

OCR (B) Chemistry A-Level

PL1 Structure and bonding

Flashcards

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What is an amino acid?



What is an amino acid?

An organic compound that contains both an amine (-NH_2) and carboxylic acid (-COOH) functional group.

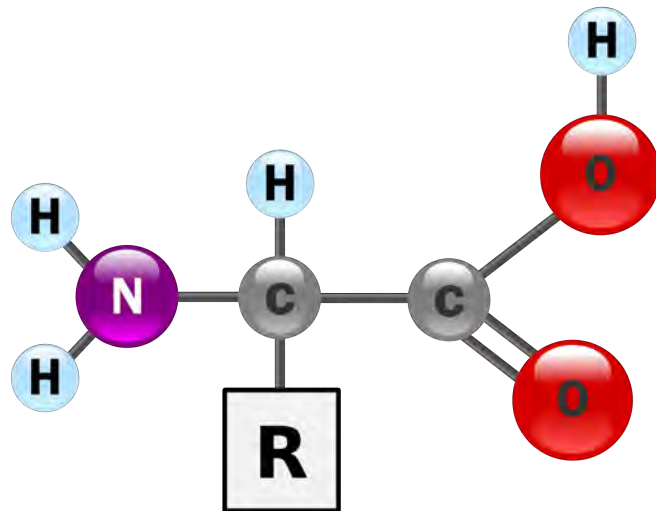


What is the general structure of an α -amino acid?



What is the general structure of an amino acid?

Contains an amine group, a carboxylic acid group, a hydrogen atom and an R group (which is different for every amino acid).



What is a protein?



What is a protein?

A protein is a condensation polymer formed from amino acid monomers.

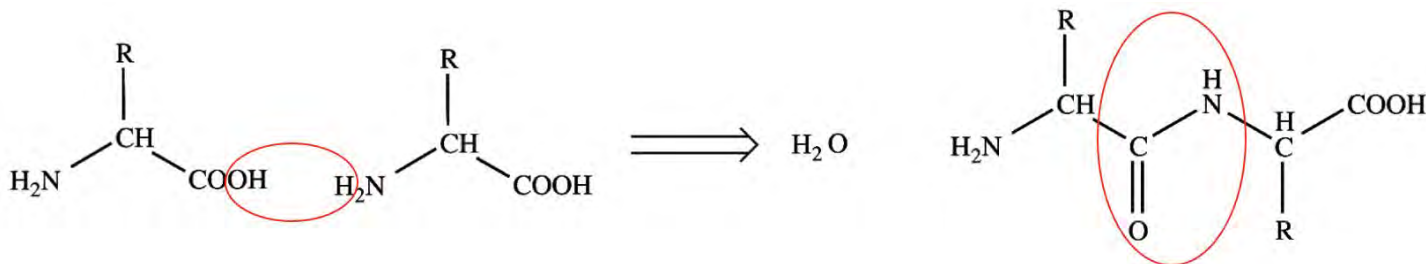


How is a peptide link formed?



How is a peptide link formed?

When two amino acids react in a condensation reaction, a molecule of water is released and a peptide link/bond is formed.



How is a peptide link broken?



How is a peptide link broken?

The hydrolysis of a peptide bond requires a water molecule so that the amine and carboxylic acid groups can be fully reformed. A concentrated acid and heat is usually required too.



What is paper chromatography and why is it used?



What is paper chromatography and why is it used?

It is the separation of a mixture into its constituent components on filter paper for further analysis. This allows identification by the calculation and comparison of R_f values.



How do you carry out paper chromatography?



How do you carry out paper chromatography?

1. Add solvent to a jar. Seal to create a saturated environment.
2. Draw a pencil line on filter paper. Spot samples along this line using a capillary tube.
3. Add paper to jar. Make sure solvent is below pencil line.
4. The solvent rises up the filter paper, bringing components of the samples with it.
5. Draw a pencil line where the solvent finishes (don't allow it to travel to the top of the paper). Allow to dry.



How do you calculate an R_f value?



How do you calculate an R_f value?

$R_f \text{ value} = \frac{\text{Distance travelled by component}}{\text{Distance travelled by solvent}}$



Why must any lines drawn on the paper
be in pencil?



Why must any lines drawn on the paper be in pencil?

Because if drawn in ink, this will dissolve in the solvent and run up the paper with the other components, contaminating them.



Why should the solvent be below the pencil line?



Why should the solvent be below the pencil line?

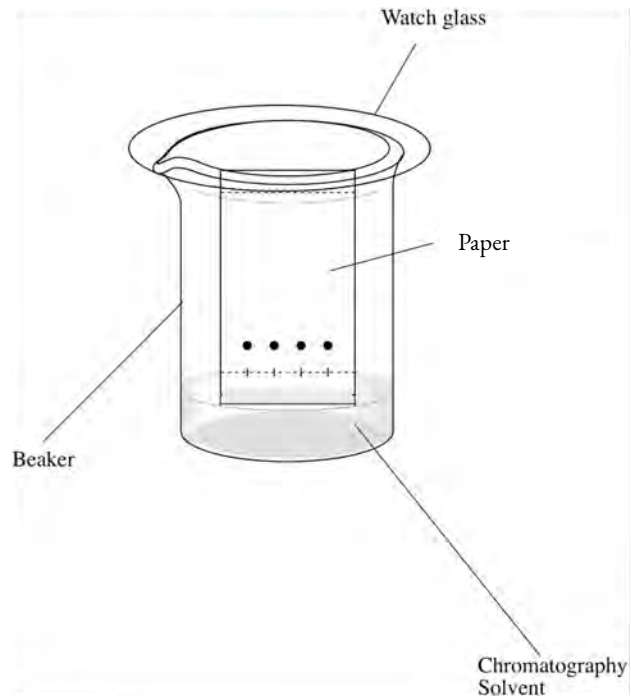
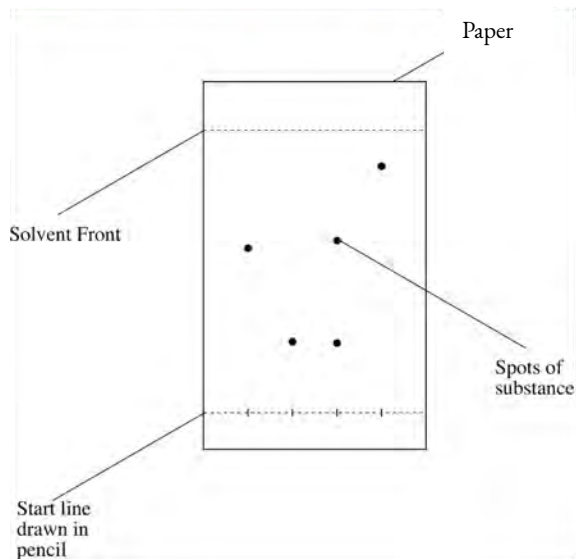
If above the pencil line, the solvent will dissolve all samples and they will not run up the paper.



What does a diagram of paper chromatography look like?



What does a diagram of paper chromatography look like?



What is the primary, secondary and tertiary structure of proteins?



What is the primary, secondary and tertiary structure of proteins?

1. Primary structure: The sequence of amino acids in the polypeptide chain.
2. Secondary structure: The twisting and folding of the polypeptide chain due to hydrogen bonding.
3. Tertiary structure: The further folding/twisting of the chain due to disulfide bridges, ionic bonds and further hydrogen bonds.



What determines secondary and tertiary protein structure?



What determines secondary and tertiary protein structure?

Intermolecular bonds (hydrogen, ionic and disulfide bonds) between the R groups of amino acids.



What are DNA and RNA?



What are DNA and RNA?

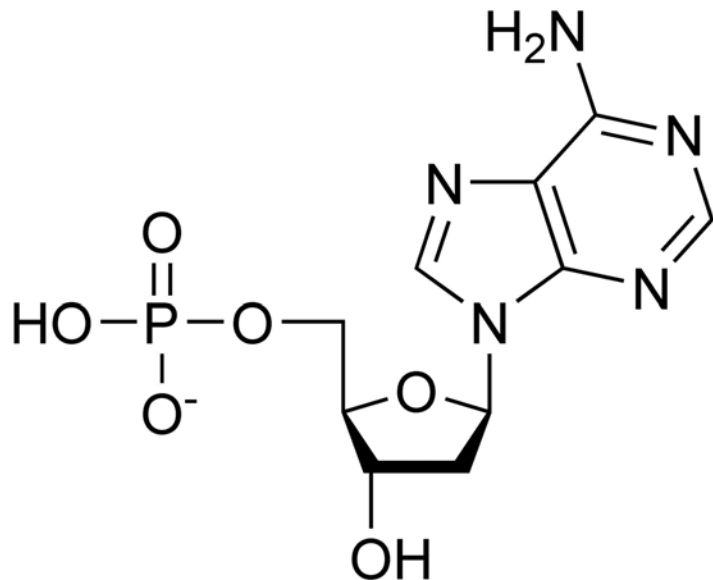
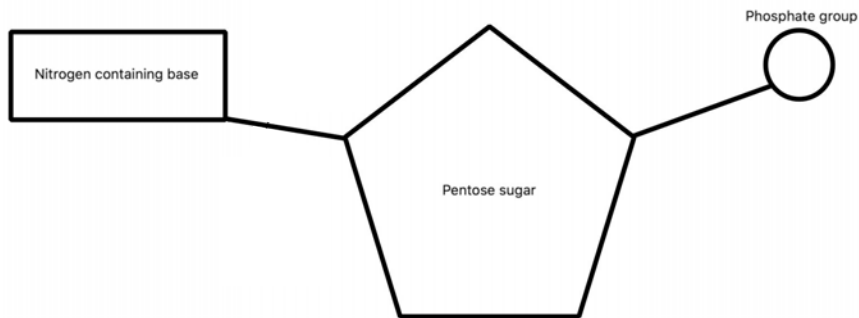
- DNA and RNA are polymers formed from condensation reactions between **nucleotide** monomers.
- A nucleotide has a phosphate group, a pentose sugar and a nitrogen containing base.



What is the structure of a nucleotide?



What is the structure of a nucleotide?



What is the structure of DNA?



What is the structure of DNA?

- DNA is made from **two** antiparallel polynucleotide chains that are held together by hydrogen bonds between complementary base pairs. This causes it to twist into a double helix.
- Pentose sugar = Deoxyribose.
- Bases are A, T, G and C.



What is the structure of RNA?



What is the structure of RNA?

- Single stranded polynucleotide chain.
- Bases are A, U, G and C.
- Pentose sugar = Ribose.



What happens when two nucleotides react?



What happens when two nucleotides react?

- When two nucleotides react in a condensation reaction, a bond forms between the pentose sugar of one nucleotide and the phosphate group of the other nucleotide.
- For DNA and RNA, many nucleotides join in this way to create a long chain. The section of the chain containing the sugar-phosphate bonds is called the sugar-phosphate backbone.



Why is hydrogen bonding important in the structure and function of DNA?



Why is hydrogen bonding important in the structure and function of DNA?

- In DNA, hydrogen bonds hold the two polynucleotide strands together.
- Without hydrogen bonding, this structure would not occur and DNA wouldn't be able to replicate by semi-conservative replication.



How does DNA base sequence code for a protein?



How does DNA base sequence code for a protein?

- For coding regions of DNA, the base sequence is read in terms of triplets (a sequence of three bases), whereby each triplet codes for a corresponding amino acid.
- Hence a sequence of triplets codes for a corresponding sequence of amino acids, which will be joined later in condensation reactions to form a protein.



What is molecular recognition?



What is molecular recognition?

The interaction between multiple molecules through bonding that is not covalent e.g. hydrogen bonding, hydrophobic forces, van der Waals forces etc.



What is a pharmacophore?



What is a pharmacophore?

The part of the molecule that is responsible for a particular interaction, either biological or pharmacological.



What are the ways that species interact
in three dimensions?



What are the ways that species interact in three dimensions?

- Size
- Shape
- Bond formation
- Orientation

