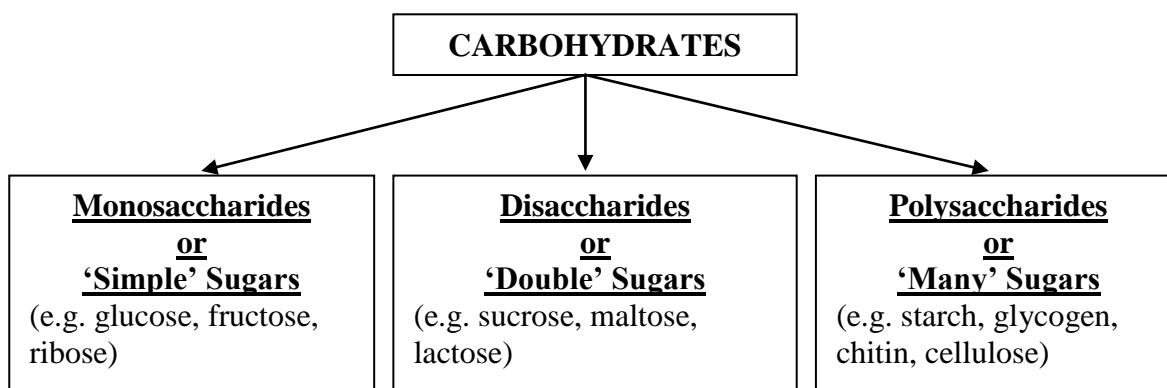


## ORGANIC MACROMOLECULES

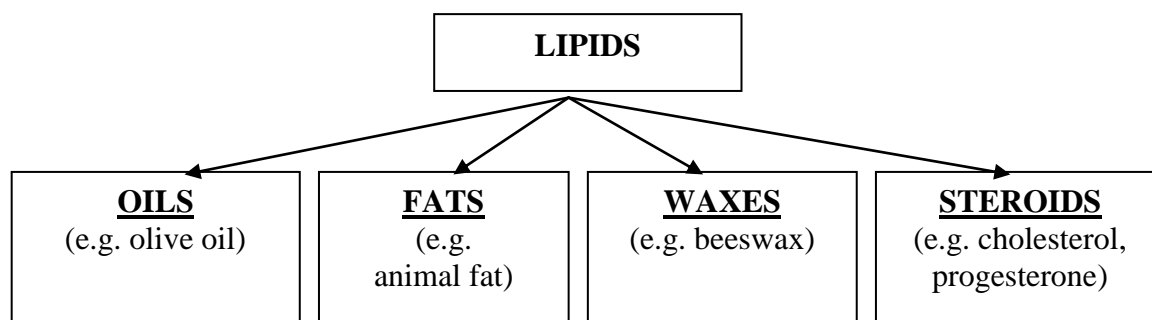
- ◆ **Organic compounds** are those that contain \_\_\_\_\_ (e.g. carbohydrates, lipids, \_\_\_\_\_, nucleic acids).
- ◆ For example, a piece of human liver contains 80% water, 12% protein, 5% fats, 2% nucleic acids, 1% carbohydrate and less than 1% of other substances.
- ◆ Many organic molecules are assembled from **small repeated units**. Proteins are macromolecules made from \_\_\_\_\_ acids, nucleic acids are made from nucleotides, carbohydrates are made from \_\_\_\_\_ sugars, and lipids are made from fatty acids and \_\_\_\_\_
- ◆ Carbohydrates, proteins and nucleic acids are generally large macromolecules, whereas lipids are \_\_\_\_\_

## CARBOHYDRATES

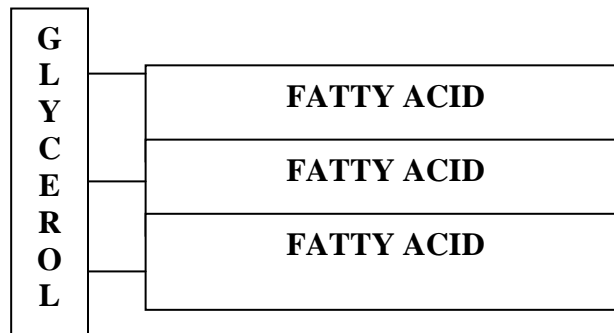


- ◆ Carbohydrates are a ready source of \_\_\_\_\_
- ◆ All carbohydrates are built up from monosaccharides or simple \_\_\_\_\_, which can be formed in photosynthesis. During digestion, carbohydrates are mostly broken down to \_\_\_\_\_. Sugar in animals is transported in the form of glucose.
- ◆ Polysaccharides or 'many sugars' differ in their chemical structure. Animals cannot digest \_\_\_\_\_ and store their carbohydrates as glycogen. Plants use cellulose as a major component in cell \_\_\_\_\_. Chitin is a major component of the exoskeleton of insects and crabs.

## LIPIDS (FATS AND OILS)



- ◆ Lipids are hydrophobic ('water-hating' or insoluble in water).
- ◆ Functions of lipids are:
  1. Long-term energy storage, providing 6 times as much \_\_\_\_\_ as carbohydrates
  2. Lipids and proteins are the major structural components of \_\_\_\_\_ membranes
  3. Insulation e.g. whale blubber



- ◆ Lipids are made of 1 glycerol molecule (an alcohol) and 3 different fatty acid molecules, and are often called triglycerides. Human digestive enzymes break down lipids to \_\_\_\_\_ and glycerol in digestion.

### **PROTEINS (POLYPEPTIDES)**

- ◆ Proteins are macromolecules that consist of long, unbranched chains of amino acids. These chains may contain about 20 up to hundreds of \_\_\_\_\_ acids. An example of the size of proteins is the red pigment in red blood cells called haemoglobin with the chemical formula –  $C_{3032} H_{4816} O_{872} N_{780} S_8 Fe_4$
- ◆ Each cell contains hundreds of different proteins, and each kind of cell has some proteins that are \_\_\_\_\_ to it.
- ◆ There are about 20 different amino acids, that can be arranged in billions of ways to make long-chain \_\_\_\_\_
- ◆ Not all proteins contain all of the possible amino acids.
- ◆ Proteins are broken down by digestive enzymes to amino acids, and then these amino acids are reassembled to form different body proteins (e.g. \_\_\_\_\_, hormones).
- ◆ About 12 of the amino acids can be synthesised by the human body (in ribosomes), but 8 amino acids cannot be made by the body. These 8 must be included in the diet, and are called \_\_\_\_\_ amino acids.
- ◆ 5 Functions of Proteins:
  1. Supporting structure (e.g. cell \_\_\_\_\_)
  2. Metabolism (e.g. enzymes)
  3. Immune defence (e.g. \_\_\_\_\_)
  4. Body regulation (e.g. hormones)
  5. Last resort \_\_\_\_\_ source after carbohydrates and lipids
- ◆ Proteins may also be completely broken down to form the nitrogenous wastes of urea and \_\_\_\_\_ acid (in human urine and \_\_\_\_\_) or ammonia (in other animals).

## NUCLEIC ACIDS (DNA and RNA)

- ◆ DNA or Deoxyribonucleic Acid forms the \_\_\_\_\_ and is found only in the nucleus of cells
  - ◆ RNA or Ribonucleic Acid is found in the nucleus, ribosomes, and some other parts of the cell such as mitochondria and chloroplasts
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## GLOSSARY OF CHEMISTRY TERMS

### Atom

- ◆ The building block of matter
- ◆ There are more than 100 different types of atoms known, as shown in the Periodic Table. Only 92 are naturally-occurring with hydrogen as the lightest and uranium as the heaviest of these.
- ◆ The most common atoms on earth are carbon (C), hydrogen (H), oxygen (O), nitrogen (N), phosphorus (P) and sulphur (S).

### Ion

- ◆ A charged atom
- ◆ If an atom loses an electron/s, it becomes a positively-charged ion (e.g. hydrogen ions are  $H^+$ ).
- ◆ If an atom gains an electron/s, it becomes a negatively-charged ion (e.g. oxygen ions are  $O^{2-}$ ).

### Element

- ◆ A substance composed of only one type of atom (e.g. gold Au)

### Compound

- ◆ A substance composed of more than one type of atom (e.g. water  $H_2O$ )

### Molecule

- ◆ The smallest particle of an element or a compound

### Acid

- ◆ A compound containing hydrogen ions
- ◆ Has a pH less than 7 (7 is neutral e.g. water)
- ◆ Sour taste
- ◆ Changes blue litmus paper to a red colour
- ◆ Examples of acids in living organisms are: vinegar (acetic acid), lactic acid (from sour milk), sweat, urine

### Base or Alkali

- ◆ A compound that neutralises an acid
- ◆ Has a pH more than 7
- ◆ Soapy feel
- ◆ Changes red litmus paper to a blue colour
- ◆ Example of a base in a living organism is blood