**Biological Molecules**

|  |  |  |
| --- | --- | --- |
| 1 | Covalent Bond | Type of chemical bond in which two atoms share a pair of electrons. |
| 2 | Ionic Bond | A bond between a positive ion which has lost an electron(s) and a negative ion which has gained an electron(s). |
| 3 | Hydrogen Bond | Chemical bond formed between the positive charge on a hydrogen atom and the negative charge on another atom of an adjacent molecule e.g. between the Hydrogen atom of one water molecule and the Oxygen atom of an adjacent water molecule |
| 4 | Polar Molecule | A molecule which has a partially positive charge in one part of the molecule and completely negative charge in another part (a dipole). |
| 5 | Monomer | One of many small molecules that combine together to form a polymer |
| 6 | Polymer | Large molecule made up of many repeating smaller molecules (monomers). |
| 7 | Polymerisation | The process of making a polymer |
| 8 | Condensation | Chemical process in which two molecules combine to form a more complex one with the elimination of a simple substance, usually water. Many biological polymers (e.g. polysaccharides, polypeptides) are formed by condensation. |
| 9 | Hydrolysis | The breaking down of large molecules into smaller ones by the addition of water molecules. |
| 10 | Metabolism | All the chemical processes that take place in living organisms. |
| 11 | Mole | The mass of a substance containing the same number of fundamental units as there are atoms in exactly 12g of 12C. |
| 12 | Molar (M) Solution | An aqueous solution that contains 1 mole of solute in 1 litre of solution. |
| 13 | Carbohydrate | Compounds made from carbon, hydrogen and oxygen. Either monosaccharides, disaccharides and polysaccharides. |
| 14 | Monosaccharide | A single sugar e.g. glucose |
| 15 | Organic Molecule | Molecules containing carbon that can be found in living things; four classes are carbohydrates, proteins (chain of amino acids), lipids, and nucleic acids |
| 16 | Disaccharide | Made up of two sugar units that are formed by a condensation reaction. Monosaccharides are joined by a glycosidic bond. |
| 17 | Polysaccharide | Made of many sugar units that are formed by a condensation reaction. Monosaccharides are joined by a glycosidic bond. |
| 18 | Hexose sugar | A sugar made up of 6 carbons. |
| 19 | Glucose | C6H12O6 – a single sugar which is used in respiration. |
| 20 | Reducing Sugar | A sugar that serves as a reducing agent. All monosaccharides are reducing sugars along with some disaccharides. |
| 21 | Reducing sugar test | Heat solution with Benedict’s reagent to test for reducing sugars. If it goes brick red then a reducing sugar is present. |
| 22 | Benedict’s reagent | Blue solution which is used to test for reducing and non-reducing sugars. |
| 23 | Glycosidic bond | Bond between sugar molecules in disaccharides and polysaccharides. |
| 24 | Non-reducing sugar | A sugar which cannot serve as a reducing agent. An example is sucrose. |
| 25 | Non-reducing sugar test | Following a negative reducing sugars test. Heat the solution with HCl to hydrolyse the non-reducing sugar into it’s monosaccharides. Then perform the Benedict’s test again. If you get a positive result after hydrolysis then a non-reducing sugar is present. |
| 26 | Starch | A polysaccharide found in plant cells made up of alpha-glucose – comprised of amylose (alpha-1,4 glyosidic bonds) and amylopectin (alpha-1,4- and alpha-1,6-glyosidic bonds). |
| 27 | Glycogen | A highly branched polysaccharide made up of alpha-glucose found in animal cells (alpha-1,4- and alpha-1,6-glyosidic bonds). |
| 28 | Cellulose | A polysaccharide made up of beta-glucose found in plant cells (beta-1,4-glycosidic bonds). |
| 29 | Alpha glucose | An isomer of glucose that can bond together to form starch or glycogen. |
| 30 | Beta glucose | An isomer of glucose that can bond together to form cellulose. |
| 31 | Lipid | A class of organic compounds that are fatty acids are their derivatives and are insoluble in water but soluble in organic solvents. They include triglycerides, phospholipids, waxes and steroids. |
| 32 | Triglyceride | An individual lipid molecule made up of a glycerol molecule and three fatty acids. Contains ester bonds. |
| 33 | Fatty acid | A carboxylic acid with a hydrocarbon tail. |
| 34 | Glycerol | A molecule which combines with three fatty acids to form triglycerides. It is 3 carbon chain with 3 hydroxyl groups. |
| 35 | Saturated fatty acid | A fatty acid in which there are no double bonds between the carbon atoms |
| 36 | Mono-unsaturated fatty acid | Fatty acid which possesses a carbon chain with a single double bond between carbon atoms. |
| 37 | Poly-unsaturated fatty acid | Fatty acid which possesses a carbon chain with many double bonds between carbon atoms. |
| 38 | Phospholipid | Triglyceride in which one of the three fatty acid molecules is replaced by a phosphate molecule. Phospholipids are important in the structure an functioning of plasma membranes. |
| 39 | Hydrophilic | Section of a molecule which is attracted to water. |
| 40 | Hydrophobic | Section of a molecule which is repulsed by water. |
| 41 | Emulsion test | Test for lipids. Mix your sample with ethanol and then add water. If a white cloudy emulsion forms then a lipid is present. |
| 42 | Protein | A polymer which is made up of amino acids linked by peptide bonds. May also contain prosthetic groups as part of its quaternary structure. |
| 43 | Amino acid | A monomer which makes up proteins. Has a central carbon atom which is bonded to: a carboxylic acid group, an amino group, a hydrogen atom and a R group. |
| 44 | Amino group | The -NH2 group of an amino acid. |
| 45 | Carboxyl group | The -COOH group of an amino acid. |
| 46 | R-group | Each of the 20 amino acids has a different R group – determines the bonding that the amino acid can carry out. |
| 47 | Peptide bond | The type of bond that is formed between two amino acids. |
| 48 | Polypeptide | Many amino acids joined together by peptide bonds. |
| 49 | Primary protein structure | The sequence of amino acids that makes up the polypeptides of a protein. |
| 50 | Secondary protein structure | The way in which the chain of amino acids of the polypeptides of a protein is folded. |
| 51 | Tertiary protein structure | The folding of a whole polypeptide chain in a precise way, as determined by the amino acids of which it is composed. |
| 52 | Disulfide bridge | Bond formed between Sulphur atoms in R groups of amino acids. |
| 53 | Quaternary protein structure | A number of polypeptide chains linked together, and sometimes associated with non-protein groups to form a protein. |
| 54 | Biuret test | A simple biochemical reaction to detect the presence of protein, if the Biuret’s solution turns purple then protein is present. |

**Enzymes**

|  |  |  |
| --- | --- | --- |
| 55 | Enzyme | A protein that acts as a catalyst and so lowers the activation energy needed for a reaction. |
| 56 | Activation energy | Energy required to bring about a reaction. |
| 57 | Active Site | A group of amino acids that makes up the region of an enzyme into which the substrate fits in order to catalyse a reaction. |
| 58 | Substrate | A substance that is acted on or used by another substance or process. Fits into the active site of an enzyme. |
| 59 | Enzyme-substrate complex | The intermediate formed when a substrate molecule interacts with the active site of an enzyme. |
| 60 | Complimentary | Describes the relationship between the active site of an enzyme and the substrate molecule – the way in which they fit together. |
| 61 | Specific | Describes how enzymes catalyse a certain chemical reaction. |
| 62 | Induced fit | A mechanism of interaction between an enzyme and a substrate. As the substrate fits into the active site the active site of the enzyme changes shape in order to allow an enzyme-substrate complex to be formed. |
| 63 | Lock and key | An analogy for how enzymes work – only the correctly sized key (substrate) fits into the key hole (active site) of the lock (enzyme) |
| 64 | Rate of reaction | The speed of a chemical reaction - can be worked out by looking at the decrease in concentration of a reactant over time or increase in concentration of a product over time. |
| 65 | Kinetic Energy | The energy of motion, observable as the movement of an object, particle or set of partices. |
| 66 | pH | A figure expressing the acidity or alkalinity of a solution on a logarithmic scale on which 7 is neutral, lower values are more acidic and higher values are more alkaline. Equivalent to -log10[H+]. |
| 67 | Inhibitor | A substance which reduces the activity of an enzyme. |
| 68 | Competitive inhibitor | A form of inhibitor which binds to the active site of the enzyme preventing the binding of substrate. |
| 69 | Non-competitive inhibitor | A form of inhibitor which does **not** bind at the active site of the enzyme which prevents the binding of substrate. |

**Nucleic Acids**

|  |  |  |
| --- | --- | --- |
| 70 | DNA | Deoxyribonucleic acid which is present in nearly all living organisms as the carrier of genetic information. A double helix made up of two polynucleotide chains, running **antiparallel** to each other, with the sugar-phosphate backbone on the outside and organic bases bonded together by Hydrogen bonds in the centre of the helix. The nucleotides have a deoxyribose sugar and the bases adenine, thymine, guanine or cytosine. |
| 71 | Nucleotide | Complex chemicals made up of an organic base, a sugar and a phosphate. They are the basic units of which the nucleic acids DNA and RNA are made. |
| 72 | Polynucleotide | A polymer of monomers called nucleotides. |
| 73 | Phosphodiester bond | The bond formed by a condensation reaction between the phosphate group of one nucleotide and the pentose sugar of another nucleotide. |
| 74 | Organic base | Part of a nucleotide - either adenine, thymine, cytosine, guanine or uracil. |
| 75 | RNA | A polynucleotide which contains nucleotides that have the pentose sugar **ribose** rather than deoxyribose and contains the bases adenine, uracil, guanine or cytosine. Can be either mRNA, tRNA or rRNA. |
| 76 | Complimentary base pairing | Specific rules for how the bases pair together. Adenine pairs with thymine with 2 hydrogen bonds. Guanine binds with cytosine with 3 hydrogen bonds. |
| 77 | Double helix | Structure of DNA made up of 2 strands of nucleotides running in opposite directions. |
| 78 | Semiconservative replication | The process in which the double helix of a DNA molecule unwinds and each strand acts as a template on which a new strand is constructed. |
| 79 | DNA helicase | Enzyme that acts on a specific region of the DNA molecule to break the hydrogen bonds between the bases causing the two strands to separate and expose the nucleotide bases in that region |
| 80 | DNA polymerase | Enzyme that joins DNA nucleotides together in a condensation reaction (forming phosphodiester bonds) during DNA replication. |
| 81 | ATP (Adenosine triphosphate) | An activated nucleotide found in all living organisms, which is produced during respiration and acts as an energy carrier. The hydrolysis of ATP (catalyzed by ATP hydrolase) leads to the formation of adenosine diphosphate (ADP) and inorganic phosphate, with the release of energy. |
| 82 | ADP | A nucleotide which combines in a condensation reaction, catalysed by ATP synthase, with a phosphate molecule to form ATP. |
| 83 | ATP Synthase | An enzyme which catalyses the formation of ATP. |
| 84 | ATP Hydrolase | An enzyme which catalyses the hydrolysis of ATP. |
| 85 | Polymerases | Group of enzymes that catalyse the formation of polymers from monomers |

**Water & Inorganic Ions**

|  |  |  |
| --- | --- | --- |
| 86 | Specific heat capacity | The amount of energy needed to change the temperature of 1kg of the substance by 1℃. |
| 87 | Latent heat of Vaporisation | The heat energy needed to change the substance from a liquid at its boiling point into gas at the same temperature. |
| 88 | Cohesion | Attraction between molecules of the same type. It is important in the movement of water up a plant. |
| 89 | Surface tension | The tension of the surface film of a liquid caused by the attraction of the particles in the surface layer by the bulk of the liquid. |
| 90 | Solvent | The liquid in which a solute is dissolved to form a solution. |
| 91 | Inorganic ions | Formed when an element or compound, that does not contain carbon, gains or looses electrons to become negatively or positively charged, for example: hydrogen ions, phosphate ions, iron ions and sodium ions. |
| 92 | Transparent | A material that allows light to pass through so that objects behind can be distinctly seen. |