

21/9/23.

Lipid chemistry.

Lipids may be defined as a heterogeneous group of compounds which are relatively insoluble in water, but soluble in non-polar organic solvents such as ether, benzene, acetone, chloroform etc.

The Heterogenous group of compds include

(1) Fats

(2) Oils

(3) Steroids

(4) Waxes

Functions. (11)

#1 Source of energy (9 kcal/g.)

#2 Storage form of lipid is (2)

(Triacyl glycerol aka Triglycerides.)

#3 Structural components of biomembranes
ie, phospholipid and cholesterol.

- ④ they also act as metabolic regulators.
→ steroid hormones and prostaglandins.
- ⑤ act as electric insulators in neurons. ⑧.
- ⑥ Act as surfactants, detergents and emulsifying agent.
- ⑦ Give shape and contour to body. ③ ✓
- ⑧ protect internal organs by providing cushioning effect (pads of fat). ⑥.
- ⑨ they are required for absorption of fat soluble vitamins. ⑦ ✓
K, E, A, D.
- ⑩ Provide insulation to the body from cold (subcutaneous fat). ④.
- ⑪ Improves taste and palatability of food. ⑤.

Classification of lipids. (4 marks.)

1. Simple lipids.
2. Compound lipids.
3. Derived lipids
4. Lipids complexed to other compounds.

Simple lipids.

Esters of fatty acids ^{with} & various alcohols.

Two types.
→ major type of lipids.

(1) Fats & oils.

(2) waxes.

✓ Eq

3. R-COOH

fatty acid.

+

CH₂-OH

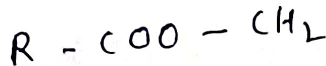
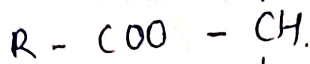
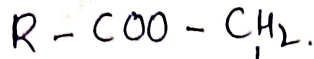
|
CH-OH

|
CH₂-OH.

glycerol.

esterification.

→



+ water.

Triglyceride {major fat}

acid

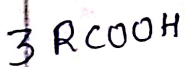
+

alcohol

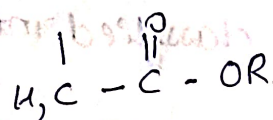
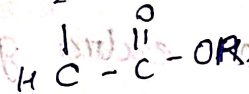
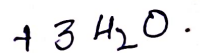
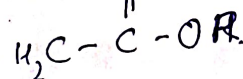
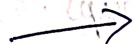
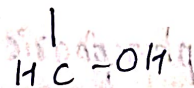
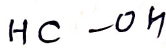
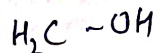


Ester

+ water.



+



oils

Fats.

① Animal origin.

② solid @ room temp.

③ Contains mainly long chain saturated fatty acids.

① plant origin.

② liquid at room temp.

③ Contains short chain unsaturated fatty acids

waxes: Esters of fatty acids with higher mol. wt
② monohydric alcohol.

• used as base for prep of cosmetics,
ointments, lotions etc.

(2) Compound lipids.

esters of fatty acids with alcohol but in addition
they contain other groups.

Depending on extra groups,
they are classified into.

- (A) phospholipids, containing phosphoric acid.
- (B) Non phosphorylated lipids.

(A) phospholipids, containing phosphoric acid

(i) Nitrogen containing glycerophosphatides.

- (i) lecithin (phosphatidyl choline)
- (ii) cephalin (phosphatidyl ethanolamine)
- (iii) phosphatidyl serine.

N
L
C
P
S.

(B) Non-nitrogen glycerophosphatides.

- (1) phosphatidyl inositol.
- (2) phosphatidyl glycerol.
- (3) cardiolipin. (diphosphatidyl glycerol)

(C) Plasmalogens, having long chain alcohol.

- (1) choline plasmalogen.
- (2) ethanolamine plasmalogen.
- (4) phosphosphingolipids, with sphingosine.
sphingomyelin.

(B) Non-phosphorylated lipids.

(1) glycosphingolipids.

- cerebroside (ceramide monohexoside)
- globoside (ceramide oligosaccharides)
- ganglioside (ceramide oligosaccharide + NANA)

(2) sulfolipids - (sulfatides)

- ① Sulfated cerebroside
- ② Sulfated globoside

(3) sulfated gangliosides.

III. Derived lipids.

Compds which are derived from lipids or precursor of lipids

eg: fatty acids, steroids, prostaglandins.

IV. Lipids complexed to other compounds.

eg: lipoprotein
glycolipids.

Neutral lipids : Uncharged lipids.

eg: acylglycerols, cholesterol,
cholesteryl esters.