Types **:** (i) Amylose (ii) Amylopection

CHAPTER 1

LIPIDS

INTRODUCTION

LIPO MEANS FAT

Definition
The lipids are organic substances occurring in plant and animal tissues belong to a very heterogeneous group of compounds related to fatty acids.
Lipids include fats, oils, waxes, steroids, & defined as substances having the following properties:

1. They are insoluble in water (hydrophobic) but soluble in non-polar solvents (ether, chloroform, benzene).
2. Their primary building blocks are fatty acids, glycerol, sphingosine and sterols.
3. In most cases, they can be utilized by the living organisms.
Most common lipid is fat in animals & plants
4.Lips used to store energy because of higher proportion of C-H bonds and very low proportion of oxygen , oxygen store double the amount of energy as compared to the same amount of any carbohydrates

CLASSIFICATION OF LIPIDS

These are classified as,

I. **Simple Lipids**
II. **Compound Lipids**
III. **Derived Lipids**

SIMPLE LIPIDS

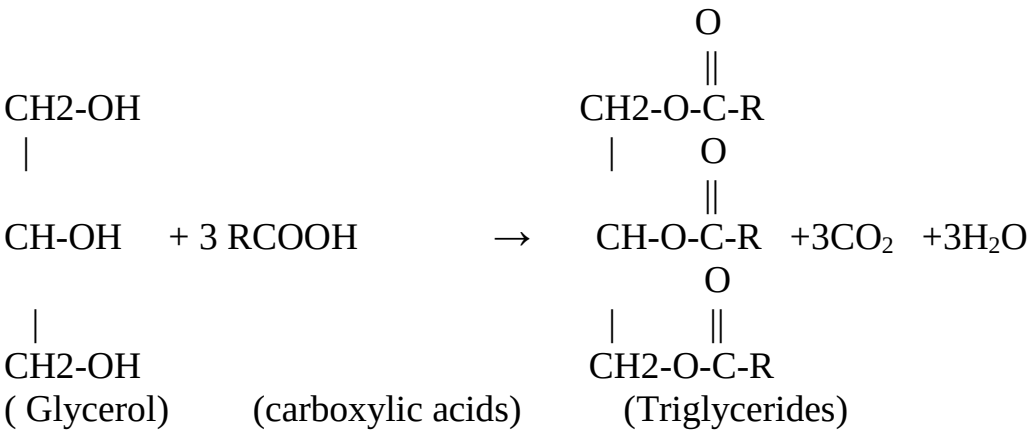
This class includes fats oil & waxes.

FATS AND OILS

These are esters of fatty acids with glycerol. (Trihydroxy alcohol).
They are known as triglyceride or triacylglycerol or fat.
A fat in liquid state called oil
Fats & oils are lighter than water and have specific gravity of about 0.8

Glycerol+3Carboxylic acid -------→Triglycerides+$3CO_2$+$3H_2O$

OR



WAXES

Definition
These are esters of fatty acids with long chain monohydric alcohols.

RCOOH + ROH —→ RCOOR + H_2O

Occurrence
Waxes are widespread in nature as secretion of certain insects as protective coating of skin, e.g. honey bee wax, fur of animals, certain animal oil & whale largely composed of waxes.

Human secretion (sebum wax)

Sebum is a secretion of human skin having waxes. It helps skin to be moist and flexible.
Plant waxes present in cuticle of plant cell.

COMPOUND OR COMPLEX LIPIDS

Definition
These are esters of fatty acids containing groups in addition to an alcohol and fatty acids.
These are sub divided as follows:
1. Glycolipids also called Glycosphingolipids
These contain sphinogosine, fatty acid and a monosaccharide or an oligosaccharide unit.
2. Sulphosides
These contain sphingosine, fatty acids, a sugar & a phosphate group.
3. Phospholipids
These are lipids that contain an alcohol, fatty acid and phosphoric acid in addition they frequently have N-containing bases & other sustituents.
4. Lipoproteins
These are complex of lipid with proteins.

III. DERIVED LIPIDS

These include fatty acids, glycerol, steroids, sterols, fatty aldehyde, lipid soluble vitamins, ketones etc.

Fatty acids

Definition
Hydrolysis of fats is called fatty acid.
Fatty acid contain long hydrocarbon chain bonded to –COOH
Group.
"They are aliphatic monocarboxylic acids"

Classification

BIOCHEMISTRY

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Fatty acid may classified as,

1.Saturated Fatty acids

They do not contain double bond.
"Animal fat are usually saturated"
Fats containing saturated fatty acids are solids at room temperature

Example
Butyric acid C_3H_7COOH

2.Unsaturated fatty acids

They contain one or more double bond in their formula.
Plant fats are mostly unsaturated.
Fats containing unsaturated fatty acids are liquid at room temperature

Types

Monounsaturated fatty acids
i.e. Oleic acid $C_{18}H_{33}COOH$
Polyunsaturated fatty acids
i.e. Archidonic acid $C_{19}H_{31}COOH$

STEROIDS

A large number of compounds found in nature occurring in nonsaponifiable fraction of lipids belong to the class of compounds called steroids.

STEROLS

A sub group of steroids is sterols which contain one or more –OH groups and no carbonyl and carboxyl groups; their names end in -ol.
Examples
Some of natural compound belonging to steroids are cholesterol, ergosterol, bile acids, male and female sex hormones and the hormones of adrenal cortex.

CHOLESTEROLS

It is most abundant animal sterol.
It occurs in animal tissues most abundant in the adrenal gland followed by nervous system. Normal plasma level ranges from 150 to 220mg/dl.
Some 140 grams of cholesterol may be present in an adult human being.
It also present in plasma membranes of tissue cells & in plasma lipoproteins.

FUNCTIONS OF LIPIDS

Energy source

They are good source of energy.

Carrier of fat – soluble vitamins

Lipid in food also acts as a carrier of fat-soluble vitamins and nutritionally essential fatty acids.

Dietary Lipids

The dietary lipids decrease gastric motility and have a high satiety value.

Stability

Body fat gives anatomical stability to organs like kidney. When a person loses weight rapidly, his kidney is liable to become floating kidneys.

Good reservoir

Fats are good reservoir in the body. Adipose tissue is best suited for this purpose due to its very little water content.

Insulating Effect

Lipids exert an insulating effect on the nervous tissue.

Integral part

Lipids are integral part of cell protoplasm and cell membranes.

Precursor

Some lipids act as precursors of very important physiological compounds .e.g. cholesterol is precursor of steroid hormones.

CHAPTER 1

Proteins

Definition

The proteins are extremely complicated molecules and are nitrogenous compound made up of a variable no. of amino acids joined to each other by specific type of covalent bond called peptide bond or peptide linkage.

Derivation

The name protein derived from Greek "protos" which means the first or the supreme. "Proteins are polymers of amino acids"