

23/9/23

Fatty acids.

- # aliphatic Carboxylic acids
- # General formula $R-COOH$
- # included in the group of derived lipids.

Classification of fatty acids (3)

- # depending on total no. of Carbon atoms.
- # depending on length of hydrocarbon chain.
- # depending on nature of hydrocarbon chain.

I. Based on total no. of Carbon atoms. (2)

- Even chain : contains Carbon atoms
2, 4, 6 etc..
- Naturally occurring lipid.
- odd chain : Carbon atoms 3, 5, 7 etc.

I. Depending on length of hydrocarbon chain. (4)

(1) short chain: with 2-6 carbon atoms.

eg: Butyric acid (4C)

(2) medium chain: 8-14 carbon atoms.

eg: lauric acid (12C).

(3) long chain: 16 and above, usually upto 24C atoms

eg: palmitic acid (16C)

(4) very long chain fatty acids (VLCFA): 24 C atoms and above.

eg: Eicosapentaenoic acid (EPA), 20C.

• Docosahexaenoic acid (DHA), 22C.

III. Depending on nature of hydrocarbon chain. (4).

- ① Saturated fatty acids.
- ② Unsaturated fatty acids.
- ③ Branched chain fatty acids.
- ④ Hydroxy fatty acids.

Fatty acids - Nomenclature.

- Fatty acids named after corresponding hydrocarbon chain.
- The saturated fatty acids end in -anoic.
& unsaturated FA end in -enoic.

Eg: Octanoic acid (saturated).

octadecenoic acid. or

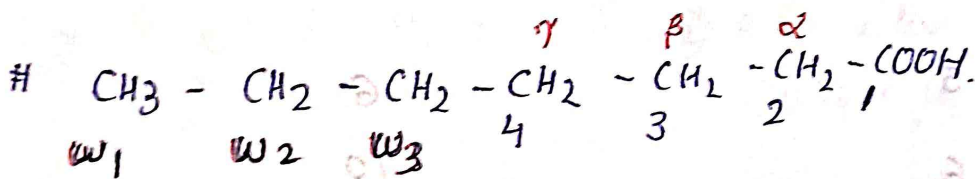
oleic acid (unsaturated).

Carbon atoms are numbered from the Carboxyl Carbon.

(Carbon No. 1.)

The carbon atoms adjacent to the Carboxyl carbon (No. 2, 3, 4) are also known as α , β , γ Carbons respectively.

The terminal methyl Carbon is known as ω (Omega) or n-Carbon.



Δ - Use for indicating the no. and position of double bond.

eg: $\Delta 9$ indicates a double bond between carbon 9 & 10 of the fatty acid.

Saturated fatty acids.

#. No. of double bonds
or

Contains only

single C-C bonds.

Common name.

No. of atoms.

acetic

2.

2
4

Butyric.

4.

pentanoic

5

Valeric.

5

CH₃ - CH₂ - CH₂ - CH₂ - CH₂ - COOH

6

Caproic

6.

12

Lauric.

12

14

Myristic.

14

16

Palmitic

16

18

stearic.

18.

acetic acid and butyric acid are important metabolic intermediates.

◦ palmitic (16c) acid and stearic acid (18c) are most abundant in body fat.

Unsaturated fatty acids.

◦ Contain one or more double bonds →

① Mono Unsaturated.
(monoenoic)

② Polyunsaturated.
(polyenoic).

③ Eicosanoids.

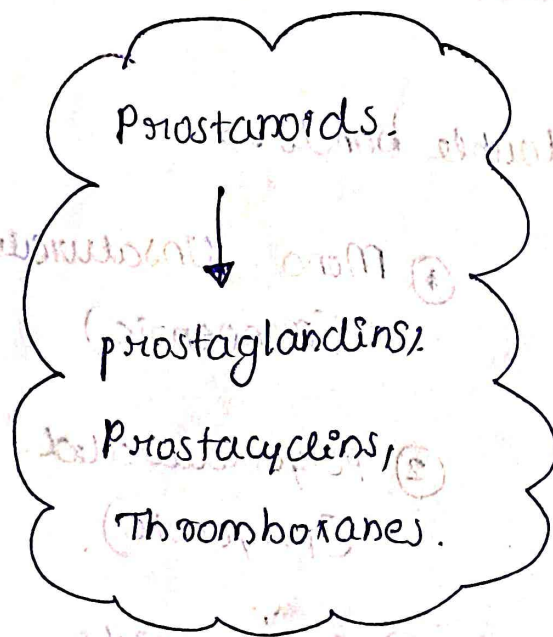
Mono Unsaturated (MUFA).

◦ having single double bond.

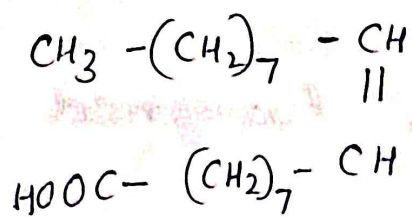
eg: Oleic acid. - Octadecenoic acid.

Polyunsaturated (PUFA) with 2 or more double bonds.

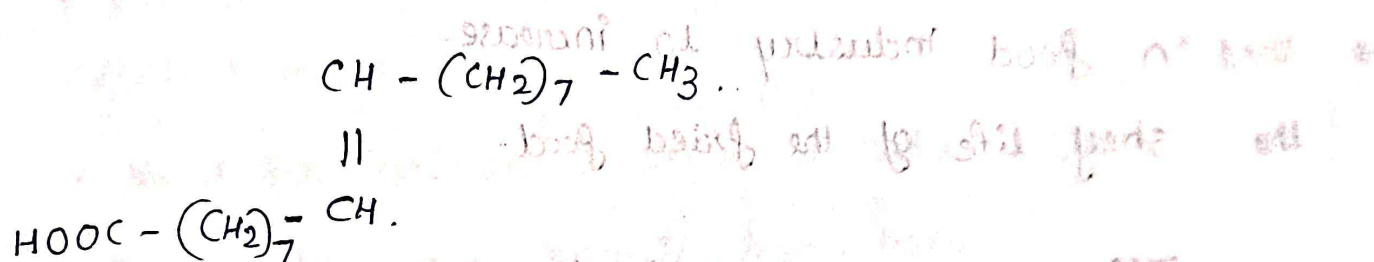
Eicosanoids : compounds derived from
icosa (20C) polyenoic fatty acids,
Comprise the prostanooids,
leukotrienes (LTs)
and lipoxins (LXs).



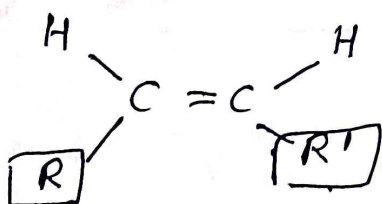
- # Unsaturated fatty acids exhibit geometrical isomerism at the double bonds, produce cis & trans configuration.
- # If the acyl chains are on same side, it is cis, if on opposite side, it is trans.
- # Naturally occurring Unsaturated long chain fatty acids have the cis configuration.



cis form (oleic acid).



Trans - form (elaidic acid)



cis. isomer.