properties of fatty acids.

- Hydrogenation
- Halogenation.
- melting point
- salt formation.
- Ester formation
- Oxidation.

Hydrogenation.

- Unsaturated fatty acids react with H_2 and convert to saturated FA.

  C=C bonds ⟶ C–C bonds.

- Hydrogenation of oils can lead to solidification
  eg: vanaspathi.

Halogenation.

- Unsaturated FA can take up 2 ~~hydrogen~~ halogen. atoms can at each double bond to form halogenated derivative.
- Oleic acid + I_2 ⟶ Di-Iodo Oleic acid.

• The no. of halogen atoms taken up will depend on the number of double bonds {degree of unsaturation}.

Melting point.

• Unsaturated fatty acids have low melting point compared to saturated FA's with same chain length.

Fatty acids.	Melting point.
• Stearic acid (C18, saturated)	69°C
• Oleic acid (C18, unsaturated)	13°C.

30/9/21

Salt formation.

- Saturated and unsaturated FAs form salts with alkali $CH_3COOH + NaOH \longrightarrow CH_3-COONa + H_2O$

Soaps.

- Na & K salts of long chain fatty acids.

Oxidation.

- FA undergo oxidation in the body to give energy.
- β-oxidation is the process.

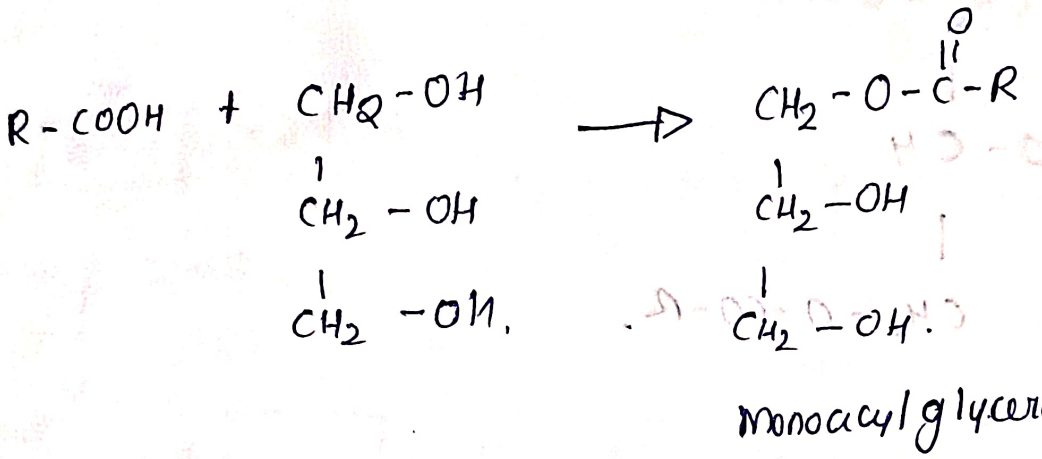
Ester formation.

- Saturated and unsaturated FA form esters with alcohol (glycerol).
- mon, di, tri esters are formed with alcohol groups of glycerol.

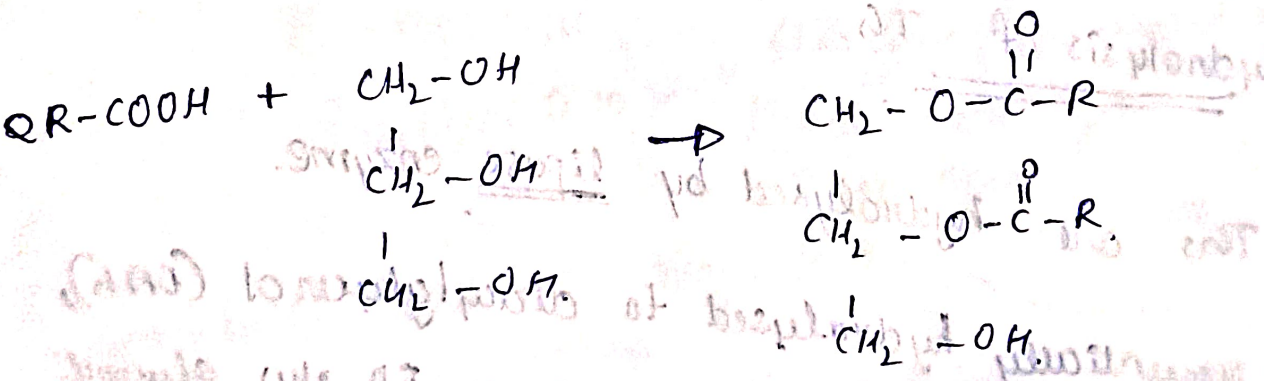
Glycerol + FA ⇒ Monoacyl glycerol.

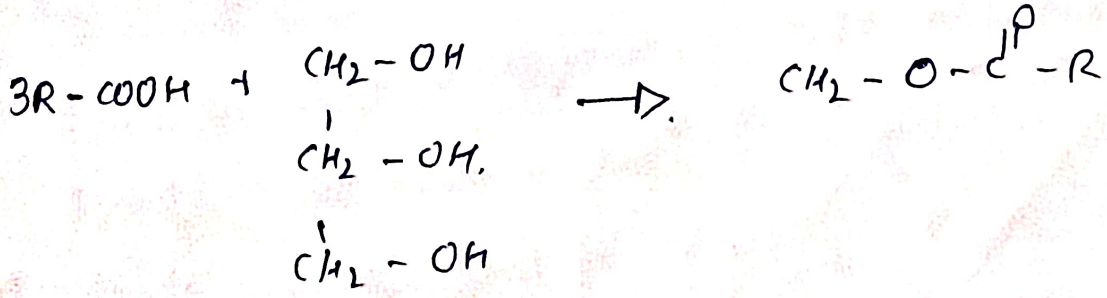
Monoacyl glycerol + FA ⇒ Diacyl glycerol.

diacyl glycerol + FA ⇒ Triacyl glycerol.

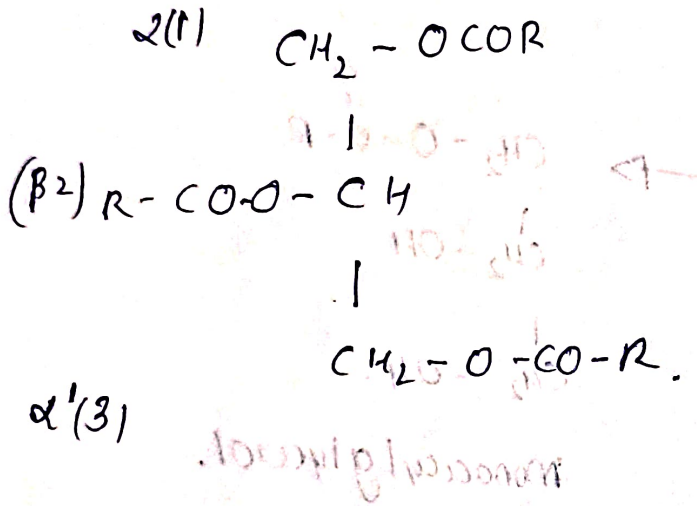


Monoacyl glycerol.



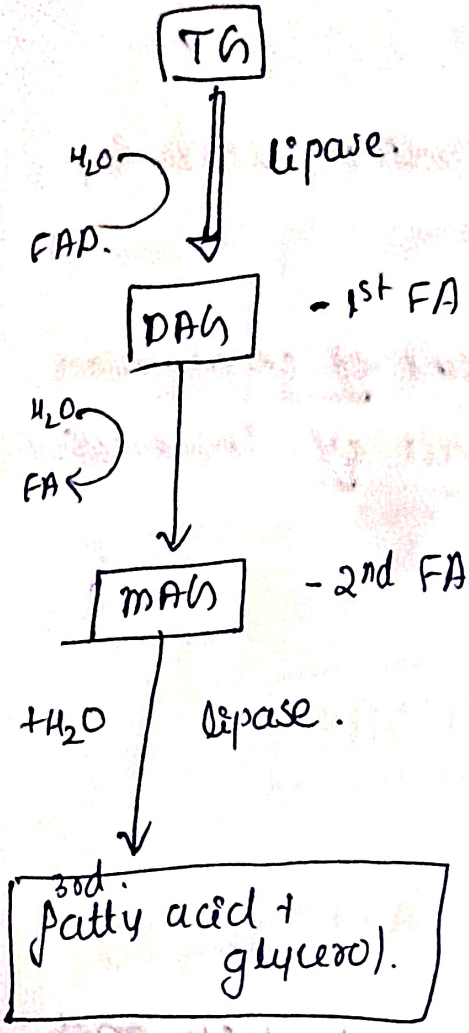


The carbon atoms of glycerol in TGs are designated as α, β, α' or 1, 2, 3.



Hydrolysis of TGs.

- TGs are hydrolysed by lipase enzyme.
- sequentially hydrolysed to diacylglycerol (DAG), monoacylglycerol (MAG) and finally FA plus glycerol.



Saponification. → TGs are hydrolysed not FA. Lipases never hydrolysis! It is by base!! not lipase

- Hydrolysis with a strong Base.
- triglycerides split into glycerol & soap.

mpt - 1 mark.

✓ Saponification number.

defined as no. of milligrams of KOH required to saponify one gram of fat.

It is inversly prop to mol wt of the fat.

Eg: Saponification no. of human fat is 194-198.

Iodine number. Impt 1 mark.

- It is the number of grams of Iodine taken by 100 gms of fat.
- directly proportional to the content of unsaturated FA or it is and Index of degree of Unsaturation.

eg: Iodine no. of Butter is 28.

Rancidity of fat. 4 mark.

- refers to the appearance of an unpleasant taste and smell for fats and oils.

Rancidity

- Hydrolytic
- Oxidative.

Hydrolytic Rancidity.

- due to partial Hydrolysis of TG due to presence of Hydrolytic enzymes.

Oxidative rancidity is the result of partial oxidation of unsaturated fatty acid with result formation of epoxides & peroxides.

Antioxidants.

- prevents occurence of oxidative rancidity.

H- → hydrolytic.

due to partial