Amino Acids, Proteins and DNA Map

AQA A-level Chemistry · 3.3.13 Amino acids, proteins and DNA

1 Amino acids

3.3.13.1

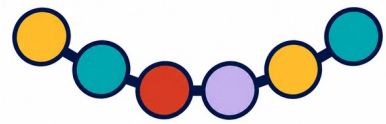
- Acidic and basic
- Zwitterion: $^{+}H_3NCH(R)COO^{-}$
- Low pH: positive ion
- High pH: negative ion



2 Peptides

3.3.13.2

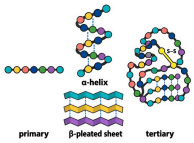
- Peptide link: **–CONH–**
- n units, n − 1 links
- Conc HCl, reflux: hydrolysis
- Back to the amino acids

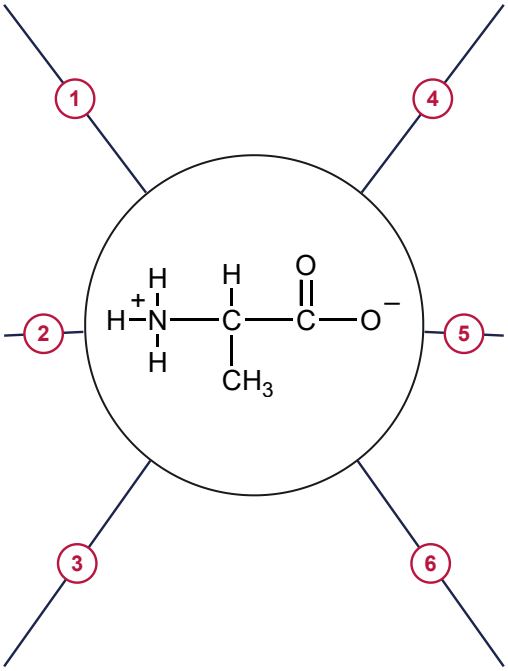


3 Protein structure

3.3.13.2

- Primary: the sequence
- Secondary: helix or sheet
- Tertiary: the folded shape
- H bonds and **S–S bonds**

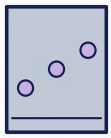




4 Chromatography

3.3.13.2

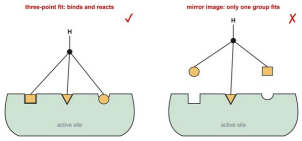
- Thin-layer plate
- Ninhydrin or UV light
- Rf = spot ÷ solvent
- Compare with known values



5 Enzymes

3.3.13.3

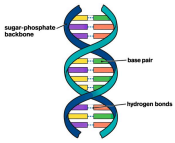
- Protein catalysts
- **Stereospecific** active site
- One enantiomer binds
- Inhibitor drugs block the site



6 DNA and cisplatin

3.3.13.4, 3.3.13.5

- Phosphate, sugar, base
- A–T two, G–C three H bonds
- Pt–N to guanine
- Replication stops



Forms and bonds

amino acids, proteins and DNA

Feature	Detail	Force or 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−
Alpha-helix	N–H to C=O along the backbone	Hydrogen bonds
Two strands of DNA	Base pairs A–T and G–C	Hydrogen bonds

Worked examples

Mr of a dipeptide

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

Rf

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

Base pairs

- DNA is 30% A
- So 30% T
- **G 20%, C 20%**

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