IOSR Journal of Applied Physics (IOSR-JAP)
e-ISSN: 2278-4861.Volume 7, Issue 3 Ver. IV (May. - Jun. 2015), PP 49-52
www.iosrjournals.org

Internal Mechanism of Photosynthesis and Exhibit of Colors through the Equation of Unification of Physics

Nirmalendu Das
Assistant Engineer, All India Radio, Siliguri (Retd)
Life Member: 1) The Von Karman Society For Advanced Study And Research In Mathematical Sciences (Vks), Old Police Line, Jalpaiguri, West Bengal(India), 2) Life Member: Indian Science Congress Association, Kolkata, India.

Abstract: *Leaf chlorophylls exist mainly in two forms namely chlorophyll – a and chlorophyll – b, this is wellknown now. Willstatter and Stoll discovered in 1913. The converted photon equation shows the equation of unification of physics [1] which is very important to forming particle, stars, galaxies, thus the universe and already discussed in other chapter. Here we will discuss on Chlorophyll – a, this is mostly present in all photosynthesizing plants. As per present idea, the absorption of light leads to the excitation of an electron from its ground state to a higher energy level. In what way 1000 photons can liberate from outermost electron 9th shell [2] and how this energy will act on chlorophyll to use the photon equation, that functions need to look and gives us a new path of science.*

So, we can explain the internal functions of absorption of energy and we can classify the spectrum analysis in various part of leaf. Many experiments continuing and established these scientific facts now.

I. Chlorophyll And Photosynthesis

Chlorophyll exists mainly in two forms as Chlorophyll – a ($C_{55}H_{72}O_5N_4Mg$) and chlorophyll – b. Chlorophyll – a is mostly present in all photosynthesizing plants. Chlorophyll – b is found to be present in green algae, bryophytes and pteridophytes [3]. We can consider the molecular weight of Chlorophyll – a to find the real reason of absorption of light or photon energy.

Molecular weight of chlorophyll – a is 893.235

(12.011x55+1.0079x72+15.99994x5+14.0067x4+24.035)

During photosynthesis, particle will take place from rest to excited state. The difference of energy of two states will function in this case also. We need to find out the value of Pi at excited state to follow the equation (32)[1] adding the mass of Chlorophyll – a

According to Eyster (1928), the precursor of chlorophylls is protochlorophyll ($C_{55}H_{70}O_5N_4Mg$, atomic weight, 891.2193). On putting this atomic weight in the equation (33)[1] and (35)[1] at rest and excited state, we get,

at rest of the particle

$$\sigma'_0 = \frac{m_e\,(m_0^2 - m_1^2)}{\pi_0^2\, N_A\, m_1^2} = 7.484154\text{x}10^{-42}\ \text{gm} \quad (33)$$

$$\sigma'_0\, c^2 = 6.72642216\text{x}10^{-27}\ \text{erg}$$

at excited state of the particle

$$\sigma'_e = \frac{m_e\,(m_0^2 - m_1^2)}{\pi_e^2\, N_A\, m_1^2} = 7.430338\text{x}10^{-42}\ \text{gm} \quad (35)$$

$$\sigma'_e\, c^2 = 6.67810106\ \text{x}10^{-27}\ \text{erg}$$

Energy of Planck Constant h = 6.6260755x10^{-27} erg-s, this energy is almost equal to calculated result. So, we can write, $h \approx \sigma' c^2$.

In this view, chlorophyll can produce the energy of Planck constant and real internal functions of photosynthesis as given here.

The difference of energy of the equation (33) and (35) is important to exhibit color as:

(Method No. – 1)

$(\sigma'_0 - \sigma'_e)c^2$ = 4.832118x10^{-29} erg or $(\sigma'_0 - \sigma'_e)c^2 / \varepsilon$ = 3.2395716x10^4 photons or 0.032395716x10^6 photons

Where, energy of a photon = 1.49159172x10^{-33} erg.

For chlorophyll – a, $C_{55}H_{72}O_5N_4Mg$ of molecular weight 893.2351, and considering the value π_o = 3.141592654 at rest & π_e at excited = 3.15293853 in the equation (33), (35) respectively, we get,

$(\sigma'_0 - \sigma'_e)c^2 / \varepsilon$ = 0.032395716x10^6 photons. Let,

ν'_n = ½ [n^2 x 0.032395716x10^6 photons / 2 x √(3/2) x Å^2] x frequency of a photon ($\overline{\nu}$) …..(P)

Or, $\nu'_n = n^2 \times 0.149537 \times 10^{14}$ Hz.
Here, Å = Armstrong (10^{-8} cm), angular quantum number ($\sqrt{j} = \sqrt{(l \pm ½)}$, l = 1,2,3,4….., when l = 1, then, $\sqrt{j} = \sqrt{3/2}$), Frequency of a photon = $\bar{\nu}$ = $2.251093763 \times 10^{-7}$ Hz.

Now the frequency of $0.03254320541 \times 10^6$ photons is 0.00732578 Hz, when these photons keep in a box Å^2 (10^{-16} cm), then we get, 0.732578×10^{14} Hz and corresponding wavelength will 409.23 µm at the initial stage, for progressing to next step and then to next, these photons will follow the equation (P). In reference, we see that, absorption of chlorophyll – a at the starting peak is 410nm or 410 µm which touch the calculated result.

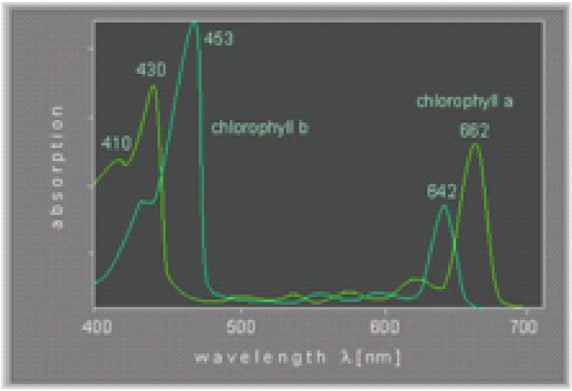
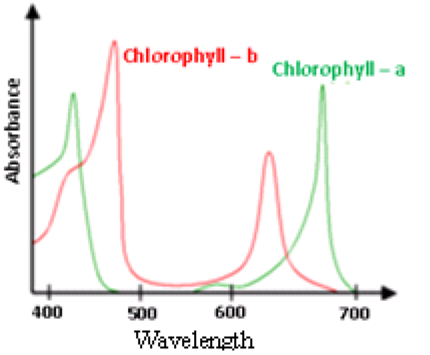


Figure – 1

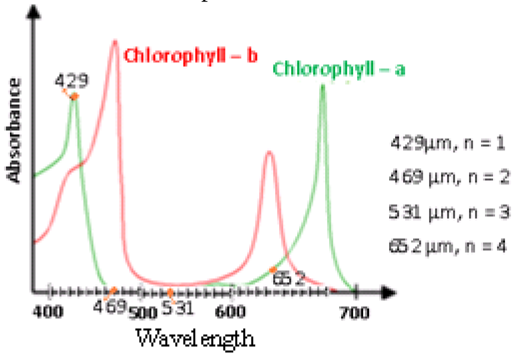
The wavelength of chlorophyll – a is 429µm [4], which take place at the peaks in the region of blue-violet. In terms of frequency is 6.9881×10^{14} Hz. If ν'_n shifted from ν, then according to quantum number (n), we will get new frequency as given here,

$\nu_1 = 6.9881 \times 10^{14}$ Hz - $1^2 \times 0.149537 \times 10^{14}$ Hz = 6.8386×10^{14} Hz = Violet = 429µm, n = 1
$\nu_2 = 6.9881 \times 10^{14}$ Hz - $2^2 \times 0.149537 \times 10^{14}$ Hz = 6.3900×10^{14} Hz = Blue = 469 µm, n = 2
$\nu_3 = 6.9881 \times 10^{14}$ Hz - $3^2 \times 0.149537 \times 10^{14}$ Hz = 5.6423×10^{14} Hz = Green = 531 µm, n = 3
$\nu_4 = 6.9881 \times 10^{14}$ Hz - $4^2 \times 0.149537 \times 10^{14}$ Hz = 4.5955×10^{14} Hz = Red = 652 µm, n = 4
$\nu_5 = 6.9881 \times 10^{14}$ Hz - $5^2 \times 0.149537 \times 10^{14}$ Hz = 3.2497×10^{14} Hz = Red = 922 µm, n = 5 (Blood Red)

The similarities of calculated results are given herewith an experimental result.



Experimental Results
(Reference: Chlorophyll from Wikipedia, the free encyclopedia)
Figure – 2



Calculated Result within graph is showing as orange dot tallying with Experimental Results
Figure – 3

(Method No. – 2)

When the molecular formula of chlorophyll – a is $C_{55}H_{72}O_5N_4Mg$, then we observed that, there are 55 carbon (carbon has 4 valency electrons) and if linked with 72 hydrogen (1 valency electrons), 5 oxygen (2 valency electrons), 4 nitrogen (3 valency electron), 1 magnesium (2 valency electrons). If 55x4 electrons of carbon absorbed by 72x1, 5x2, 4x3, 1x2 electrons of H, O, N, Mg, then rest of the electron of carbon may take place for occurring colors when each electron will produce 1000 photons during reaction with quantum number in a small box of length 1 Å (10^{-8} cm).

So, in this compound 124 electrons are present. Since, out of 124 electrons, few electrons will function for emitting colors from chlorophyll in which the carbon will take main part. When carbon has 4 valency electrons, then we can consider 124/4 = 31 electrons will take part to produce color. If one electron able to produce 1000 photons, then, 31 electros will produce 31000 photons. So, we can follow equation (P) as given here:

$\nu'_n = ½ [n^2 \text{ x } 0.031\text{x}10^6 \text{ photons} / 2 \text{ x } \sqrt{(3/2)} \text{ x } Å^2] \text{ x frequency of a photon } (\bar{\nu})$ .....(P)

Or, $\nu'_n = n^2 \text{ x } 0.1424459\text{x}10^{14}$ Hz.

$\nu_1 = 6.8457\text{x}10^{14}$ Hz - 1^2x $0.1424459\text{x}10^{14}$ Hz = $6.8457\text{x}10^{14}$ Hz = Violet = 437.9μm, n = 1

$\nu_2 = 6.9881\text{x}10^{14}$ Hz - 2^2x $0.1424459\text{x}10^{14}$ Hz = $6.4183\text{x}10^{14}$ Hz = Blue = 467.1 μm, n = 2

$\nu_3 = 6.9881\text{x}10^{14}$ Hz – 3^2x $0.1424459\text{x}10^{14}$ Hz = $5.7061\text{x}10^{14}$ Hz = Green = 525.5 μm, n = 3

$\nu_4 = 6.9881\text{x}10^{14}$ Hz – 4^2x $1424459\text{x}10^{14}$ Hz = $4.7090\text{x}10^{14}$ Hz = Red = 636.6 μm, n = 4

$\nu_5 = 6.9881\text{x}10^{14}$ Hz – 5^2x $1424459\text{x}10^{14}$ Hz = $3.4270\text{x}10^{14}$ Hz = Red = 874.8 μm, n = 5

(Blood Red).

The frequency ranges of visible spectrum are given here to compare calculated results.

7.69 – 6.59 x10^{14} Hz = Violet (difference of frequency = 1.1x10^{14} Hz)

6.59 – 6.10 x10^{14} Hz = Blue (difference of frequency = 0.49x10^{14} Hz)

6.10 – 5.20 x10^{14} Hz = Green (difference of frequency = 0.9x10^{14} Hz)

5.20 – 5.03 x10^{14} Hz = Yellow (difference of frequency = 0.17x10^{14} Hz)

5.03 – 4.82 x10^{14} Hz = Orange (difference of frequency = 0.21x10^{14} Hz)

4.82 – 3.87 x10^{14} Hz = Red (difference of frequency = 0.95x10^{14} Hz)

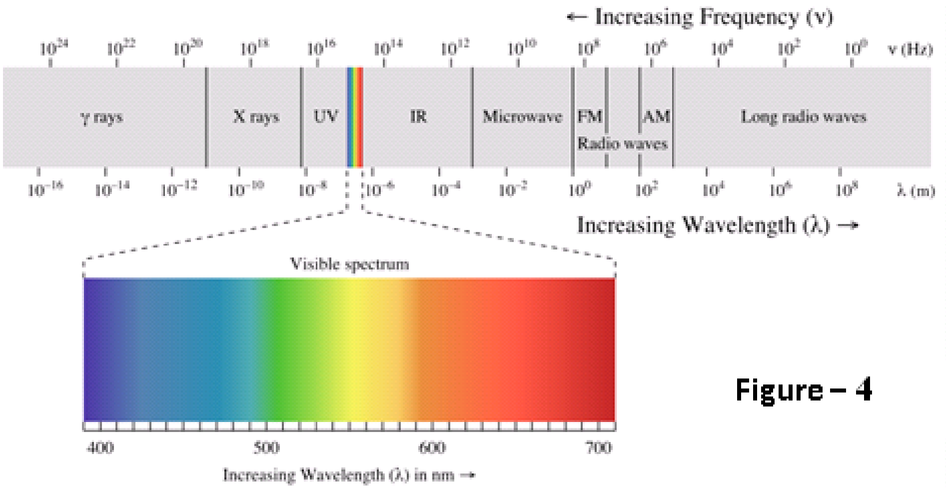
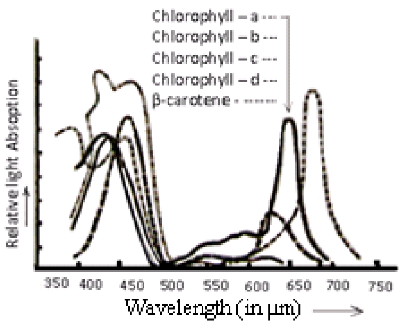


Figure – 4

The intermediate frequency of the equation (P) ν'_n is 0.149537 x10^{14} Hz when quantum number n = 1. The difference of frequency of Yellow in visible spectrum is 0.17x10^{14} Hz which may creator of all color as 0.149537 x10^{14} Hz within this range and on changing quantum number, other colors will visible. The difference between two frequencies is 2.0463x10^{12} Hz. The above difference of frequencies is in infrared region in electromagnetic spectrum [5].

From the above two method by using energy of a photon of mass 1.659x10^{-54} gm, we observed that it does not touch the yellow and orange spectra which tallied to traditional view. According to reference, maximum absorption of chlorophyll – a takes place in the region of blue – violet with picks at about 429 nm or 429μm and the next maximum is in the red region of about 642 nm and 660 nm. Chlorophyll – a show there distinct from the bands on the basis of their maximum absorption in the red. They are chlorophyll – a 670, 683 and 695 nm [6].



Showing the patterns of energy absorption among chlorophyll and β-carotene

Figure – 5

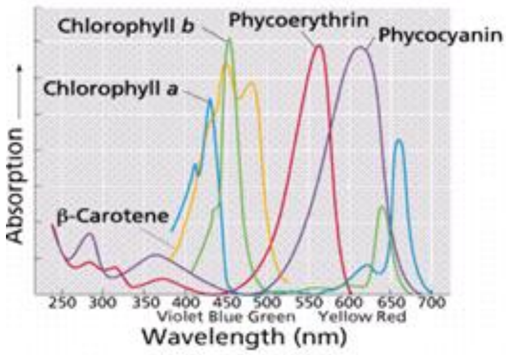


Figure – 6

The absorption maxima of chlorophyll a are λ= 430 and λ = 662 nm [7]

Frequency of a photon = $\bar{\nu}$ (say) = 2.251093763x10^{-7} Hz. So, 0.03239571617x10^{6} photons, ν = 0.00729252579 Hz. If we keep in a box one $Å^2$ (=10^{-16} cm). then we get 0.729252579x10^{14} Hz or 411.895 μm which may follow quantum numbers as n^2 and square root of angular quantum number (√*j* = √(*l* ± ½), *l* = 1,2,3,4….., when *l* = 1, then, √*j* = √ 3/2), if this frequency acts with its original frequency from lower state to higher state or higher to lower position in spectrum, then we can analyze the intermediate frequencies which may be the cause of shifting of colors from one to next step in the form of followings:

ν'_n = ½ [n^2 x 0.03239571617x10^6 photons / 2 x √(3/2) x $Å^2$] x frequency of a photon ($\bar{\nu}$) …..(P)
Or, ν'_n = n^2 x 0.1488591549x10^{14} Hz, when, n = 1 and *l* = 1
Special plant lights increase the amount of light of this wavelength that they produce. But a 400-500 nm wavelength bulb wouldn't be enough, since many plants take cues for germination, flowering, and growth from the presence of red light as well. Good plant lights produce red light as well, giving plants all the wavelengths of light they need for proper growth.
Calculation is showing that good action may take place from λ = 411.895 μm. The absorption maxima of chlorophyll a are λ= 430 and λ = 662 nm.

II. Conclusion

The mass or energy of photon is creator of all things; in view it is the main reason to create the unification of physics and complete unified theory in very simple way.

References

[1] Nirmalendu Das, Internal functions of matter (*m*) of Einstein equation, $E = mc^2$ and emission of energy (*E*) after finding the mass of a photon, graviton and Equation of Unification of Physics, International Journal of Science and Research, Volume 3, Issue 6, June 2014, www.ijsr.net

[2] Nirmalendu Das, An idea of new system to alert all living bodies before Earthquake Structure of Electron, International Journal of Science and Research, Volume 4, Issue 5, May, 2015, www.ijsr.net

[3], [4] [5] Debabrata Mitra, Department of Botany, Anandamohan College, Calcutta, Jibesh Ghuha, Department of Botany, Surendra Nath College, Calcutta, *Studies in Botany (Vol-2)*, Moulik Library, 18-B, Shymacharan De Street, Calcutta- 700073, First Edition – 1968, reprinted 1990, P-132, 138.

[6] Marcelo Alonso, *Fundamental University Physics, Vol – II,* Fields and Waves, Department of Scientific Affairs, Organization of American States, Edward J. Finn, Department of Physics, Georgetown University, Addition – Wesley – Publishing Company, Tenth Printing, 1979.

[7] At which wavelength does maximum Photosynthesis take place? UCBS science line, from internet.