

Most Diversed Group → **LIPIDS**

- Essential Elements (C, H, O)
- Energy (2x that of carbohydrates)

Hydrophobic molecules

Bloor → 1943

Heterogenous group of compounds related to fatty acids.

L
Layers of protection

- Cuticle (Plants)
- Exoskeleton

I
Insulation

- Heat
- Cold

P
Proportions

- C, H ↑↑ (Energy)
- O₂ ↓↓ (Stability)

I
Insoluble in water
Soluble in Organic.

(Ether, Benzene, Alcohol...)

D
Double Energy as that of Carbohydrates.
→ Triglycerides

FATTY ACIDS

Derivatives of carboxylic acid (-C(=O)-OH)

Types → 30
C-atoms (2 — 30) → Even no. of C-atoms

- 2C → Acetic Acid (Vinegar)
- 4C → Butyric Acid (Butter)
- 6C
- 8C
- 10C
- 12C
- 14C
- 16C → Palmitic Acid (Palm oil)
- 18C → Oleic Acid / Stearic Acid (Olive oil)

$$(63.1) - (-8^{\circ}\text{C})$$

$$63.1 + 8 = 71.1^{\circ}\text{C}$$

$$m.p. = 63.1^{\circ}\text{C}$$

No. of C-atoms \propto m.p.

No. of C-atoms \propto Solubility

No. of C-atoms \propto Hydrophobic nature

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→ Simplest Fatty Acids

- Acetic Acid
- Butyric Acid

→ Most Common Fatty Acids

- Palmitic Acid
- Stearic Acid

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FATTY ACIDS

Specific gravity →

0.8

FATS
Solids
(Saturated)
↑↑

Double Bonds
Energy

OILS
Liquid
(Unsaturated)
↓↓
(upto → 6)

Animal

Plant body

- Acetic Acid
- Butyric Acid
- Palmitic Acid
- Stearic Acid (70°C)

4°C ← • Oleic Acid (C₉ = C₁₀)

-5°C ← • Linoleic Acid (2 double bond)

- Palmitic Acid
 - Stearic Acid (70°C)
- Stearin ($C_{57}H_{110}O_6$)

- (-5°C) ← • Linoleic Acid (2 double bond)
- Linolin (Cotton Seeds)
- $C_{57}H_{104}O_6$

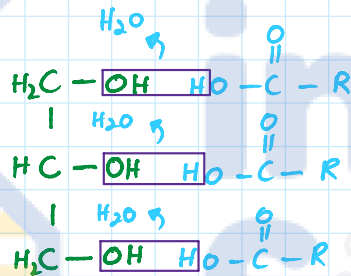
TYPES OF LIPIDS

- Oils, Fats
- Cholesterol / Sterol
- Waxes
- Phospholipids
- Sphingolipids

ACYLGLYCEROL

→ Most abundant lipids in living things
Esters of fatty acids and alcohols.

Fatty Acids (F) Alcohol (Glycerol) (A)



- Average Fat → 16 KJ (144000 Kcal)

- 1 Glycerol + 1 F. Acids → Monoacylglycerol
- 1 Glycerol + 2 F. Acids → Diacylglycerol
- 1 Glycerol + 3 F. Acids → Triacylglycerol / Triglycerides.
- Neutral lipids
- Energy Storage

WAXES → Highly Hydrophobic

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- Natural Waxes (Simple lipids)
- Synthetic Waxes (Paraffine) → Candle

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PROTECTIVE COATINGS

- Sheep wool
- Cuticle
- Birds feather
- Bee's Wax

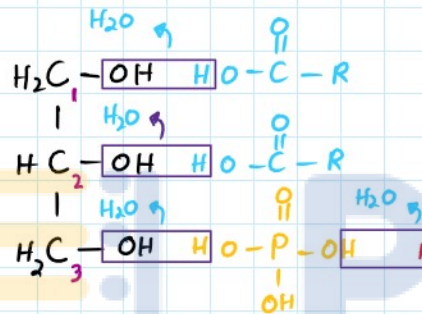
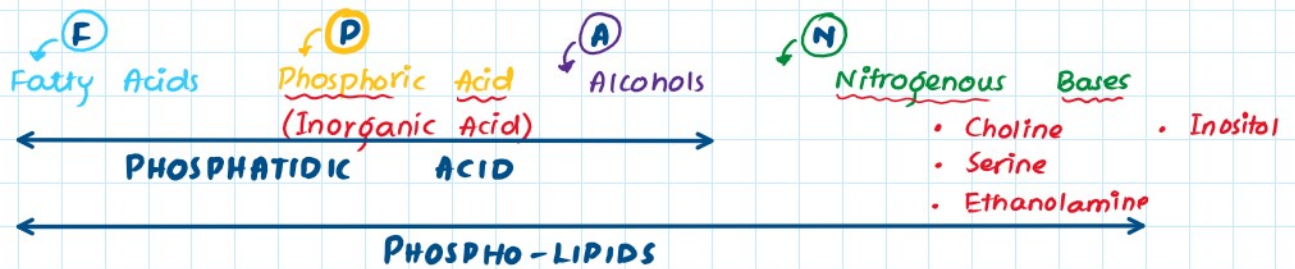
(For STB)*

PREVENT FROM ABRASIVE DAMAGE

PHOSPHOLIPIDS

→ Found in membranes (Bio-membranes)
Derivatives of phosphatidic acids.*

F P A N



Phosphatidic Acid + Choline → Phosphatidylcholine (Lecithin)

Phosphatidic Acid + Serine → Phosphatidylserine

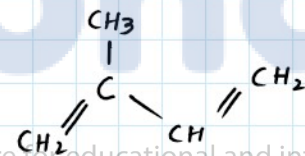
Phosphatidic Acid + Ethanolamine → Phosphatidylethanolamine

- Phosphatidic Acid
 - Glycerol 1
 - F. Acids 2
 - Phosphoric Acid 1



TERPENOIDS → Polymers of **isoprenoid** sub-units (C_5H_8)

- Rubber
- Carotenoids
- Steroids
- Terpenes



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Monoterpene → 2 **Isoprene** → **Menthol**

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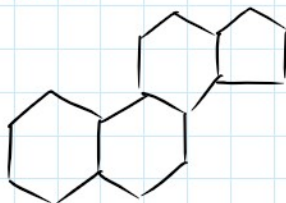
Diterpene → 4 **Isoprene** → **Vitamin + Phytol chain**

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Triterpene → 6 **Isoprene** → **Ambrein**

STERIODS → High molecular weight
Can be crystallized

17C atom

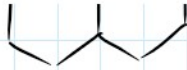


- Found in membranes
- Precursors of steroid hormones

→ Sex Hormones

Testosterone

Estrogen



Testosterone

Estrogen

- Maintains membrane flexibility / fluidity.

PROSTAGLANDINS

modified F. Acids

Local hormones, Every mammalian tissues.
20 lipids

Prostate Gland

1935 → Seminal Fluid

Prostaglandins → Derived from arachidonic acid

- Two non-polar tails attached to 5 Carbon ring

- Blood Pressure
- Induction of fever, Inflammation
- Sense of Pain
- Formation of Blood clots

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