MOLECULES FOR LIFE GRADE 10

All living organisms need to take in fuel in order to survive. In Grade 9 we learnt about the different food groups with our hook sentence: Please Can We Fry More Fat Vienna's or translated into Proteins, Carbohydrates, Water, Fibre, Mineral salts , Fats and oils and Vitamins. In Grade 10 we will re categorize these food groups and learn more about them.

Now we talk about two groups viz. Inorganic and Organic.

Organic groups contain the elements Carbon , Hydrogen and Oxygen. The *Inorganic groups* do not contain all three of these elements. Water and Mineral salts are inorganic. The Organic groups are Proteins, Carbohydrates and Fibre , Nucleic acids DNA and RNA, Lipids and Vitamins.

WATER contains hydrogen and oxygen but no carbon. We know that it forms roughly 75% of the human body.

- It is a solvent as minerals, vitamins and gases travel in it.
- Several chemical reactions in living organisms take place in water. These include photosynthesis in plants , digestion and excretion in animals. 50% of blood is water too.
- Water is important for reproduction as fish and amphibians reproduce in water and sperm need water to swim up to the ova.
- Water plays a role in body form .Plants need water in their vacuoles to keep them upright and to strengthen them internally and worms, jelly fish etc have fluid filled innards.
- Water is used to keep both plants and animals cool. In plants transpiration occurs and in animals they perspire or sweat.
- Water also allows animals to be buoyant so that they float in water.

Mineral Salts Study and Master page 22 and 23

Macro elements are elements needed in large quantities. They include Nitrogen, Sodium and Calcium.

Micro elements are needed in small quantities. They include Iodine and Iron

Please generate your own table showing the functions, sources of and deficiency diseases of these minerals. Nitrogen, Sulphur, Magnesium, Phosphorus, Sodium, Calcium, Iron, Iodine and Potassium.

Also discover how N P K artificial fertilizers can create Eutrophication.

- Name 3 natural fertilizers.
- Explain what leaching is.
- Explain what eutrophication is.
- How do algae and water plants impact eutrophication?
- How do low oxygen levels impact fish and other water animals and plants ?

Vitamins

They are organic compounds that are either water soluble (B and C) and need to be renewed daily as they cannot be stored or fat soluble (A< D E and K). They are absorbed with glycerol and fatty acids into the Lacteals. Refer to page 44 and copy the table.

Carbohydrates

- Provide short term energy.
- They store energy. Plants store starch and animals store glycogen.
- They can form structures e g cellulose in plant cell walls.

They were grouped as sugars and starch but are now renamed as

Monosaccharides, Disaccharides and Polysaccharides.

Monosaccharides are single sugars.

- The monomer is glucose 6 H12 O6,
- Fructose is found in fruit
- Galactose in dairy products.

Disaccharides are double sugars.

- Sucrose is the joining of glucose and fructose.
- Maltose is glucose and glucose
- Lactose is glucose and galactose

Common characteristics of Mono and Disaccharides

- The ratio between H and O is 2:1
- They taste sweet.
- They can dissolve in water.
- They form crystals.

Write up the experiment on page 26 The Glucose Test

Draw the result.

Answer the question

Polysaccharides are multiple sugars.

- Starch is found in bread, cereals, some fruit etc. Chitin that forms the exoskeleton of insects.
- Glycogen is stored in muscles.
- Cellulose forms part of a plant cell wall.
- Is a form of roughage or fibre.

Characteristics of polysaccharides :

- The relationship between H and O is never 2:1.
- They do not taste sweet
- They do not dissolve in water.
- They do not form crystals.

Write up the starch test on page 27.

Draw the result and Answer the questions.

Answer these questions :

1. Name the 3 types if saccharides and explain them.
2. Why does glucose become orange in Fehling's A & B ?
3. Why does crushed chalk turn blue in Fehling's A & B ?
4. Tabulate 4 differences between sucrose and starch.
5. Which substance indicates the presence of starch?
6. What colour shows a positive result?
7. What colour shows a negative result ?
8. Where can we find chitin?
9. What type of polysaccharide is found stored in muscle?
10. What is cellulose?