Amino Acids and Amides Map

OCR A Level Chemistry A · 6.2.2 Amino acids, amides and chirality

1 α-Amino acids

6.2.2(a)

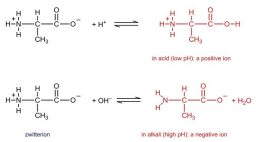
- $RCH(NH_2)COOH$
- R varies
- Glycine: R = H
- Alanine: $R = CH_3$



2 Acids and alkalis

6.2.2(a)

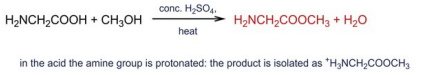
- COOH + alkali: COO^- salt
- NH_2 + acid: NH_3^+ salt
- Both ends react
- **Amphoteric**



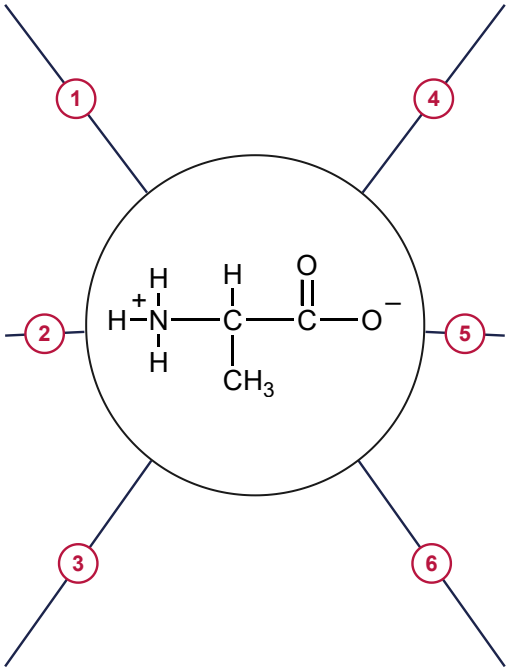
3 Esters

6.2.2(a)

- COOH + alcohol
- Warm, conc H_2SO_4
- Water lost
- NH_2 stays



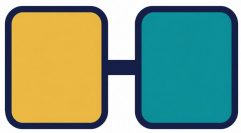
in the acid the amine group is protonated: the product is isolated as $^+H_3NCH_2COOCH_3$



4 Primary amides

6.2.2(b)

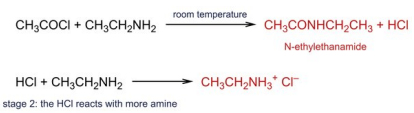
- $R–CO–NH_2$
- Two H on N
- $RCOCl + NH_3$
- Ethanamide, butanamide



5 Secondary amides

6.2.2(b)

- $R–CO–NH–R'$
- One H on N
- $RCOCl + RNH_2$
- N-methylethanamide



stage 2: the HCl reacts with more amine

6 Chirality

6.2.2(c), (d)

- Four different groups
- Non-superimposable
- Mirror images
- Glycine is not chiral



Reactions at a glance

amino acids and amides

Reagent	Group	Product
NaOH(aq)	COOH	$H_2NCH(R)COO^-Na^+$
HCl(aq)	NH_2	$Cl^-H_3N^+CH(R)COOH$
Alcohol, H_2SO_4	COOH	Ester
$RCOCl + NH_3$	Acyl chloride	Primary amide
$RCOCl + RNH_2$	Acyl chloride	Secondary amide

Worked examples

Moles

- 0.890 g alanine, Mr 89
- 0.890 ÷ 89
- **0.0100 mol**

% nitrogen

- $H_2NCH_2COOCH_2CH_3$, Mr 103
- 14 ÷ 103 × 100
- **13.6%**

Chiral centres

- $CH_3CH(OH)CH(NH_2)COOH$
- C2 and C3
- **Two**

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