

GSA (Food Sciences)

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Assignment #2: Types / Classification of Carbohydrates, Proteins, Fats.

1- Carbohydrates:-

- hydrated carbons.
- Polyhydroxy aldehydes or ketones.

Classification / Types of Carbohydrates:

- Monosaccharide
- Oligosaccharide
- Polysaccharide.

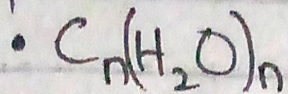
Carbohydrates

Monosaccharide	Oligosaccharide	Polysaccharide
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- Monosaccharide (Mono = 1 saccharide = sugar).
- Simplest sugars
- basic units from which other carbohydrates are formed.
- Properties
 - Colourless
 - sweet in taste
 - Water soluble

- Crystalline solids.
- Can't hydrolyzed into simple sugars.

→ General formula



→ Types:

- Triose (e.g.; Glyceraldehyde)
- Tetrose (e.g.; Erythrose, Throse)
- Pentose (e.g.; Ribose, deoxyribose)
- Hexose (e.g.; Glucose, fructose)

→ Oligosaccharide :-

→ formed by combination of two or more monosaccharides by glycosidic linkage.

→ Properties :-

- Colourless
- Less sweet
- Less water soluble
- yields two or more monosaccharides on hydrolysis.

→ General formula:-

- for disaccharides $C_n(H_2O)_{n-1}$
- for trisaccharides $C_n(H_2O)_{n-2}$
and so on.

→ Types:

- Disaccharide (e.g; sucrose, lactose)
 - Trisaccharide (e.g; Raffinose)
 - Tetrasaccharide (e.g; stachynose)
- and so on.

→ Polysaccharides: - (Poly = many)

→ Polymers of many mono-saccharides.

→ Macromolecules.

→ Properties:

→ Tasteless

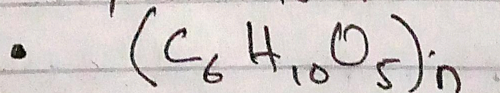
→ Sparingly water soluble

→ Abundant in nature

→ Usually branched or unbranched.

→ Storage and building material.

→ General formula:-



→ Types:-

- Homopolysaccharide

e.g; Starch, glycogen.

- Heteropolysaccharides

e.g; Agar, Peptidoglycan.

2- Proteins:-

- Chief builders of the body
- Complex molecules of carbon hydrogen, oxygen, nitrogen (sometimes sulfur and phosphorus also).

Classification of Proteins/ Types of proteins:-

- On the basis of structure:-
 - Four types

▶ Primary structure:-

- linear ~~sequence~~ sequence of amino-acids in polypeptide chain.
- particular arrangement.
- non-functional proteins.

~~→~~

▶ Secondary structure.

- formed by folding or coiling of polypeptide chain through Hydrogen-bonding.
- Repeating pattern of H-bonds between amino-acids

e.g.: Keratin, silk fibres etc.

▷ Tertiary structure:-

- formed by folding of helix or sheets into a three dimensional shape
- Irregular structures between side chains of amino acids.
- Two types of forces involved i.e; Hydrophobic interactions and Disulphide bridge

▷ Quarternary structure:-

- formed by aggregation of two or more polypeptide chains.
- aggregation of such polypeptide chain forms one functional macromolecule.
- polypeptide chain called subunit of protein
e.g.- Collagen, haemoglobin

→ On the basis of Biological function:-

▷ Enzymatic proteins:-

- most varied and highly specialized proteins with catalytic activity.
- Enzymes catalyze a variety of reactions.

e.g. - urease, catalase, cytochrome C
etc

▷ Structural proteins:-

→ aid in strengthening or protecting biological structure.

e.g. - collagen, elastin, keratin. etc

▷ Transport / Carrier proteins:-

→ help in the transport of ions or molecules into the body.

e.g. - myoglobin, Haemoglobin.

▷ Nutrient and storage proteins:-

→ Provide nutrients to growing embryo and store ions.

e.g. - Albumin

3- Lipids:-

→ known as oils or fats.

→ non-polar organic compounds
molecules insoluble in polar water,
soluble in polar organic solvents.

→ high proportion of C-H bonds.

Classification / Types of Lipids:-

→ three types of fats.

• Saturated fats:-

- Solid fats as solid at room temperature.
- carbon atoms joined by single Carbon-Carbon bonds.
- Each carbon binds to many hydrogen atoms.
- can raise the cholesterol level in the body.
- less than 10% of daily calories from saturated fats in healthy diet.
e.g.- cheese, milk, meat etc.

• Unsaturated fats:-

→ liquid at room temperature.

→ carbon-carbon double bonds exists

→ Chains bend at double bond.

→ low melting points.

→ mostly oils from plants.

→ helps improve cholesterol levels.

→ Types:-

• Monounsaturated fat

fatty acid with one double bond

• Polyunsaturated fat

fatty acid with numerous double bonds.

- Trans fats:-

- fats changed by the process of hydrogenation.
- this process increases shelf life of fats, makes fat harder at room temperature.
- can increase cholesterol, so intake should be little.

found in:-

Cookies, Processed food etc