AL-RASHEED PHARMACY
Dpt.

3rd year-1st trimester 2021
Biochemistry lab

Lab 8

Lipid

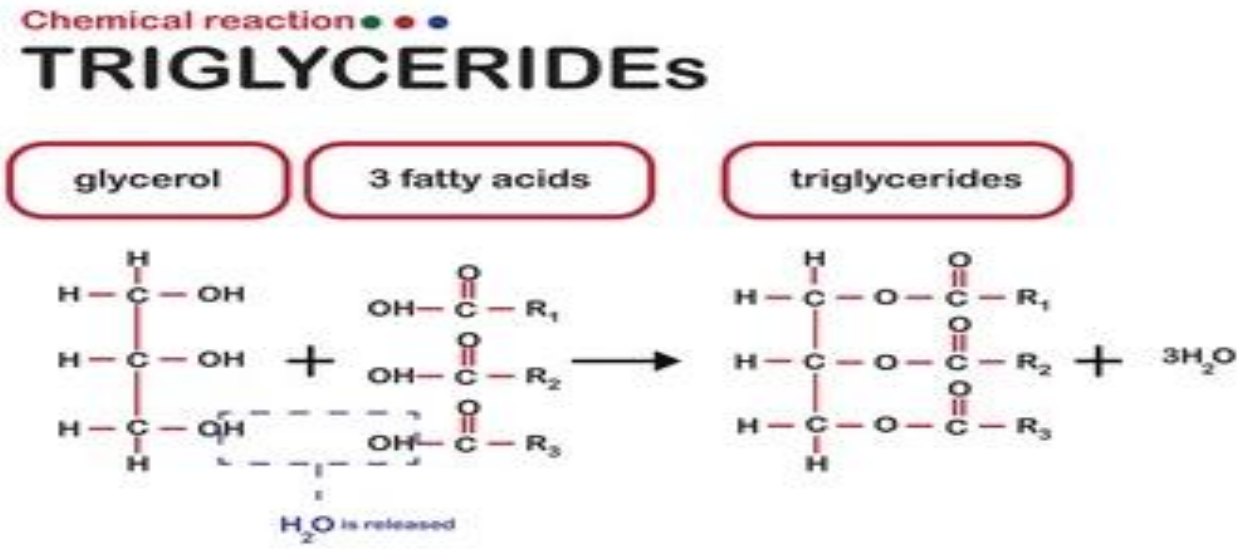
Introduction

Lipids are molecules that contain hydrocarbons and make up the building blocks of the structure and function of living cells. Examples of lipids include fats, oils, waxes, certain vitamins (such as A, D, E and K), hormones and most of the cell membrane.

Lipid composition

Lipids are mainly composed of hydrocarbons in their most reduced form, making them an excellent form of energy storage, as when metabolized the hydrocarbons oxidize to release large amounts of energy. The type of lipid found in fat cells for this purpose is a triglyceride, an ester created from glycerol and three fatty acids.

Triglycerides structure



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Where do Lipids Come From?

Excess carbohydrates in the diet are converted into triglycerides, which involves the synthesis of fatty acids from acetyl-CoA in a process known as lipogenesis, and takes place in the endoplasmic reticulum.

Some types of unsaturated fatty acids cannot be synthesized in mammalian cells, and so must be consumed as part of the diet, such as omega-3.

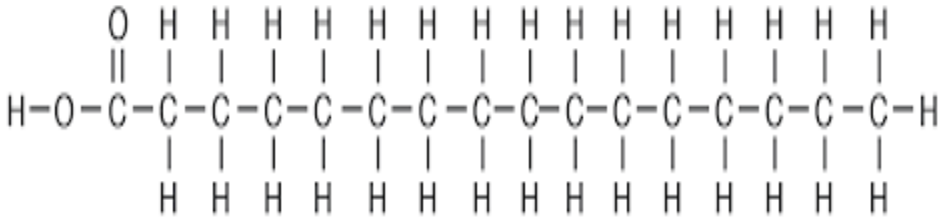
Hydrolysable and Non-hydrolysable Lipids

Lipids that contain an ester functional group are hydrolysable in water. These include neutral fats, waxes, phospholipids, and glycolipids. Fats and oils are composed of triglycerides, made up of glycerol (1,2,3-trihydroxypropane) and 3 fatty acids to form a triester. Triglycerides are found in the blood, and stored in fat cells. Complete hydrolysis of triacylglycerols yields three fatty acids and a glycerol molecule.

Non-hydrolyzable lipids lack such functional groups and include steroids and fat-soluble vitamins (A, D, E, and K).

Fatty Acids

Fatty acids are long chain carboxylic acids (typically 16 or more carbon atoms) which may or may not contain carbon-carbon double bonds. The number of carbon atoms are almost always an even number and are usually unbranched. Oleic acid is the most abundant fatty acid in nature.



Palmitic Acid

Waxes/Fats and Oils

These are esters with long-chain carboxylic acids and long-alcohols. Fat is the name given to a class of lipids that appear as solid or semisolid at room temperature, fats are mainly present in animals. Oils are lipids that appear as a liquid at room temperature, oils are mainly present in plants and sometimes in fish.

Mono/Poly Unsaturated and Saturated fatty acid

- Those fatty acids with no carbon-carbon double bonds are called saturated. Those that have two or more double bonds are called polyunsaturated. Oleic acid is monounsaturated, as it possesses a single double bond.
- Saturated fats are typically solids and are derived from animals, while unsaturated fats are liquids and usually extracted from plants.
- Unsaturated fats assume a particular geometry that prevents the molecules from packing as efficiently as they do in saturated molecules, leading to their tendency to exist as a liquid rather than a solid. Thus, the boiling point of unsaturated fats is lower than that of saturated fats.

Grease Spot test

It is general test for all lipids. lipids have property of filling meshes of filter paper that lead the paper permeable to lights

Aim of test

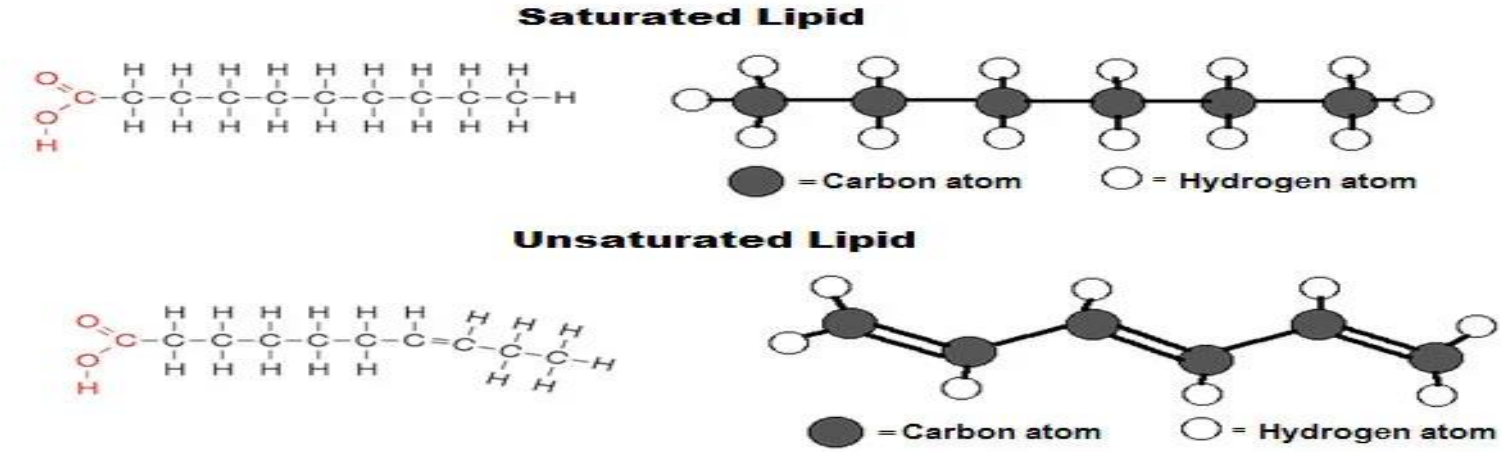
To distinguish the lipids from other liquids like water.

Procedure

In the test, some oil and some water are smeared onto a piece of paper. Some time later, the water smear would become not translucent. But the smear of oil would keep translucent for a long time. This is known as the grease spot test.

Iodine test for fatty acid

It is specific test for distinguish unsaturated fatty acid (Oleic)from saturated fatty acid(Palmatic) .



How to prepare Iodine test reagent

Dissolve 1 Gram of iodide in 100 ml of potassium iodide(2%)

Procedure

1-Pipette 5 ml of chloroform into each of three test tube

2-pipette 1 ml of oleic and linoleic acid into 1&2 respectively .tube member three serves as a blank.

3-After the fatty acids have dissolved, add 10 drops iodine reagent into3 test tubes

4-Note the disappearance of the typical brown color of iodine.

Result

Iodine + Lipid = clear color (unsaturated)

Iodine + Lipid = brown color (saturated)

THANK YOU FOR LISTINING

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