Amides and Polymers Map

Edexcel International A Level Chemistry · Unit 5 · Topic 19B Amides and Polymers

1 Amides

19.1, 19.7

- RCOCl + conc NH_3: **$RCONH_2$**
- RCOCl + amine: N-substituted
- Room temperature
- Acid part in the name, N- for the rest



2 Condensation

19.8

- Two reactive groups per monomer
- Diamine + diacid: **H_2O lost**
- Diamine + dichloride: **HCl lost**
- One monomer can carry both

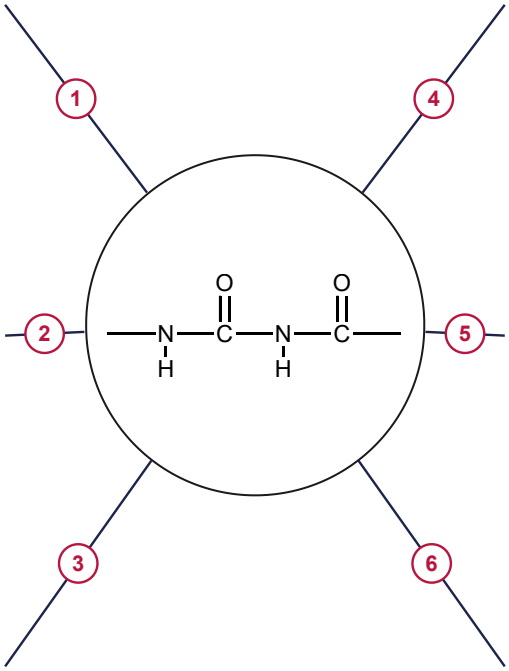


3 Repeat units

19.9

- –$NH(CH_2)_6NHCO(CH_2)_4CO$–
- Kevlar: rings joined by –CONH–
- Remove H from N, OH from COOH
- Going back: **break each C–N**

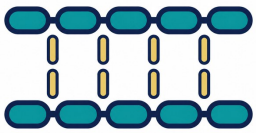




4 Hydrogen bonds

19.10

- N–H to O=C **between chains**
- Stronger than London forces
- Strong fibres, high melting
- Kevlar: flat chains pack closely



5 Addition polymers

19.8, 19.9

- Poly(propenamide): CH_2=$CHCONH_2$
- Nothing lost, amide on the **side**
- Poly(ethenyl ethanoate) + CH_3OH
- Ester exchange: **–$CH_2CH(OH)$–**



6 Solubility and uses

19.10

- OH groups hydrogen bond to water
- Poly(ethenol) **dissolves**
- Soluble laundry bags
- Liquid detergent capsules



Amide reactions and polymers

conditions and products

Change	Conditions	Products or result
Amide in acid	HCl(aq), reflux	RCOOH + amine salt
Amide in alkali	NaOH(aq), reflux	$RCOO^-Na^+$ + amine or NH_3
Nylon	Diamine + diacid	Polyamide + 2n H_2O
Kevlar	Aromatic diamine + dichloride	Polyamide + 2n HCl
Poly(propenamide)	C=C opens	Addition polymer only
Poly(ethenol)	Methanol, ester exchange	Polymer + CH_3COOCH_3

Worked examples

Mr of a repeat unit

- Nylon 6,6: $C_{12}H_{22}N_2O_2$
- Mr 226
- **2 mol H_2O: 36 g lost**

Counting units

- Poly(propenamide) Mr 71 000
- Repeat unit Mr 71
- **1000 units**

Reagents

- Target $CH_3CH_2CONHCH_3$
- Split at C–N
- **Propanoyl chloride + CH_3NH_2**

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