WJEC (Eduqas) Chemistry A-level

OA3 - Organic Compounds Containing Nitrogen

Definitions and Concepts

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OA 3 Organic Compounds Containing Nitrogen

OA3.1 - Amines

Aliphatic amine: An amine which only contains straight or branched alkyl chains. Aliphatic amines can be formed via a substitution reaction of haloalkanes with either ammonia or amines in ethanol solvent.

Amines: Compounds that contain the NR_3 functional group (where R could be hydrogen atoms or alkyl chains). Amines are basic as the nitrogen atom has a lone pair of electrons that can accept a proton. In a reaction between amines and dilute acids, salts are formed.

Aromatic amine: An amine which contains a benzene ring directly attached to the nitrogen atom. Aromatic amines can be formed by reducing nitroarenes with tin and concentrated HCl.

Azo compound: A molecule which contains the functional group R−N=N−R′.

Chromophore: The part of a molecule which gives a compound its colour.

Ethanoylation: A reaction that involves the addition of an acetyl group to a molecule.

Halogenoalkane: A saturated molecule where one or more of the hydrogen atoms in an alkane have been substituted for a halogen.

Nitrile: A molecule with a -CN functional group.

Nitrobenzene: A molecule with the molecular formula $C_6H_5NO_2$, it is made up of a benzene ring where one of the hydrogen atoms has be substituted with a nitro group (NO_2).

Phenol: A benzene ring where one of the hydrogen atoms has been substituted for a hydroxyl group.

Primary amine: An organic compound that contains the functional group RNH_2 (where R is an alkyl chain).

OA3.2 - Amino Acids, Peptides and Proteins

α-Amino acid: A compound with the general formula $RCH(NH_2)COOH$, where an amino group and a carboxylic acid group are bonded to the same carbon atom. The carboxylic acid group of an amino acid can react with alkalis or can be used to form esters. The amine group of an amino acid can react with acids.

Amino acid: An organic compound containing both a carboxyl group (-COOH) and an amino group ($-NH_2$).

Amphoteric: A substance that is able to react as both an acid and a base.

Dipeptide: A compound made up of two amino acids linked by a peptide bond.

Enzyme: A biological catalyst.

Polypeptides: A polymer made up of lots of amino acids.

Primary protein structure: The sequence of amino acids in a polypeptide chain.

Protein: A large molecule formed when a polypeptide folds into its 3D shape.

Secondary protein structure: The initial folding of the polypeptide chains, these are usually alpha-helix or beta-pleated sheets. These arise due to hydrogen bonding between peptide bonds.

Solubility: The ability of a given substance to dissolve in a solvent.

Tertiary protein structure: The three dimensional shape of the protein.

Zwitterion: A dipolar ion with a positive charge in one part of the molecule and a negative charge in another part of the molecule. The zwitterionic form of an amino acid is the state in which the amine group has a positive charge ($^+NH_3$) and the carboxyl group has a negative charge (COO^-).