Biology

In this essay I will be writing about the structure and the function of biochemical monomers and how they are related to one another, and how they are formed at macromolecular level. These include carbohydrates, proteins and lipids.

Carbohydrates, proteins and lipids are all known as organic molecules, this is because they are living organisms, which contain carbon. The carbon atom is very unusual, as it is able to bond with other carbon atoms, as well as with other elements. Due to this many organic molecules are very large and are know as macromolecules. The smaller organic molecules are known as monomers and can join together to from polymers.

Condensation

The two monomers join to from a polymer and a water molecule is removed.

Hydrolysis

The polymer is broken down and a water molecule is added.

Carbohydrates

A Carbohydrates molecule contains three different elements, which are carbon, hydrogen and oxygen. There are always twice as many hydrogen atoms than oxygen atoms.

Plants produce carbohydrates, the main one is glucose which is produced during photosynthesis, and is passed on to other living organism though the food chain. When glucose is dry, the carbon atoms are arranged in a straight line, and the other atoms, attach themselves around the carbons, but when dissolved the carbon atoms, change from a straight to a ring from. There are two different rings from, alpha glucose and beta glucose. The alpha and beta glucose are isomers, so they have the same chemical formula but the atoms are arranged in different ways. When ring structures are formed the alpha glucose's are able to link together and form longer chains. The way that the chains link together is by two carbon atoms bonding and forming a glycosidic bond.

The beta glucose link together, the same way as the alpha do, with a glycosidic bond. When a large number of beta glucose's are linked together they make a molecule of cellulose

The terms are monosaccharide is one chain, disaccharide is two chains and polysaccharides are however many chains you want.

Glucose is need for respiration in animal and plant cells, to from energy which is very important for us to survive. The ways in which our bodies stores the glucose, is changing it to an insoluble polysaccaride , which is glycogen in animal cells, and starch in plant cells.

When you are testing for sugars, there are two different types which are reducing and non-reducing sugars. Reducing sugars are simple carbohydrate sugars, except for sucrose.

To test for these reducing sugars, is to heat them up with Benedict reagent and if the colour changes form the starting colour blue to brick red, then a sugar is present. The way that Benedict reagent works is that it contains copper sulphate, the sugars reduces the copper to solid precipitate of copper oxide, which is red.

Non-reducing sugar, which is sucrose, needs to be heated with dilute hydrochloric acid, and changes the sucrose into a monosaccharid (glucose) and then it is made into an alkaline, and now it would be ready to be tested with Benedict reagent.

Proteins

There are many different types of proteins formed, this is because proteins are made from amino acids, and there are twenty different types of amino acids used in living organisms. These amino acids can join up in any order, and each chain is a different protein. So because amino acids make proteins they will have the same chemical elements, which are carbon, hydrogen, oxygen and nitrogen.

All amino acids have a central carbon atom, which are attached to a nitrogen(NH), a hydrogen atom (H) and a carboxyl group (COOH). The other group is defined as the R group.

There are many different ways that amino acids can link together, and one is by condensation, this is the same procedure as when two monomers joined to from a polymer. So one hydrogen atom is removed from an amino acid and as from the other amino acid, a carboxylic acid is removed, which produces the water particle and peptide residues between the two amino acids, is formed. The reason that it's called a residue and not a bond is because parts of the molecule have been removed. When two amino acids are joined this is called a dipeptide residue. The ways that the amino acids are broken down is by the process of hydrolysis. When a small amount of amino acid link together, these are called peptide bonds, and if many amino acids join, then they are called polypeptide bonds.

One or more polypeptide chains make up a protein, and these chains are shaped in a three-dimensional helix. Different proteins have different shapes, and the way the shapes of the helix are decide, is how the amino acids are arranged. The sequences of amino acids, which make up the polypeptide, are known as the primary structure. The polypeptide may be folded to in to different shapes, to get rise in the second and tertiary sectors. If there are more than one polypeptide chain the protein, this is known as the quaternary sector.

The way to test for proteins is the biuret test (the colour test). You need to get 2cm of the extract, and add 2cm of dilute potassium hydroxide and a few drops of dilute copper sulphate solution. If there is any proteins present, then the colour will change from a blue to purple.

Lipids

Lipids are a very useful and diverse group, as they are able to dissolve in organic compounds, but not in water. There are different types of lipids they are,

Triglycerides – these are fats and oils, which are a very important fuel resource, as a mass of lipid would give a large amount of energy when oxidised during respiration. Also Triglycerides are used as insulation by mammals e.g. seals. Triglycerides are made from glycerol and three fatty acids molecules.

Phospholipids – these contain a phosphate group. In a Phospholipids, a glycerol joins with two fatty acids molecules and a phosphate group. The hydrocarbon tails of the fatty acids are insoluble in water, and are known as hydrophobic. Which means that when Phospholipids are placed I water, they rearranged themselves into a double layer (Phospholipids bilayer). This is what happens in our cell membranes.