Trans fatty acids.

Present in diary products and in hydrogenated edible oils.

Injurious to health.

Used in food industry to increase the shelf life of the fried food.

High TFA content in fast food preperations.

28/9/23.

Trans fatty acid - Continuation.

TFA decreases the fluidity of membranes due to close packing of hydrocarbon chain.

- Cis FA creats a kink or V shape in the hydrocarbon chain has marked effect in the fluidity of membrane
- disease associated with TFA are endothelial dysfunction insulin resistance, diabetes, etc..

PUFA.

learn structure

Contain 2 or more double bonds.

✓ linoleic acid (C_{18}) $\Delta 9, 12$ (two double bonds)

$$CH_3-(CH_2)_4-\overset{13}{CH}=\overset{12}{CH}-CH_2-\overset{10}{CH}=\overset{9}{CH}-(CH_2)_7-COOH.$$

learn str.

✓ α - linolenic acid. (C_{18}) $\Delta 9, 12, 15$ (three double bonds).

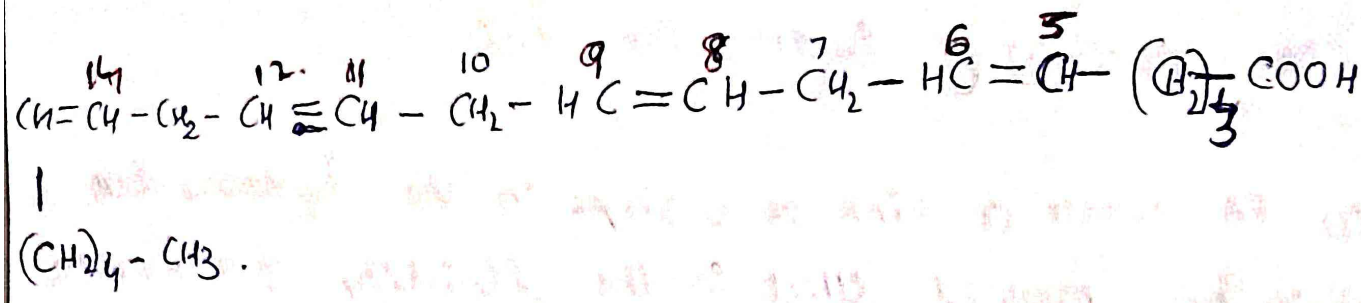
$$CH_3-CH_2-\overset{16.}{CH}=\overset{15}{CH}-CH_2-\overset{13}{CH}=\overset{12}{CH}-CH_2-\overset{10}{CH}=\overset{9}{CH}-(CH_2)_7-COOH$$

{If you are writing in condensed form, please make sure that the position of DB is same}

don't forget to count -COOH

✓ learn.

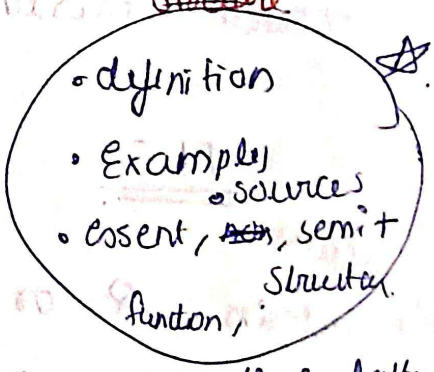
Arachidonic acid (C_{20}) $\Delta 5, 8, 11, 14$. (4 O.B)



Richest source of PUFA.

While writing ~~essential~~ ~~fatty acid~~ PUFA.
must draw structure.

- vegetable oils - Sunflower, corn etc.



Essential fatty acids.

- linoleic acid and α-linolenic acid are essential fatty acids.
- Essential fatty acids cannot be synthesised by body and have to supplied in the diet.
- Essential for complete nutrition.

PUFA (8 marks.)

Definition.
Example → essential + structure
semi
sources.
- Function
- deficiency.

• Arachidonic acid can be formed, if the dietary supply of linoleic acid is sufficient.

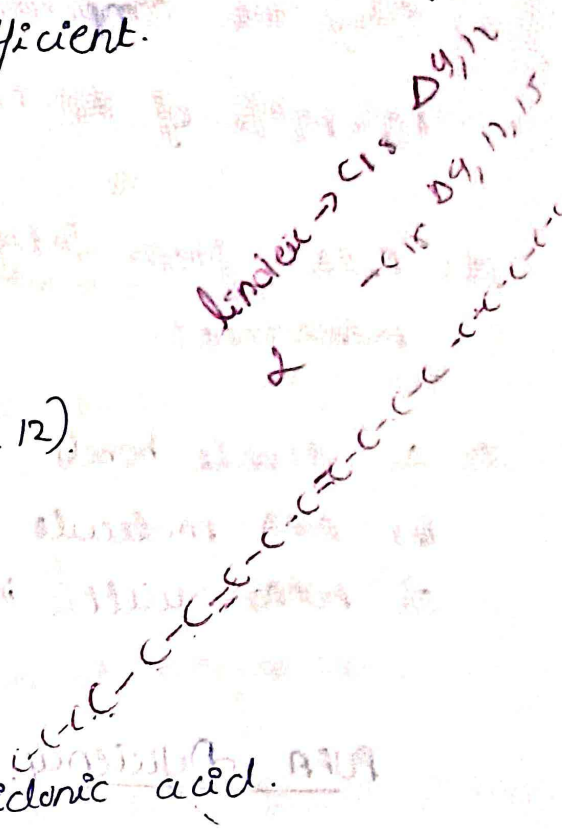
linoleic acid ($\Delta 9, 12$)

↓

γ linoleic acid ($\Delta 6, 9, 12$).

↓

Arachidonic acid.



Semi essential fatty acid - Arachidonic acid.

Double bonds can be introduced at Δ4, Δ5, Δ6 & Δ9 positions in most animals.

Humans lack the enzyme that can introduce double bond beyond carbon 9.

{so, beyond 9, it is essential fatty acid}.

Functions.

(a) Used for esterification and excretion of cholesterol. So PUFA in general are antiatherogenic.

(b) Arachidonic acid is the precursor of prostaglandins, Thromboxanes, LTs and Lx.

(c) They are components of biomembrane (arachidonic acid. 10-15% of the FAs of membrane)

(d) PUFA's from Integral part of mitochondrial membranes.

(e) as double bonds are in cis-configuration, the PUFA molecule will be sickle shaped. So PUFAs will increase the fluidity of membrane.

PUFA Deficiency.

- Biological oxidation is reduced.

- EFA deficiency cause,
  - Acanthocytosis
  - Hyper Keratosis
  - Acrodermatitis.
  - Hypercholesterolemia.

Unsaturated. fatty acids are also designated as {ω_6 family}.

ω_3
ω_6
ω_9.

Omega - 3 - fatty acids.

✓ can be asked short answer

Omega indicates the position of first double bond from methyl group.

- Omega - 3 FA has a site of unsaturation between the third and fourth carbon atom from the omega end.
- great significance on human nutrition and health issues.

eg: . Alpha linoleic acid.
- Eicosapentaenoic acid (EPA.)
- Docosahexaenoic acid (DHA).

Sources - fruits., Soyabean oil, nuts, cold water fishes ✓ main source like salmon, sardines, tuna etc.

Functions.

- reduce risk of cancer, CVD, alzhiemer's disease, inflammation etc.
- Reduce blood triglyceride level and increase HDL level.
- High dose may improve insulin sensitivity.
- DHA is required for normal development and function of retina.

Omega - 6 - fatty acids.

eg: linoleic acid & Arachidonic acid.

Omega - 9 - fatty acids.

eg: Oleic acids.