Amino Acids and Proteins Map

Edexcel A Level Chemistry · Topic 18B Amino Acids and Proteins

1 Amino acids

18B.8, 18B.16

- $RCH(NH_2)COOH$
- R = H: glycine; R = CH_3: alanine
- NH_2 is basic, COOH is acidic
- **Amphoteric**



2 Zwitterions

18B.16

- **$^+H_3NCH(R)COO^-$**
- Low pH: $^+H_3NCH(R)COOH$
- High pH: $H_2NCH(R)COO^-$
- Solid: ionic attractions, high melting

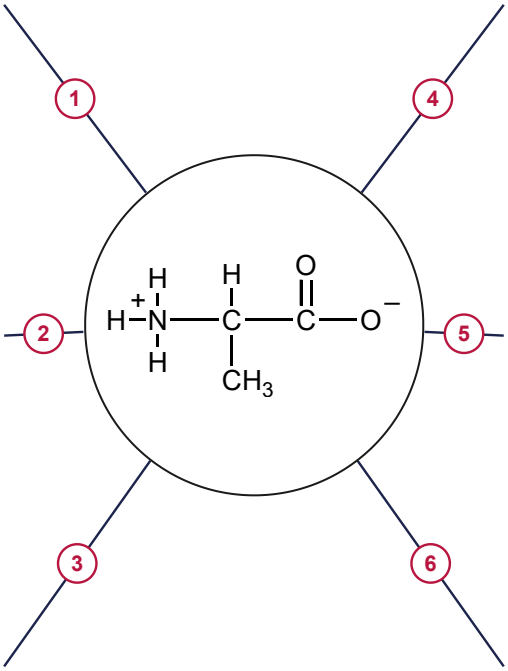


3 Enantiomers

18B.16

- Carbon 2: **four different groups**
- Non-superimposable mirror images
- Glycine: two H, achiral
- Racemic: equal amounts





4 Polarimeter

18B.16

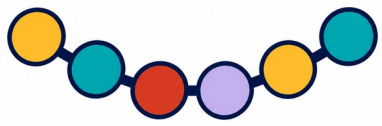
- Monochromatic light, polariser
- Sample tube
- Analyser turned: read the angle
- Enantiomers: **opposite rotation**



5 Peptides and proteins

18B.15, 18B.17

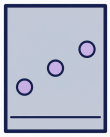
- Peptide link: **–CONH–**
- n units, n − 1 links
- Name reads from the free NH_2
- Protein: a condensation polymer



6 Chromatography

18B.17

- Hydrolyse: conc HCl, reflux
- Spots, solvent, then **ninhydrin**
- Rf = spot ÷ solvent
- Standards in the same solvent



Forms in acid and alkali

alanine, then Gly–Ala after hydrolysis

Condition	Main form	Overall charge
Strong acid	$^+H_3NCH(CH_3)COOH$	1+
Near pH 6	$^+H_3NCH(CH_3)COO^-$	0
Strong alkali	$H_2NCH(CH_3)COO^-$	1−
Gly–Ala, conc HCl, reflux	$^+H_3NCH_2COOH$ + $^+H_3NCH(CH_3)COOH$	1+ each
Gly–Ala, NaOH(aq), reflux	$H_2NCH_2COO^-$ + $H_2NCH(CH_3)COO^-$	1− each

Worked examples

Mr of a dipeptide

- Gly 75, Ala 89
- 75 + 89 − 18
- **146**

Orders

- Three different amino acids
- 3 × 2 × 1
- **6 tripeptides**

Rf

- Spot 4.2 cm, solvent 6.0 cm
- 4.2 ÷ 6.0
- **0.70**

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