

1.3 LIPIDS

Learning outcome

At the end of the lessons, students should be able to:

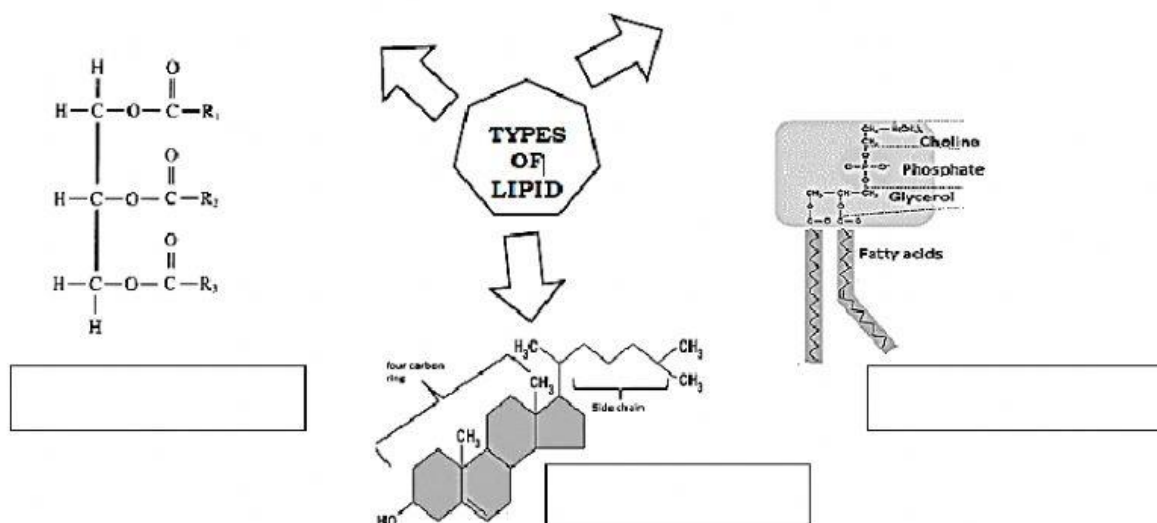
- State the types of lipid: triglycerides (fat & oil), phospholipids and steroids.
- Describe the structure of fatty acids and glycerol.

INTRODUCTION

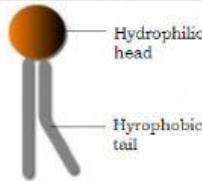
- ❖ Built up from carbon, _____ and _____. But proportion of oxygen is lower than in carbohydrates
- ❖ Large biological molecule that does not consist of _____ but it is called macromolecule.
- ❖ _____ compounds that insoluble in water but soluble in solvents.

a) State the types of lipid: triglycerides (fat & oil), phospholipids and steroids.

Exercise 1.3 (a): Identify types of lipid: triglycerides (fat & oil), phospholipids and steroids and name in the boxes below.



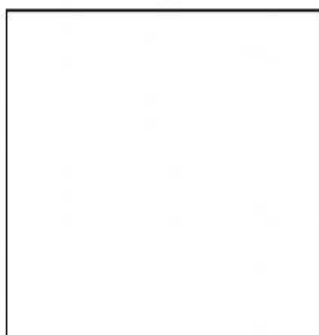
Types of Lipid	Structure	Characteristics
1. _____ e.g: Fat and Oil	- Consist of : - _____ molecule of fatty acids - _____ glycerol molecule - Bond : _____ bond	- Non polar molecule which is _____ in water. - Has 2 types: - Fat (_____ state at room temperature). _____ (liquid state at room temperature).

2. _____ e.g: Lecithin	- Consist of: - _____ molecule of fatty acids - _____ glycerol - _____ phosphate group	Has _____ head which attracted to water & _____ tails which repel water. 
3. _____ e.g: Cholesterol, Testosteron	- Consist of : - _____ ring carbon skeleton with variable side chain. *The side chain will determine different types of steroids.	- Cholesterol is a steroid found in cell membrane. - It act as _____ for other steroids such as testosterone (a hormone).

b) Describe the structure of fatty acids and glycerol.

- Triglyceride molecule is composed of _____ glycerol and _____ fatty acids.

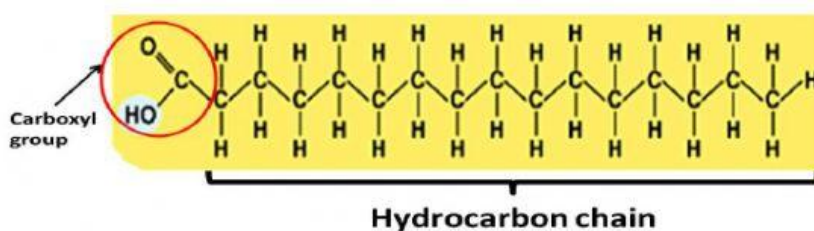
Exercise 1.3 (b): Draw a structure of glycerol.



Structure of fatty acids

- A glycerol is an _____ with three _____ atoms and three _____ groups (-OH).
- Molecular formula $C_3H_8O_3$
- Can form _____ bond with carboxyl groups (-COOH) of _____.
- Fatty acids are long, _____ chains of hydrocarbon (-CH₂) with a _____ group (-COOH) at the end of each chain.
- This giving the molecule its _____ properties.
- Fatty acid is _____ compound.
- Because the carboxyl group is _____ but, the hydrocarbon tail is _____.

Structure of Fatty acid



Two types of fatty acids:

Saturated fatty acids	Unsaturated fatty acids
1. Only has _____ bond in the hydrocarbon chain.	1. Has one or more _____ bond ($\text{-C=}\text{C-}$) in the hydrocarbon chain. ➤ Monounsaturated (has only 1 double bond). ➤ Polyunsaturated (has more than 1 double bond).
2. Triglycerides containing saturated fatty acids tend to be _____ at room temperature.	2. Triglycerides containing unsaturated fatty acids tend to be _____ at room temperature.
Stearic acid, a saturated fatty acid	Oleic acid, a monounsaturated fatty acid. Note that the double bond is <i>c/c</i>; this is the common natural configuration.

Function of lipids:

1. Energy storage
2. Component of the cell membrane
3. Insulation/heat insulator
4. Important carriers or precursors of important flavour and odour compounds.
5. Transport fats-soluble vitamin
6. Protect internal organ