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  **PAPER:**

**MICRONUTRIENTS.**

**Q1) Define the following.**

# **1)BILE ACIDS:**

 They are a type of steroid acids that are produced in the fluid. It is produced to work with bile in the digestion of fats in the small intestine. They are activated by the ATP and co-enzyme-A.

# **2) HYDROGENATION OF OIL:**

 The hydrogenation of oils is the type of process in which the unsaturated fats in liquid state are converted in to solid fat by the help of hydrogen gas. These fats are also called Trans Fats like margarine.

# **3) IODINE NUMBER:**

 The iodine number is the mass of iodine in grams that is consumed by 100g of chemical substances. It is used to measure the degree of the unsaturation of the fats, oils, and waxes. It is also called as the Iodine Index or Iodine Value.

# **4) LECITHIN:**

 It is an important type of Phospholipid that are important for the digestion and metabolism of fats. They are found in the plant cells, in the egg yolks and animal cells. They are also used as an Emulsifier.

# **5) TRIGLYCERIDES:**

 They are the major and the most common type fats that are stored in the body. The triglyceride is formed by three molecules of fatty acid and one molecule of alcohol, they are also like a backbone for the lipids. They are in the food that we eat and also produced in the body.

**Q2) What are lipids? What is the difference between fats and waxes? What is the importance of lipids in our body?**

LIPIDS:

 The Lipids are one of the macromolecules that are essential for the human body. The lipids is a class of organic compounds that contains fatty acids and their derivatives and that are insoluble in the water but are soluble in organic solvent like ether, alcohol or chloroform. They also contains organic substances like oils, fats, waxes, steroids and hormones and they are an essential component of living cells.

# **DIFFERENCE BETWEEN FATS AND WAXES:**

## **FATS:**

The following are the difference of fats which are given below;

1. Fats are the esters of fatty acids and glycerol.
2. They are solid at room temperature.
3. Fats are the major component that are stored in the plants and animal cells.
4. Fats are nonpolar, they are hydrophobic, they can not dissolve in water.
5. They are soluble in organic solvent.
6. They are the used by the body as fuel.

## **WAXES:**

These are the differences of waxes, which are given below;

1. The waxes are the esters of fatty acids other than glycerol.
2. The waxes contain one mole of long chain of fatty acids esterified with one mole of high molecular weight monohydroxy alcohol.
3. Waxes are malleable solids.
4. They are hydrophobic, can not dissolve in water.
5. They can be mixed in organic solvent like ether.

### **IMPORTANCE OF LIPIDS IN OUR BODY:**

 As we know that lipids are one of the macronutrients and they are essential for the human body, as lipids play a very important role and performs essential functions in the body, those important functions are given below;

1. They are a source of energy.
2. They are stored in the body as fats and are used as fuel when needed.
3. They are an important part of the cell as the membrane surrounding the body cell.
4. They also produce some hormones.
5. They also produce bile acids which makes the digestive juices which helps in the digestion of the food.
6. They also act as insulations and protects the body from harm and cold conditions.
7. They keep the internal body temperature normal.
8. They are also important for the transportation of fatty acids in the body.
9. The Testosterone are also produced by the lipids which essential for the development of male characteristics.
10. The Progesterone and the Estrogen are also produced by the lipids, which are important for the development of female characteristics.
11. They also act as chemical messengers, so they are also involve in the Nervous System.
12. They are also emulsifying agents. They also gives insulation to the nervous system in harsh conditions.
13. Lipids also prevents loss of water and electrolytes.

**Q3) What are Prostaglandins (PGs)? And what are their functions?**

# **PROSTAGLANDINS:**

 The Prostaglandins (PGs) they are a group of lipids. They are made up of unsaturated fatty acids that contains cyclopentane 5-carbon rings, while they are derived from the polyunsaturated fatty acid precursor arachidonic acid. They are hormone like and are involved in the functions, like the dilation and contraction of the blood vessels, contraction and relaxation of the smooth muscles, control of blood pressure, modulation of inflammation etc.

## **FUNCTIONS OF THE PROSTAGLANDINS:**

 Some of the important functions of prostaglandins are given below;

1. They are found in all of the tissues of the body of humans and the help in the maintenance of normal blood pressure.
2. They help in the vasodilation and in the clotting of blood at the site of injury.
3. They help in the inflammation. Like the immune system response to infection or an injury, like redness, swelling, edema etc.
4. They play a role in the contraction and relaxation of the smooth muscles.
5. They help in the metabolism of fatty acids.
6. They are also responsible for the dilation and contraction of blood vessels.
7. Helps in the clotting of the blood at the site of injury.
8. They cause uterine contraction in pregnancy.
9. They also have healing affects, like lowering the acid concentration in the stomach.
10. They play a role in the decreasing intraocular eye pressure.
11. Regulation of menstruation.

**Q4) What are fatty acids? How fatty acids are classified?**

# **FATTY ACIDS:**

 The fatty acids are an important component of the lipids, they are fat soluble molecules in the animal, plant and in the micro organism cells. They are a straight of carbon atoms with hydrogen atom at one end and carboxyl group attached to the other end (-COOH). They also act as energy fuel, storage and transport of the energy. They are also one of the essential component of the membranes and gene regulation.

## **CLASSIFICATION OF FATTY ACIDS:**

 The classification of the fatty acids are done by the type of bond that is present between them or the number of carbon atoms. Which is as follows;

### **SATURATED FATTY ACIDS:**

The saturated fatty acids have no double bond. They are straight hydrocarbon chains with a fix number of carbon atoms. They contain 12-22 carbon atoms.

### **UNSATURATED FATTY ACIDS:**

They are monounsaturated fatty acids and has only one double present. They have a chain of 16-22 carbon atoms in length. The hydrogen atom on each side of the double bond are oriented in the same direction.

### **POLYUNSATURATED FATTY ACIDS:**

In polyunsaturated fatty acids contains two or more double bonds present.

### **SHORT CHAIN FATTY ACIDS:**

The short chain fatty acids has up to 6 carbon atoms. They have a bad smell, they are present in the milk and are easily digestible.

### **MEDIUM CHAIN FATTY ACIDS:**

The medium chain fatty acids contain 8-12 carbon atoms. They are found in high concentration in coconut oil and are oxidized by the Liver.

### **LONG CHAIN FATTY ACIDS:**

The long chain fatty acid has 14-18 carbon atoms. They are solid at room temperature, they are most commonly found in plants an in and are not easily digestible.

### **VERY LONG CHAIN OF FATTY ACIDS:**

These chains contain 22 or more carbon atoms. They are mostly found in oily foods and nuts.

### **OMEGA FATTY ACIDS:**

* **OMEGA 3;**

The omega 3 fatty acids are polyunsaturated fatty acids. They have a double bond three atoms away from the terminal methyl group in their chemical structure. They are very essential for the body. They are found in nuts, fish, chia seeds etc.

* **OMEGA 6;**

The omega 6 are also the type of the polyunsaturated fatty acids, has a double bond on the 6 number position, counting from the methyl end. They are found in vegetable oil, nuts, seeds etc.

* **OMEGA 9;**

They belong from the family of unsaturated fatty acids and had a double bond on the 9th bond from the methyl end of the fatty acids. They are found in the nuts, olive oil, avocado etc.

**Q5) Write a short note on the following;**

**.lipoprotein.**

**.cholesterol.**

# **LIPOPROTEIN:**

The lipoproteins are biochemical molecules that are involved in the transportation of fats like water, blood, plasma and other extracellular fluids. They contain both lipids and proteins. Many of the enzymes, antigens, transporters, structural protein, adhesins, toxins are lipoproteins. They ae also responsible for the transportation of cholesterol in the whole body by two ways, 1) Low Density Lipoprotein (LDL) and they are referred to as the (Bad Cholesterol). 2) High Density Lipoproteins (HDL) and they are referred as the ( Good Cholesterol).

# **CHOLESTEROL:**

The cholesterol are a type of steroid. They are mainly produced in the Liver and some comes from the food we eat. The cholesterol is a waxy and fatty like substance present in the cells and in the blood. They help in the making of the cell wall, hormones, tissues, bile acid and vitamin D. They are also found in the dairy products, meat, chicken and egg yolks. The right amount of the cholesterol is very important for the normal functioning of the body but when the amount increases it can causes serious diseases like heart attack and strock.