



CHEMISTRY 2

Biochemistry

Lipids Lec. 1a

Course prof.

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Lecturer at Dep. Of
Biochemistry

OBJECTIVES

1

**Classify
lipids.**

2

**Describe
fatty acids
and
classify
them.**

3

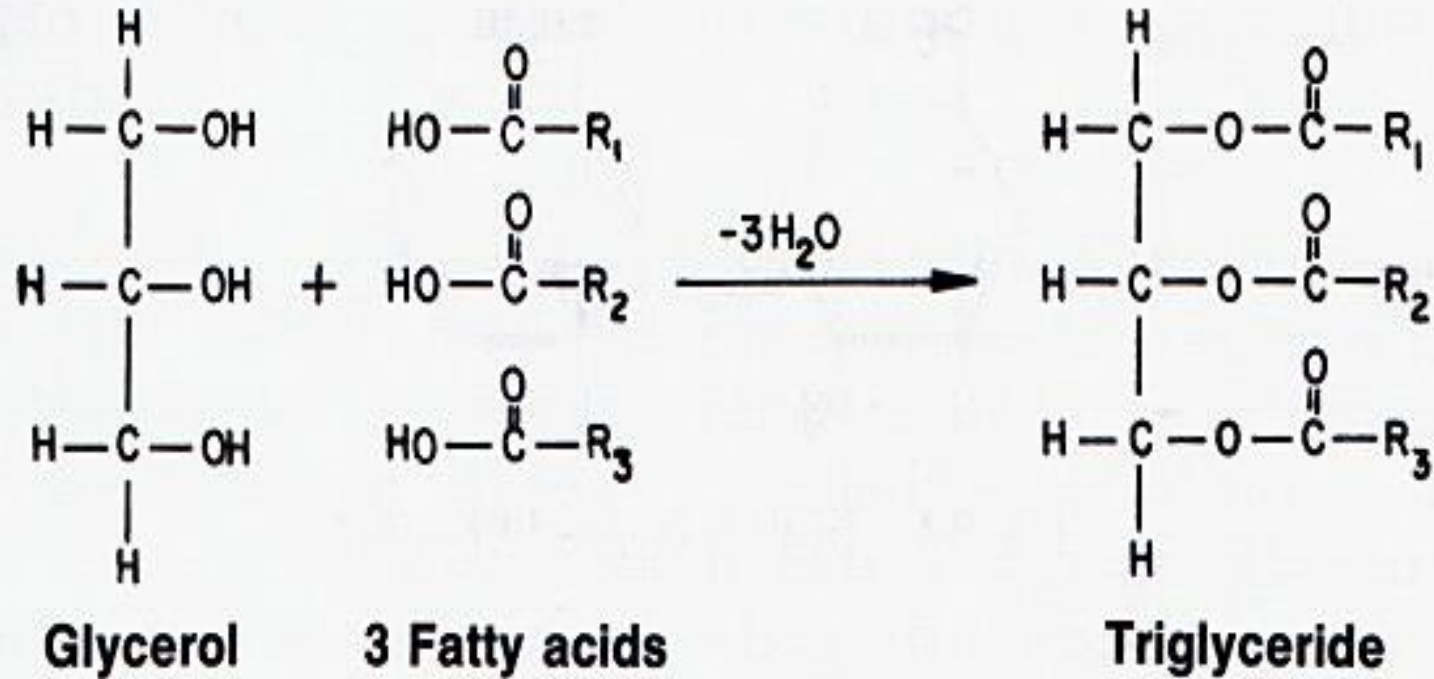
**Enlist
functions
of lipids.**

Chemistry of Lipids

Definition:

- Lipids are organic compounds formed mainly from **alcohol** and **fatty acids** combined together by **ester linkage**.

<https://www.youtube.com/watch?v=5BBYBRWzsLA>



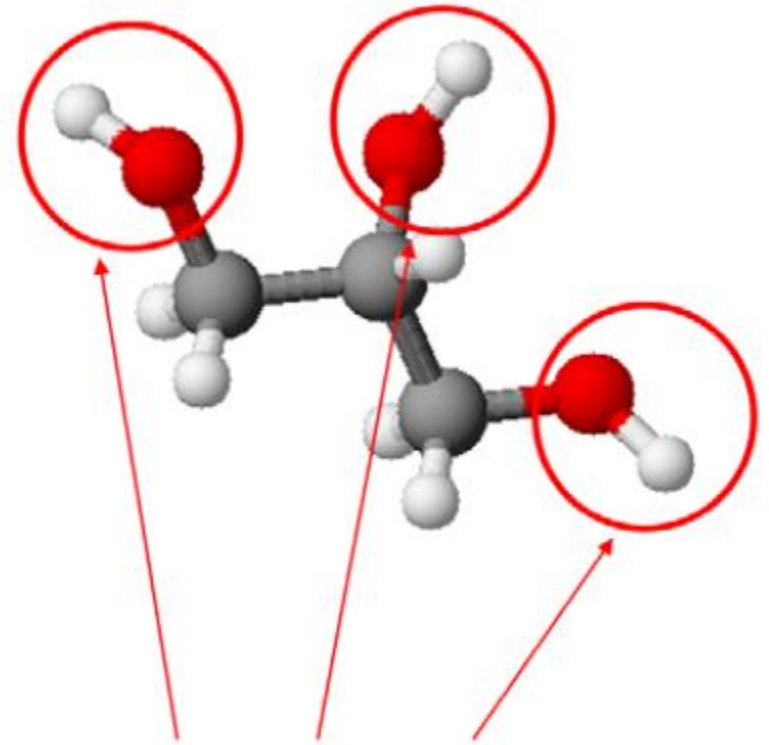
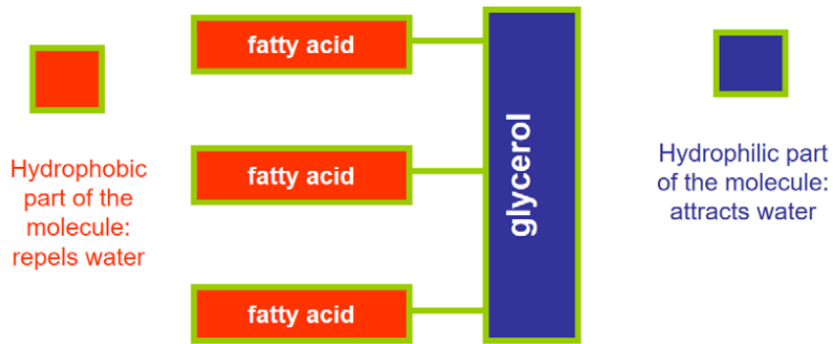
- Lipids are insoluble in water, but soluble in fat or organic solvents (ether, chloroform, benzene, acetone).
- Lipids include fats, butter, ghee, lard, tallow, terpenes and steroids.

Fatty alcohols

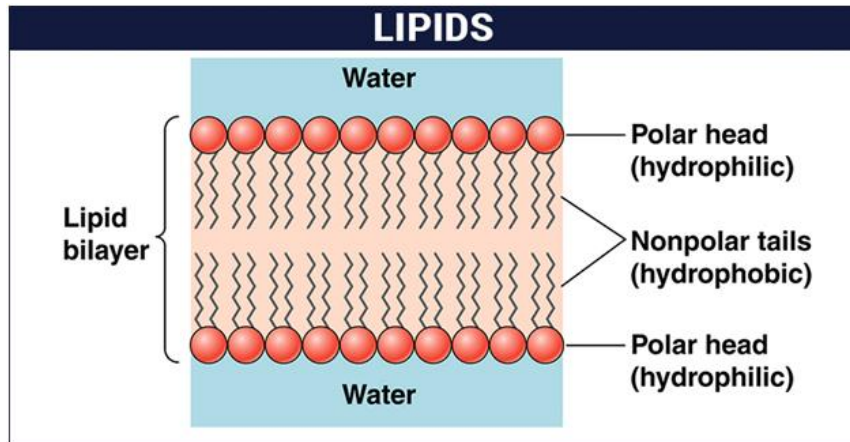
Glycerol:

It is a trihydric alcohol (i.e., containing **three OH** groups) and has the popular name glycerin.

It is synthesized in the body from **glucose**.



There is one hydroxyl (alcohol) group attached to each carbon atom in the chain



- **Also vegetable oils such as olive oil, corn oil, soybean oil, sesame oil, sun flower oil, cotton feed oil, fish oil waxes and related compounds.**
- **They are widely distributed in nature both in plants and in animals.**

Biological Importance of Lipids:

Source of energy (9 kcal/g).

Carrier of vitamins.(A,D,E,K)

Structural function.(phospholipids and sphingolipids Inter in the construction of the plant cell wall)

Protective coating. Such as waxes that important as A protective cover the tissues of plants and some animals.



Classification of Lipids

Simple lipids Such as:

A. Glycerides. Such as animal fat and fat cells that around the heart and liver.

B . Waxes (Vegetable waxes).

C. Steroids (Hormones, There are from 30-40 steroid and has a different composition from each other and different function.

Classification of Lipids

D. Prostaglandine
found in the prostate
gland its working on
lowering blood
pressure also working
on moving the non
voluntary muscles.

E. Vitamines
(A,D,E,K).

F. Coenzymes
(important in biological
oxidation reduction
process)

2. Complex lipids Such as:

A. Phospholipids.

B. Glycolipids

**Present in the brain and formed
a quarter of the weight of the
brain**

C- Lipoproteins



Fatty Acids

Definition:

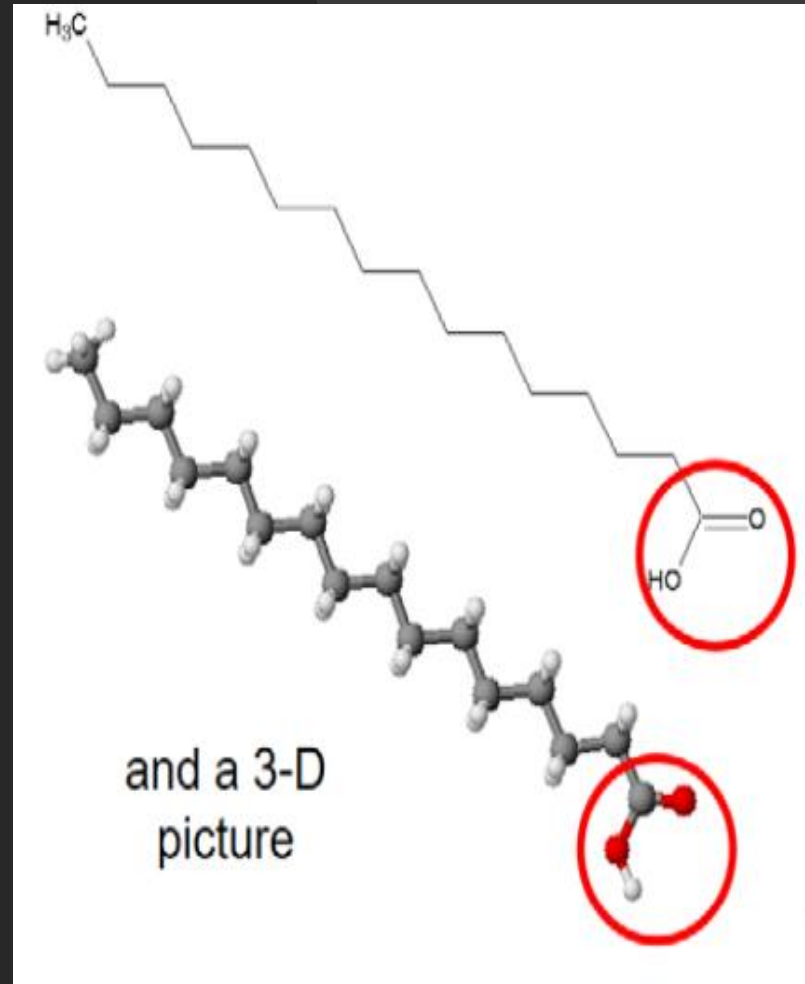
Fatty acids are aliphatic monocarboxylic acids that are mostly obtained from the hydrolysis of natural fats and oils.

Have the general formula $\text{CH}_3-(\text{CH}_2)_n-\text{COOH}$ and mostly have straight chain (a few exceptions have branched and heterocyclic chains). In this formula "n" is mostly an even number of carbon atoms (2-34)

Fatty acids are classified according to several bases as follows:

I. According to presence or absence of double bonds they are classified into:

- A-Saturated Fatty Acids
- they contain no double bonds with 2-24 or more carbons.
- They are solid at room temperature except if they are short chained.
- They may be even or odd numbered.
- They have the following molecular formula,
 $C_nH_{2n+1}COOH$.



B-Unsaturated Fatty Acids

They contain double bond

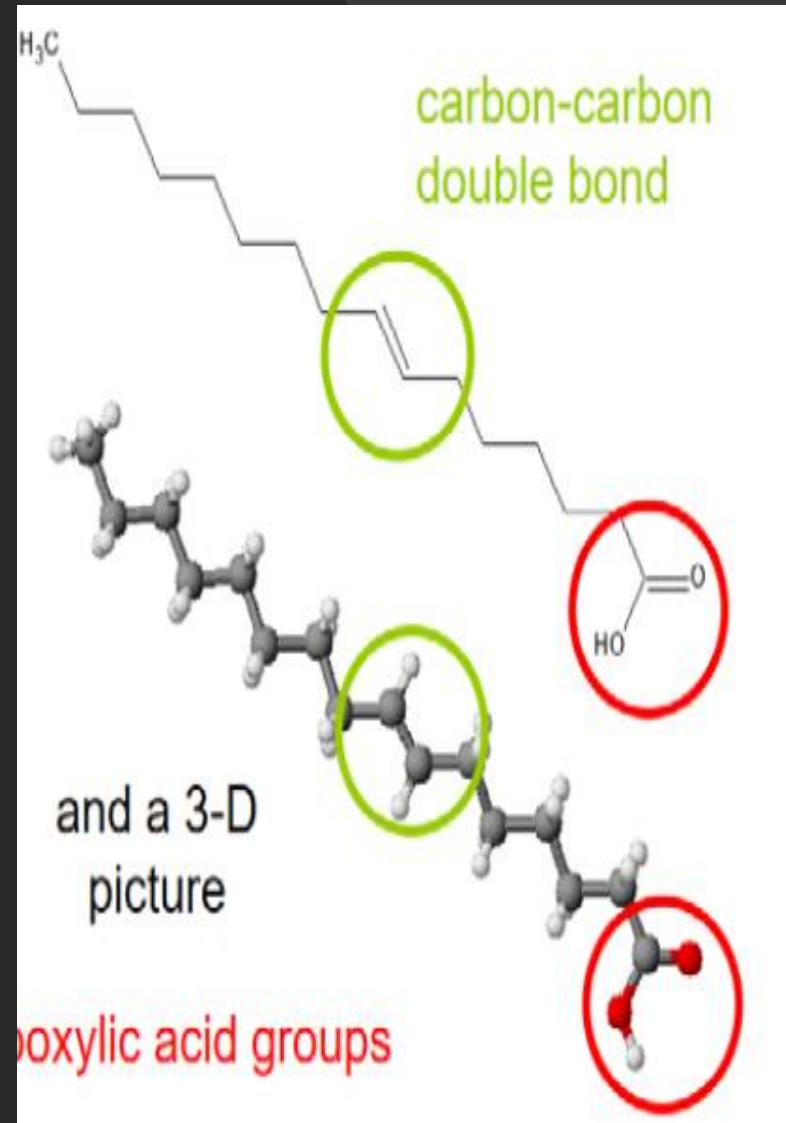
- monounsaturated

they contain one double bonds .

($C_nH_{2n-1}COOH$)

- polyunsaturated

they contain more than one double bond ($C_nH_{2n-more}COOH$).





Unsaturated fatty acid chain



Saturated fatty acid chain

A person with dark hair, wearing large white over-ear headphones and a brown ribbed sweater, is shown in profile from the back, looking at a laptop screen. The laptop screen is bright and shows a white background. The background is a warm, out-of-focus indoor setting.

<https://www.youtube.com/watch?v=kNDh1Ba0U9k>

<https://www.youtube.com/watch?v=NAGcZpq2h7k>

References:

- <https://nios.ac.in/media/documents/dmlt/Biochemistry/Lesson-05.pdf>
- https://www.rsb.org.uk/images/05_Lipids.pdf
- <http://science.marshall.edu/castella/chm204/chap19.pdf>
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