ORIGINAL RESEARCH PAPER

Physics

PHOTON ENERGY VARIANCE CAUSE OF TEMPERATURE GRADIENT ON ATMOSPHERIC AND SAMPLE MOLECULES

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ABSTRACT

Photon is a kind of energy that may be visible or invisible, at infrared range we can't see but at visible it seemed. Photon has no mass it has energy in the range of electromagnetic radiation. Temperature of an object determines the intensity of electromagnetic radiation. Photons at different frequencies travel like wave nature. When photon hit any matter/material it get absorbed by same matter and get accentuation hence photon energy slow down while penetrating the material(material denoted as temperature). Natural atmosphere observation and experimental methods like absorption spectroscopy used to identify the attenuation coefficient via absorption value. X-ray fluorescence (XRF) is one such method used to define the elemental composition at the same time one can know excited atomic ions followed by transition among K shell, L shell and M shell. These transition shows fluorescent spectrum through by one can note absorption coefficient. Accentuation concept here used to derive novel photon energy equation.

INTRODUCTION

Energy is a property of all matter and is observed indirectly through changes in physical object's speed, mass, position and so forth.[1]. The word energy has a primary place in the subject of physics and all known concepts, dominated mechanical perspective of nature also embracing heat and light combined with mechanics in a single conceptual structure.[2] Photon are the mass less particle of light. Photons are electromagnetic spectrum having lower and higher form of energy. Photons are emitted by source like sun due to its temperature.

Temperature reflects the average kinetic energy of the vibrating and colliding atoms making up a substance. Temperature can be expressed on different perspectives. The modern meaning of temperature is somewhat change when comparing to the traditional concept. The temperature may be introduced for system built of small number of particles and particles at rest. The structure of temperature visible through state of matter ie (solid, liquid, gas and plasma)[3]

Absorption of electromagnetic radiation happens when matter (electron bound in atoms) picks photon's energy and transforms electromagnetic energy into internal energy of the matter. Here internal energy means vibration motion of atoms/matter. Absorption intensity changes as a function of frequency and absorption spectrums noticed due to change in intensity.

Attenuation of radiation occurs due to effect of absorption of electromagnetic radiation by matter. When light waves propagate through the matter its intensity will get reduced gradually this phenomena is called attenuation. Proton induced x-ray emission (PIXE), high energy gamma photon-ray fluorescent (XRF) so on., techniques are used to determine the accentuation coefficients.[4]

The subject of this article explains how photon energy varies (slow down) when it interacts with matter. Matter is a disorder of system means it may be solid, liquid, gas or plasma. Hence we consider the term matter as temperature so as to derive new equation for photon energy.

Case A Temperature and Energy

An object emits electromagnetic radiation depends on its temperature. Atomic electrons vibrate faster means having higher temperature and shorter its wavelength that emits radiation. On other atomic electrons vibrate slower means having lower temperature and longer its wavelength that emits radiation.

The basic unit of electromagnetic radiation is the photon; it has smallest energy at a particular wavelength. Photon has no mass but move like waves with speed of light 3,00,000km/sec.[5]

Photon energies represent electromagnetic spectrum. Photons are created by source that emits electromagnetic waves. Electron volts (eV) are used to measure its energy. Higher the photon energy, then higher its frequency.

The sun temperature at core is approximately equal to 15.7 million Kelvin. The mass-energy conversion rate of 4.26 million metric tons per second the sun releases as energy. The next to the sun core is radiation zone and these layers hotter and dense enough to send out the intense heat radiation. These solar radiation are electromagnetic waves having different energies called photons.[6]

Gamma rays below 0.01 nm (wavelength) having temperature above 10^8 K (Kelvin). The temperature of x rays of 10^6-10^8 with0.01-20nm while 20-400nm of ultra-violet having temperature on range 10^3-10^4 K. Regarding visible light it has 400-700nm at temperature 10^3-10^4 k. The temperature of 10-10^3k on infra-red is 10-^{3}-10-^{6}nm. The micro wave and radio wave have temperature of less than 10k and their wavelength at 10-^{6}-10-^{9}nm and more than 10-9nm respectively.[7]

Case B Atmospheric Molecules and Energy

The structure of atmosphere at lowest 100km with temperature is divided into layer in vertical wise. The range of temperatures variation from 150k to 300k between atmospheric layers. Up to about 15km from ground is known as troposphere. The next layer is called stratosphere with about 50km altitude. The higher the layer up to 100km is known as mesosphere.

Electromagnetic radiation travel through the atmosphere without block referred as transmittivity but some radiation not at all passes through it. The atmosphere containing gases absorb radiation at particular wavelength and allow radiation at different wavelength while passing through the atmosphere.

The atmospheric gases like water vapor carbon dioxide and ozone absorbs the areas of electromagnetic spectrum are called absorption bands. The solar energy that get absorbed are re-radiated then in the form of long wave radiation (infrared waves) on contrary the atmosphere is transparent (small or no absorption of radiation) for specific wavelength in the areas of electromagnetic spectrum. Such wavelength bands are called as atmospheric windows. Here the radiation easily pass through atmosphere and enter earth's surface.

The atmosphere reflects about 29 percent of incoming solar radiation to the space back by means of clouds and

atmospheric particles. Approximately 23 percent of solar energy absorbed by atmosphere through water vapor and ozone and remaining 48 percent absorbed through the surface. The total absorption of solar radiation by earth planet nearly stood at 71 percent. [8]

Solar energy get weakens by the atmosphere in the process of absorption through molecules and particles. The atmosphere containing molecules reduce the solar intensity before reaching the earth. Thus atmospheric absorption attenuate the solar radiation before enter the land surface.

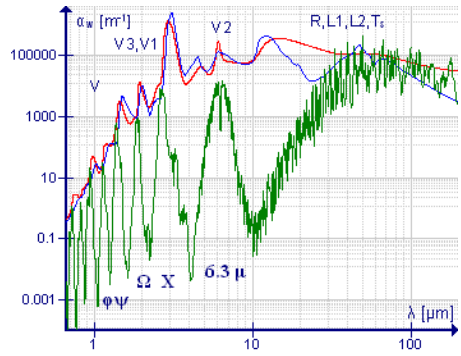

Figure.1.Absorption spectrum (attenuation coefficient vs. wavelength) of liquid water (red), atmospheric water vapor (green) and ice (blue line) between 667 nm and 200 m .

A report that clouds occupies its place in stratosphere, troposphere and mesosphere. The clouds are very important system that influences the radiation process. Clouds cover wide area (very large) of the earth's surface. Cloud interact with the incoming solar radiation nearly 25 percent get reflected back to space. The temperature of cloud determines the absorption and emission of solar radiation. Clouds having more particles reflect more solar radiation and clouds having less particles reflects small amount of radiation. This hold true for water and ice clouds. [9]

Case C Sample Molecules and Energy

The differences in the spectrum of several ice preparations compared with spectrum of liquid water dependent of temperature. To know the hydrogen bond structure of water and ice the techniques used is x-ray absorption spectroscopy (XAS). The method uses photon energies to excite electrons thereafter note spectrum of the sample. At different temperatures of ice and water there is difference in their absorption cross sections. The difference of spectrum is calculated by the data in between 530 and 560eV. The four different temperatures of XAS of water is 535eV at one of the edge (excitation). In the case of ice there is increase in absorption cross section between 544 and 548 on an edge [10]

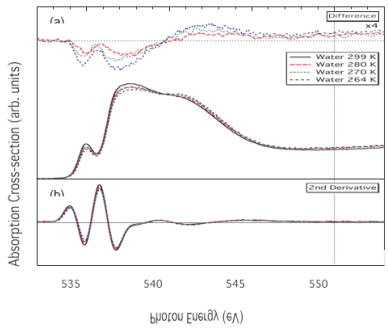

Figure.2 X-ray absorption spectra of liquid water

Accentuation coefficient is an important concept that describes the framework of this article. Before defining the above content let explain several notion of light. While light interact with material it can be transmitted, reflected or absorbed. The light bounce off when it reflected and not goes inside the material, the transmission light pass through the material comes other side of it. The case of absorption the light changed into heat inside the material therefore not visible.

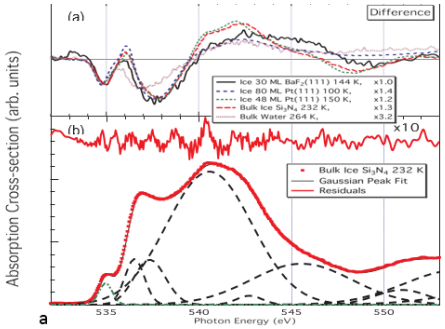

Figure.3.X-ray absorption spectra of ice

The attenuation coefficient of a volume is the addition of absorption coefficient and scattering coefficient

$\mu=\mu a+\mu s$

The absorption coefficient is the thickness of material that absorbs some amount of light. The absorption coefficient is higher when the material absorbs more light. The absorption coefficient measurements that vary depend upon different wavelength of light and different materials.

The scattering coefficient measures the radiation pass through a material that deviates from the straight path. The intensity of incident light with volume of interaction region will increases the intensity of scattering light [11]

An aligned beam passes through a material (volume) the beam intensity get reduced because of absorption and scattering. Radiation of beam is reduced (slow down) when it passes through a specific material is called attenuation coefficient.

A report of x ray spectrum used to found attenuation value. Attenuation coefficient was measured while photon interaction with matter of mercury, when thickness of mercury increases then accentuation coefficient slightly decreases and these attenuation coefficient variations coincide with other report. [12]

DISCUSSION

The reviews of atmospheric absorption clearly show that in clouds, water molecules absorb more radiation than ice molecules thus confirmed by similar studies. Regarding reviews of sample absorption only more energetic photon is absorbed by ice this means the water molecules absorb even less energetic photon than ice thus revealed by similar studies. Therefore reviews of both atmospheric molecules and sample molecules show that water absorption of radiation is more compared to ice molecules. Absorption denotes attenuation therefore energy of photon slow down when interact with the state of matter (ie temperature)

Temperature is the measure of heat, density is the measure of how closely any given substance is stuffed thus it's the ratio of the mass of the substance to its volume. While the temperature and density has a relation that inversely proportional hence as density increases the temperature decreases and vice versa and as temperature increases then density reduces and vice versa.

Temperature create pressure and pressure affect temperature both of these hold true in space and laboratory experiment hence we neglect pressure in this article. We say thickness of material (density) depends upon the state of matter (temperature) since density is explained through temperature; hence we neglect density in this article.

Pressure is the measure of force acting on a particular unit area. There is direct relation between pressure and density. As pressure increase density increases as pressure decreases density decreases as density increases pressure increases as density decreases pressure decreases.

A solid ice temperature varies like the temperature of any other solid. Also the temperature of water varies between 32 and 212 degrees. The range of temperature of ice starts at 32 degree and decreases below it.

X-ray absorption rate changes with different temperature (state of matter) by virtue of spectrum. When x-rays pass through the material (different state of matter ie temperature) the x ray photon attenuate (slow down) in the material. (whether solid, liquid or gas) .Thus photon energy varies cause of temperature changes. The state of matter (material) here called as temperature. The material may be any kind of chemical elements with its states of matter named as temperature.

A structural relativistic energy relies upon on mass and its momentum. The structural expansion of Einstein equation as follows

$E_{rel}=moc^2+pc^2$

Here mo=rest mass; pc^2=momentum

The equation diminishes to $E_{rel}=mc^2$ for the momentum p value become zero.

When considering photon the mass is equal to zero while the equation becomes

$E_{rel}=pc$

Hence quantum mechanics characterize the relativistic energy of photon with inclusion of temperature variation towards the equation. Since accordingly E_{rel}= pc+ T

Hence E_{rel}=pc+ T

Where T represents temperature and T denotes temperature variation.

The direct photon energy formula changes from E=hf to E=hf+ T

So E=hf+ T means photon energy summed with temperature variance.

E=photon energy; h=Planck's constant; f=electromagnetic frequency; T=variation in temperature.

To unify all the chemical elements or molecules and its different states of matter so as to justify under one equation for photon energy that pass through different states of matter (temperature) in atmosphere or sample molecules.

CONCLUSION

It has common to say about electromagnetic radiation when higher the energy of incident photon and less dense the material subsequently lower will be attenuation coefficient. Accentuation denotes when a beam of pure photon energy is considered then accentuation happens in an exponential form. In this form low percentage of photons in a beam get accentuate in less thickness of material where high percentage of photons get accentuates in more thickness of material. Again thickness is density and density is temperature.

We know the basic concepts of several experiments like refractive indices, absorption coefficient and re-radiation all that related to light. Each element or molecules have its specific (distinct) values for above mentioned experimental process. For example absorption depicts the attenuation which means the energy variation of photon.

Scientists exploring unknown chemical elements and finding number of atmospheres having different temperatures in exo-planets and in space. Graviton is a unit of gravity being debate among researchers. The photon energy in the electromagnetic spectrum will have to interact with multiple particles (particles named as state of matter or temperature)in future years, since the significances on studies of photon energy.

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