Structure of Lipids

• Lipids are made of the elements Carbon, Hydrogen and Oxygen, but have a much lower proportion of water than other molecules such as carbohydrates.

• Unlike polysaccharides and proteins, lipids are not polymers—they lack a repeating monomeric unit.

• They are made from two molecules: Glycerol and Fatty Acids.

• A glycerol molecule is made up of three carbon atoms with a hydroxyl group attached to it and hydrogen atoms occupying the remaining positions.

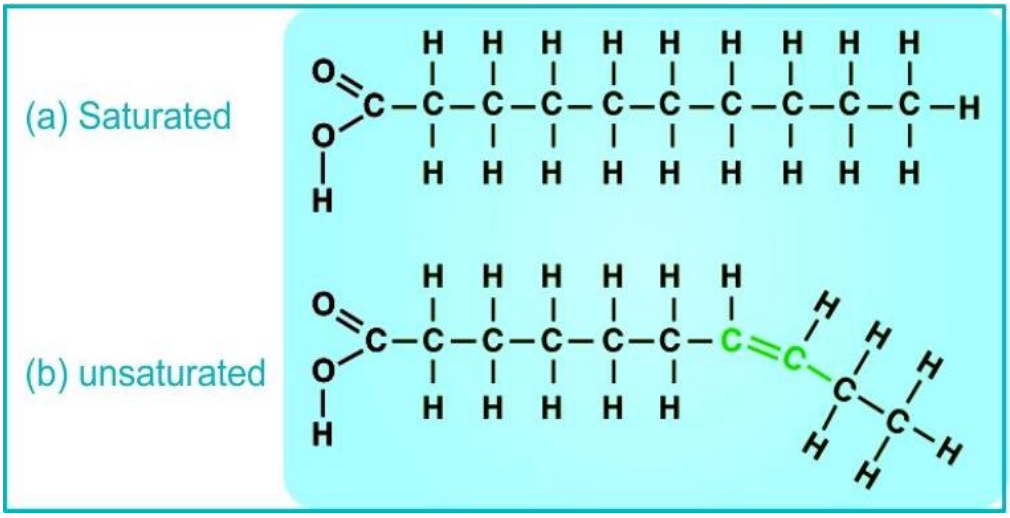
• Fatty acids consist of an acid group at one end of the molecule and a hydrocarbon chain, which is usually denoted by the letter 'R'.

• They may be saturated or unsaturated.

• A fatty acid is saturated if every possible bond is made with a Hydrogen atom.

• Unsaturated fatty acids, on the other hand, do contain C=C bonds.

Monounsaturated fatty acids have one C=C bond, and polyunsaturated have more than one C=C bond.



Biological Significance of Lipids

1. Rich source of energy: fats provide food of high calorific value (1g fat produces about 9.3 kilo calories of heat).

2. As food reserve: Fats are stored in body as reserve food material, because these could be readily stored in the body on account of insoluble character sticks. Triglycerides stored in adipocytes (fat cells) of adipose tissue are the principal fat reserve.

3. As heat insulators: Fats deposited in the subcutaneous tissues act as insulators conserving body heat.

4. Solvent: Lipids act as a solvent for fat soluble vitamins like vitamin A, D and E.

5. Structural constituents: Phospholipids, glycolipids and sterols are structural components of all the membrane system of cell (i.e. cell membrane, nuclear membrane, membranes of the endoplasmic reticulum etc.)

6. Fat transport: Phospholipids play an important role in the absorption and transportation of fatty acids.

7. Hormone synthesis: Adrenocorticoids, sex hormones, vitamin D and cholic acids are synthesized from cholesterol.

8. As shock absorber: The fat deposited around the visceral organs and underneath the skin acts as cushion and absorbs mechanical shocks.

9. As electric insulators: Myelin sheath around medullated nerve fibres forms an electric insulation.

10. Prostaglandins: They control local activities in the body.

11. Protective layers: Lipids form a protective waxy covering on the aerial parts of plants to check loss of water by evaporation.

12. Thrombokinase: helps blood clotting.

13. Leukotrienes: a group of eicosanoid helps in respiration.

14. Some isoprenoids form insect hormones.

15. Some insoprenoids form volatile oil and pigments. Natural rubber is also an isoprenoid.

16. Glycolipids help in cell recognition.

17. Complex lipids form phospholipid bilayer of plasma membrane.

18. Steroid act as hormones and neurotransmitters in mammals.