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NATURE OF LIGHT AND ELECTROMAGNETICS SPECTRUM

NEWTON'S CORPUSCULAR THEORY OF LIGHT:

Newton put forward a theory, called corpuscular theory of light. According to this theory "a source of light emits out minute particle called corpuscles. When these particies reach our eye, they produce the sensation of vision."

Newton's explained the following phenomenon of light.

i. The rectilinear propagation of light.

ii. The formation of shadow.

iii. The reflection of light.

iv. The refraction of light.

DEFECT:

To explain the refraction, he made wrong assumption that velocity of light in denser medium is greater than the velocity of light in air.

WAVE THEORY OF LIGHT:

Huygens put forward a theory called wave theory of light. According to this theory"a source of light produces the sensation of vision." This theory explained the following phenomenon of light.

i. The rectilinear propagation of light.

ii. The formation of shadow.

iii. The reflection of light.

iv. The refraction of light.

DEFECT:

i. To explain the refraction of light, he made the wrong assumption that velocity of light is smaller in denser medium, than in air.

ii. According to Huygens a source of light produces the wave sensation of vision since medium is necessary for the propagation of waves, therefore it was assumed that the entire space was filled with fluid, called ether.

MAXWALL'S ELECTROMAGNETIC WAVE THEORY:

Maxwell's put forward a theory called Maxwell's electromagnetic wave theory. According to this theory, "Since light is considered as electromagnetic waves because both have same speed and since electromagnetic waves do not need any medium for their propagation, " Therefore light waves can travel in space.

DEFECT:

Maxwell's electromagnetic theory of light failed to explain the process of photoelectric effect.

EINSTEIN'S PLANK'S QUANTUM THEORY:

QUANTUM THEORY OF LIGHT:

According to Quantum theory of light, "light are composed of bundles or particles of energy called proton. The energy of each proton is directly proportional to the frequency of radiation. "

MATHEMATICALLY QUANTUM THEORY OF LIGHT CAN BE EXPRESSED AS:

Where,

E : Energy of proton

F ; Frequency of the radiations

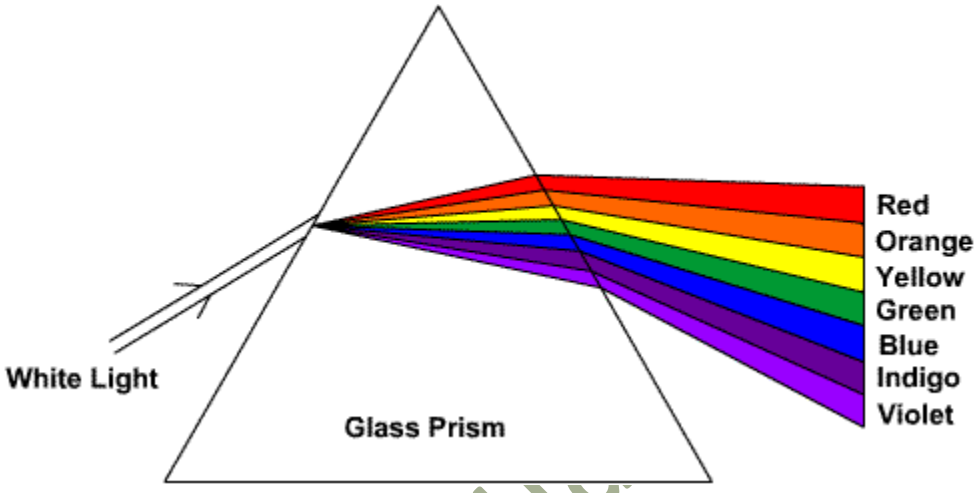
H ; plank's constant, 6.63 x 10-34 js.

DISPERSION:

Definition:

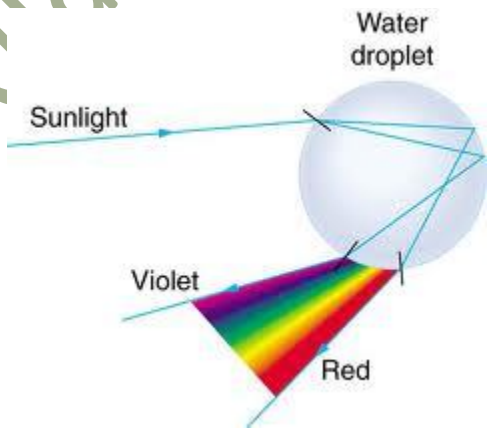
"If phenomenon of spreading of White light into its constituent colours is called dispersion."

It is explained by a simple experiment show in the fig when a beam of light (sunlight) entering a dark room through a narrow hole in a wall, falls on a prism, then on coming out of the prism forms a band of seven colours on the wall. This multicolor pattern of light is called spectrum. The colors obtained are Violet, Indigo, Blue, Green, Yellow, Orange and Red (V.I.B.G.Y.O.R)



RAINBOWS:

Sometimes an arc of beautiful colors appears in the sky after a rainfall. It is seen when sun on the back side of observer. The rain drop behaves like prism and while light entering the raindrops is splitted into its constituent's colors. Such phenomenon of light i.e. the formation of different colors is rainbow.



EMISSION OF LIGHT BY ATOMS:

According to Bohr's atomic theory every substance consists of atoms. In an atom the electron revolve round the nucleus in certain allowed orbit. The energy of the electron in each orbit has definite value. When electron gain in certain amount of energy if jumps into the higher orbit. Certain amount of energy it jumps into the higher orbit.

The atom is then said to in exited states. The atoms cannot remain with exited for a long time. Then electron jumps back into the lower orbit it emits energy in the form of photons. The frequency of such light waves (photons) depends upon the orbit in which electron transit.

THE ELECTROMAGNETIC SPECTRUM:

The spectrums of electromagnetic radiation consist of radio waves, microwaves, visible waves, ultraviolet waves, x-rays and r-rays. These electromagnetic radiations have different in their. Wave length frequencies but all they travel with the speed of light i.e. 3 x 10-8 m/s.

I. RADIO WAVE:

These electromagnetic waves have wave length between few millimeters to several meters.

II. MICRO WAVE:

These electromagnetic waves have wave length between 1 millimeters to 300 meters.

III. INFRARED:

Infra red waves, also called heat waves, have a mean wave length of 10-5 m.

IV. VISIBLE WAVE:

These electromagnetic waves have wave length ranging from 400 millimeters to 700 nm.

V. ULTRA VIOLET WAVES:

There wave length is between 600 nm to 380 nm.

VI. X-RAYS:

The wave length range is from 109 m to 1011 m.

VII. R-RAYS:

There wave length range is from 1011m to 1014 m.

GREEN HOUSE EFFECT AND GREEN HOUSES:

GREEN HOUSE EFFECT:

"Infra red rays are absorbed by carbon dioxide and water vapors present in the atmosphere and are not radiated back." Heat is trapped in this manner and this effect is known as green house effect.

GREEN HOUSE:

A green glass surface which absorbs infrared radiations is called green house.