**Topic 4. Biological molecules**

* **List the chemical elements that make up carbohydrates, fats and proteins**

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| *NUTRIENT* | *ELEMENTS PRESENT* |
| Carbohydrate | Carbon, hydrogen, oxygen |
| Fat | Carbon, hydrogen, oxygen |
| Protein | Carbon, hydrogen, oxygen, nitrogen and sometimes sulphur |

* **State that large molecules are made from smaller molecules, limited to:**
  + **starch and glycogen from glucose**
  + **cellulose from glucose**
  + **proteins from amino acids**
  + **fats and oils from fatty acids and glycerol**

Many large biological molecules are long chains of smaller units held together by chemical bonds

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| **LARGE MOLECULE** | **STRUCTURE** | **SMALLER BASIC UNIT** |
| Large (complex) CARBOHYDRATES  Starch,  Glycogen,  Cellulose |  | Monosaccharides (sugars) such as glucose |
| LIPIDS  Fats & oils |  | 3 fatty acids chemically bonded to 1 glycerol |
| PROTEINS |  | Amino acids |

* **Describe the use of:**

**– iodine solution to test for starch**

**– Benedict’s solution to test for reducing sugars**

**– biuret test for proteins**

**– ethanol emulsion test for fats and oils**

**– DCPIP test for vitamin C**

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| **Food tested** | **Name of test** | **Method** | **Positive result** |
| Starch | Starch test | Add a few drops of iodine solution (brown) to a solution of the food. | Blue/black |
| Reducing sugars e. g. glucose | Benedict’s test | Add an equal amount of Benedict’s solution (light blue) to a solution of the food.  Boil carefully. | Blue 🡪green 🡪orange 🡪brick red |
| Protein | Biuret test | Add Biuret solution (light blue) to the solution of food. | Violet |
| Fats & oils | Emulsion test | Dissolve the food in ethanol. Pour the solution into a clean test tube of water. | White emulsion |
| Vitamin C | DCPIP test | Add DCPIP solution (blue) to a solution of the food. | Colourless |

* **Explain that different sequences of amino acids give different shapes to protein molecules**
* **Relate the shape and structure of protein molecules to their function, limited to the active site of enzymes and the binding site of antibodies**
* **State that water is important as a solvent**
* **Describe the roles of water as a solvent in organisms with respect to digestion, excretion and transport**
* **Describe the structure of DNA as:**

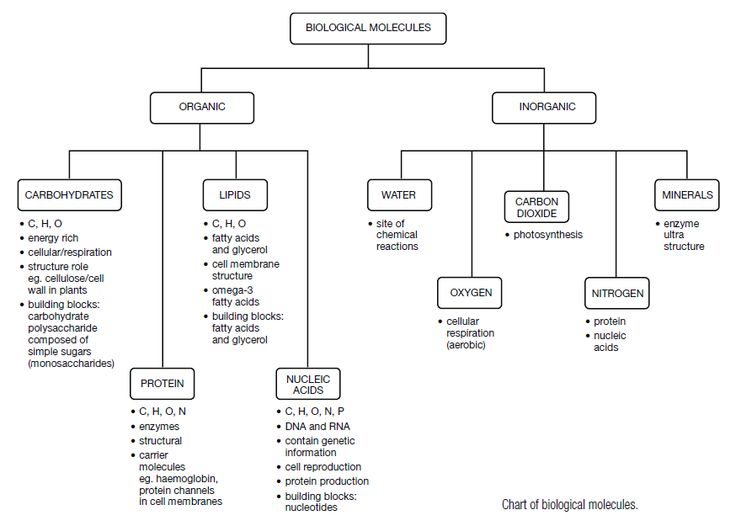
**– two strands coiled together to form a double helix**

**– each strand contains chemicals called bases**

**– cross-links between the strands are formed by pairs of bases**

**– the bases always pair up in the same way: A with T, and C with G**

**(full names are not required)**

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