Molecules to Metabolism

Metabolism is the web of all the enzyme-catalysed reactions in an organism. Anabolism is the synthesis of complex molecules from simpler molecules by condensation reactions. Catabolism is the breakdown of complex molecules from simpler molecules including the hydrolysis of macromolecules into monomers.

The original definition of the term organic was: molecules naturally produced in living organisms, which was the theory of vitalism. There are now examples of organic molecules which can be artificially synthesised, such as urea, which falsifies the theory of vitalism.

Water

The bonding between hydrogen and oxygen in water molecules is a polar covalent bond. There is a difference in charge from one side of the molecule to the other. As a result, adjacent water molecules tend to stick together by the formation of hydrogen bonds. These bonds give water its cohesion properties. Cohesion refers to the binding of two molecules of the same type. Adhesion refers to the binding between different polar molecules.

Water has a large heat capacity. This means that more energy is stored and a lot of heat is needed to warm it up. Water creates a stable aquatic environment and temperature for living organisms. It is used as a coolant in sweat because it has high heat vaporisation so it can evaporate from the skin .co.uk quickly.

Carbohydrates

Carbohydrates include: monosaccharides such as glucose f and ribose (which are isomers of each other); disaccharides such as sucrose, malto lactose; and polysaccharides such as starch, glycogen, and cellulose.

Monosaccharides a e joined together to make larger carbohydrates by id soluble and de i o t n eachons. They are sir monomers. conde



From left to right: α glucose, β glucose, and ribose.

In animals, excess glucose is stored as glycogen to give a quick release of glucose for respiration.

Fructose is found in the fruit and berries of a plant. It is the sweetest monosaccharide and attracts animals for seed dispersion.

Disaccharides consist of two monosaccharides joined together by a condensation reaction. They are



joined by a glycosidic bond. Maltose is formed by two glucose molecules, lactose is formed by glucose and galactose molecules, and sucrose is formed by glucose and fructose molecules.

Polysaccharides are chains of monosaccharides produced by condensation. Starch and glycogen are examples of polysaccharides formed by the condensation of α glucose. Starch is found in the chloroplasts of plants and is an energy store. Glycogen is found in the liver and muscles of animals and provides energy as a short term energy store. Cellulose is a polysaccharide formed by the condensation of β glucose molecules. It is found in plants and gives support and strength.