Repeat unit: draw the section between two linkages, including the linkage bonds.

3.3.12.2 *Biodegradability and disposal of polymers.*

Polyalkenes (addition polymers): non-biodegradable — strong C–C backbone, no polar functional groups, resistant to hydrolysis and microbial attack.

Polyesters and polyamides (condensation polymers): can be hydrolysed (ester/amide bonds broken by acid, alkali, or water) → biodegradable.

Disposal methods:

Landfill: slow degradation (polyalkenes persist).

Incineration: energy recovery but produces CO2 and potentially toxic gases.

Recycling: requires sorting by polymer type; reduces waste and resource use.