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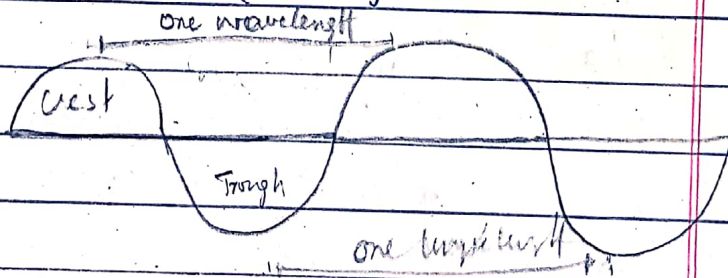
## Electromagnetic Radiation.

Electromagnetic radiation is a stream of photons (packets of energy or Bundle of energy) travelling with speed of light in vacuum  $c$ .

~~Radiant~~ According to Britannica, electromagnetic radiation, in classical physics, the flow of energy at the universal speed of light ( $c = 3 \times 10^8 \text{ m/s}$ ) through free space or through <sup>material</sup> medium in form of the electric and magnetic fields that make up electromagnetic wave.

Electromagnetic wave :- The wave which require no medium for their propagation (travel) called electro-magnetic waves  
eg: light wave

Wave length :- The distance between two adjacent crest or troughs wavelength is denoted by  $\lambda$  (lambda).



single  
wavelength

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Frequency: → It is the number of waves passing through a point in one second.  
Each wave is an energy carrier.

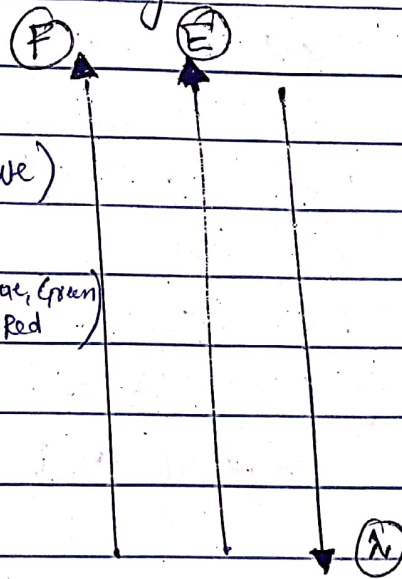
$$E \propto f$$

∴  $E = hf$  → Planck's equation  
+ Planck's constant  
value =  $6.6 \times 10^{-34}$  J·s

$$E = \frac{hc}{\lambda}$$

### Spectrum/Types of Electromagnetic Radiation

- i- Gamma Rays
- ii- X-Rays (Roentgen Wave)
- iii- Ultra Violet
- iv- Visible light (Violet, Indigo, Blue, Green, Yellow, Orange, Red)
- v- Infra Red
- vi- Micro Waves
- vii- Radio waves



+ Frequency and energy increase from bottom to top.

→ Wave length increase from top to bottom.

- i. Gamma Rays → have highest energy and frequency and has shortest wavelength. It has highest penetration power however, it is used for different purpose. such as; checking the cracks, in building, Bridges, Dam, Aeroplane, etc. and it is also used in medical like treating the cancer patient and in taking detailed images for diagnostic medicine. Gamma rays are used to sterilize foods and research equipment.
- ii. X-Rays :- have less than Gamma and more than Ultra violet energy and frequency. And wave length of X-rays are more than Gamma and less than Ultra violet. They can penetrate soft tissue like skin and muscle and are used to take X-rays picture of bones in body. X-rays are also used to study the arrangement of atoms and different materials. This technique called as X-Rays Diffraction (XRD).
- iii. Ultra Violet :- Energy and frequency is less than X-rays and more than Visible light. Wave length of UV is more than X-rays and less than Visible light.

UV light has the following applications:

- Used by powerful telescope like the Hubble Space telescope to see far away stars.
- Used in laboratories for sterilization.

iv- Visible light  $\rightarrow$  Energy and frequency less than Ultra Violet and more than Infra Red. Wave length is more than Infra Red and less than Ultra Violet.

Our sun emits the most of its radiation in the visible range, which our eyes perceive as the colour of the rainbow.

v- Infra Red  $\rightarrow$  Energy and frequency is more than micro wave and less than visible light. Wave length is less than micro wave and more than visible light.

Infra Red is used to send signals from one place to another including remote controls and ~~at~~ data over short distance.

vi- Micro wave  $\rightarrow$  Energy and frequency is more than Radio wave and less than Infra Red. Wave length is less than Radiowave and more than Infra Red. It is used in Microwave ovens, transmit information, Radar, etc.

vii- Radio Wave  $\rightarrow$  least energy and frequency and highest wave length

It is used in Mobilephone, Satellites, Radar, Towers, etc.

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## CARBOHYDRATES.

Carbohydrates are key source of energy in human body, it provide 3.9 calories energy per gram. Carbohydrates are also called saccharides, the word saccharides comes from Greek word "sakkaron" which means sugar. When carbohydrates are broken down by the body, glucose is produced. It is organic compound which composed of Carbon, hydrogen and oxygen.

### Classification of Carbohydrates.

There are three types of carbohydrates.  
1- Monosaccharide, 2- Oligosaccharides.  
3- Polysaccharides.

#### 1- Monosaccharides

Mono means one, and saccharide means sugar. This is simplest sugar and do not hydrolyzed. Monosaccharides are also called simple sugar. General formula is  $C_n(H_2O)_n$ . Monosaccharides are subdivide

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into trioses, tetroses, pentoses, hexoses, heptoses, etc. Glucose, Fructose, Ribulose, Galactose, and Erythrose are examples of Monosaccharides. However, glucose is considered as the fundamental unit of carbohydrates. Glucose is the immediate source of energy for cellular respiration and blood sugar. Galactose is a sugar which is present in milk and yogurt and Fructose is found in honey.

### Oligosaccharides

Oligo means few and saccharide means sugar. Oligosaccharides are also called oligosaccharoses. They are composed of sugars that yield 2 to 10 molecules of the same or different monosaccharides on hydrolysis. Two (2) molecules of monosaccharide on hydrolysis are called Disaccharide and 3 or 4 monosaccharides are known as trisaccharides and tetrasaccharides respectively and so on. General formula of Disaccharide is  $C_n(H_2O)_{n-2}$  and trisaccharide is  $C_n(H_2O)_{n-2}$  and so on. Three common disaccharides are Sucrose - common table sugar (Glucose + Fructose,

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Lactose - major sugar in milk (glucose + galactose),  
and Maltose - product of starch digestion  
(glucose + glucose).

### Polysaccharides:-

Poly means many, and saccharides means sugar. Polysaccharides are compound sugar and yield more than 10 molecules ~~into~~ monosaccharides on hydrolysis. They are classified into homo and hetero polysaccharides. Homo polysaccharides are same type of monosaccharides ~~of the~~ and hetero polysaccharides are different type of monosaccharides such as; starch, glycogen, cellulose, pectin and hyaluronic acid and chondroitin, respectively. General formula is  $(C_6H_{10}O_5)_n$ .

### Functions of Carbohydrates:

- Carbohydrates are chief energy source in animals. Glucose is broken down by glycolysis / kreb's cycle to yield ATP.

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- Glucose is stored as glycogen in animals and starch in plants.
- Carbohydrates aid in regulation of nerve tissue and is the energy source for brain.
- Form structural and protective components on cell wall of plants and micro-organism.
- Carbohydrates are rich in fibre content help to prevent constipation.
- Help in biological transportation, cell-cell communication and activation of growth factor.

### Sources:

Carbohydrates are available in wide variety of foods, for example cereals, fruits (especially dates), honey, milk, sugar beet, potato, pasta and sugarcane.