Observation Of UV-VIS Spectrophotometer Study On Ethanolic Leaves Of Guyabano

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***Abstract*:** The**potential of medical leaves of Guyabano (Annonamuricata) were studied on very diluted method concentrate in ethanol, observed by UV-Vis Spectrophotometer. In this method a spectrophotometer measures the amount of light absorbed energy in the form of ultraviolet or visible light by a sample solution. These techniques are mostly used to measure the concentration of solutes in solution by measuring the amount of light that is absorbed by the solution in a cuvette. The concentration of chemical solution can also be determined by measuring the intensity of light detected by using Beer's Lambert Law. The result showed that the transmittance detection wavelength was observed in 665 nm and the concentration range of ethanol at higher in absorption peak maximum was280 nm and 665 nm. In this research also estimated the optical band gap energy of nanomaterial from absorbance data by using Tauc method. This maximum absorbance is important for measuring bacteria growth. The ionizing effect of UV radiation can kill most bacteria. This plant is potential source of natural antioxidants for human body. The findings indicated that Guyabano leaf was a potential source of highly nutritious ingredients and phytomedicine.**

Keywords—Guyabano, Beer's Lambert Law, UV-Vis spectrophotometer, absorbance

I. INTRODUCTION

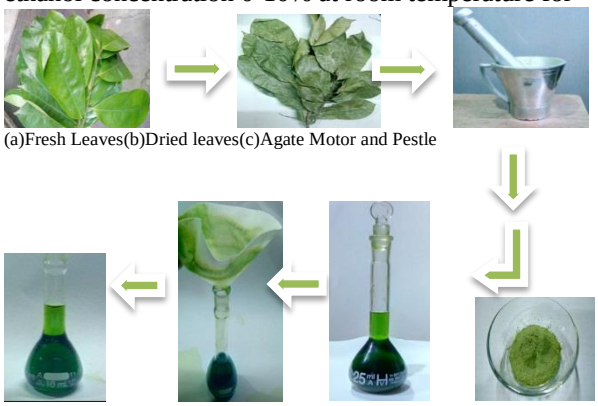
The Medical plants are great importance to the health of individuals and communities. The medical value of these plants lies in some chemical substances that produce a definite physiological action on the human body. The most importance of these bioactive constituents of plant are alkaloids, tannins, flavonoids and phenolic compounds, which are rich in antioxidant activity. One of the important herbal plant was Guyabano commonly called Soursop and Myanmar name is Du-yinn-Aw-Zar, which attracts greater attention because it has high medical value both in herbal folklore practices and also the lack of adequate information on the nature of bioactive principle. The observations of ethanolic leaves extract were studied by UV-Vis 2600PlusSpectrophotometer.This measurement helps in characterizing absorption and transmission of materials. The measurement of transmittance of ethanol extract using 10 mm square cell. In this study the concentration of solutes in solution by measuring the amount of light that is absorbed by the solution in the cuvette. A spectrophotometer measures the amount of light absorbed energy in the form of ultraviolet or visible light by a sample solution.The Guyabano is an evergreen plant that is mostly found in tropical, subtropical regions of the world and in the West Indies, North and South America, lowland of Africa, Pacific islands, and Southeast Asia from sea level to altitudes of around 1150 meters. It is cultivated mainly in home gardens. Its high antioxidant and anticancer compounds, the leaves composition of this plant include polysaccharide, protein, glycosaponin, phenolic, and flavonoid showed medical properties as antioxidant agent. The leaves are rich in annonaceous acetogenin, the most potent anticancer compound. In ancient time, it had been used as herbal remedies in treating diabetes, hypertension, fever, vomiting and against worm. It also has been used in treating headaches, cough, and asthma as a sedative. The Guyabano tree with maturing fruits and ripe heart shaped fruit were showed in Figure 1.

Figure.1 GuyabanoTree with Maturing Fruits and Ripe Heart Shaped Fruit

II. SAMPLE COLLECTION AND PREPARATION

The Guyabano leaves were obtained from Daga city, near Pathein, Ayeyarwaddy Region, in Myanmar. The preparation of collected fresh leaves, dried leaves, grinding machine, fine powder, conical flat with solvent, filtering paper with solvent and conical flat with ethanol extracts were illustrated in Figure 2.The Guyabano leaves were separated from the stalk, washed and air dried at room temperature. After two weeks later, the dried leaves were crushed and ground into fine powder by using grinding machine.The plant leaves powder 0.5 gof the dry leaves were prepared by soaking in 25ml of absolute ethanol concentration test tube conical flat. The extracts were using different ratio of solvent to raw

material ratio in the range of 1:1 to 1:10 with different ethanol concentration 0-10% at room temperature for



(a)Fresh Leaves(b)Dried leaves(c)Agate Motor and Pestle

(f)Ethanol Extracts(e)Filter Paper with Conical Flat &Solvent(d)Powder

Figure .2Preparation of Soursop leaves Extraction

48hrs.The ethanol extracts were then filtered using filter paper and drop into the 10ml conical flat. The samples were measured by using UV-Vis spectrophotometer. A spectrophotometer measures the amount of photons (the intensity of light) absorbed after passing through sample solution, the amount of known chemical substance (concentration) can also be determined by measuring the intensity of light detected. These finding the scanning range were applied from 200 nm to 1000 nm passes through a solution in a cuvette.

III.MATERIAL AND METHODS

UV-Vis spectrophotometer techniques are mostly used to measure the concentration of solutes in solution by measuring the amount of light that is absorbed by the solution in the cuvette. A single monochromators UV-2600Plus is used for capable of a measurement wavelength range can be extended from 220 to 1400nm and providing low noise performance access.The optional ISR-2600Plus integrating sphere attachment is used. The UV-2600Plus is also equipped with Shimadzu's proprietary Lo-Ray-Light grade diffraction grating which achieves high efficiency and low stray light levels. Figure 3 shows photograph of data processing Shimadzu UV-Vis 2600Plus spectrophotometer, Kyoto, Japan. The concentration of solutes in solution by measuring the amount of light was determined by using high precision of this method. The concentration of a chemical solution can be determined by using Beer's Lambert Law. It states that the concentration of chemical solution is directly proportional to its absorption of light (absorbance of a solution). Each compound absorbs or transmits light over a certain range of wavelength. It has been established the greater the number of molecules that are capable of absorbing light at a certain wavelength. Molecules containing bonding and non-bonding electrons can absorb energy in the form of ultraviolet or visible light to excite these electrons to higher anti-bonding molecular orbitals. The system can measure from the ultraviolet region up to the near-infrared region, so the suppressed reflectance in the visible region is clearly evident. In this finding result equipped with data processing functions, including only peak detection of all-in-one software package.The quantitative measurements can be performed easily. A reference cell containing only solvent is used. Light is passed simultaneously through the sample cell and reference cell. The spectrometer compares the light passing through the sample with that passing through the reference cell. An emission source which produces the spectrum, an optical system collimates and disperses the spectrum. The detecting device measures the emitted lines intensities of radiation. After spectra are measured, the software can perform data processing automatically in conjunction with the raw data, and can then display there sults of peak detection and data operations. The evidence stronger absorption peak intensity was obtained in ethanol extract was observed at 240 nm and 665 nm. The standard equation for absorbance is in equation (1)

$$A = \varepsilon \times b \times c \quad \text{----------(1)}$$

Where $A$is the amount of light absorbed by the sample for a given wavelength, ε is the molar absorptivity, b is the distance that the light travels through the solution, and c is the concentration of absorbing species per unit volume.To convert a value from percent transmittance ($\%T$) to absorbance, can be use the following equation (2)

$$A = 2 - \log(T\%) \quad \text{----------(2)}$$

The concentration of an unknown coloured solution can be caculated the following equation (3).According to Beer's Law,

$$A = -\log T\%$$

$$\%T = \frac{I}{I_o} \times 100$$

$$A = -\log\frac{I}{I_o} \quad \text{----------(3)}$$

Where A is absorbance, I is the intensity of light transmitted through the sample solution and I_o is the intensity of incident light100% I_o is equal to 100.
Solving the equation (3) can get absorbance equation (4).

$$A = -(\log I - \log I_o)$$

$$= \log I_o - \log I$$

$$= \log(100) - \log I$$

$$A = 2 - \log I \quad \text{----------(4)}$$

Absorbance and transmittance are two related, but different quantities used in spectrometry. The main

Figure.3Photograph of Data Processing Shimadzu UV-Vis 2600Plus Spectrophotometer

difference between absorbance and transmittance is that absorbance measures how much of an incident light is

Figure. 4Flowchart of Annona Muricata .L Extraction Methodwith UV-Vis 2600Plus Spectrophotometer

absorbed when it travels in a material while transmittance measures how much of the light is transmitted.In the preparation of Annona Muricata .L extraction method the concentration in ethanol with UV-Vis 2600Plus spectrophotometer was illustrated in Figure 4.The optical band gap energy of nanomaterial was calculated from absorbance data by using Tauc and Davis-Mot relation in equation (5)

$$(\alpha h\nu)^n = K(h\nu - E_g) \text{ ----------(5)}$$

From the wavelength and absorbance data can convert to absorption coefficient(α), the exponent n represent the nature of transition for direct band gap material (n=2), K is energy independent constant, the incident photon energy ($h\nu$),the optical band energy (E_g) of material can be calculated from Max Plank's equation in equation (6)

$$E_g = h\nu = \frac{hc}{\lambda} \text{ ----------(6)}$$

The absorption spectrum was evident that the maximum absorption peak is at 665 nm. The transmission measurement of the sample is highly transparent to near-infrared light.

IV. Results and Discussion

In the UV-Vis spectrophotometer observation, the result showed that the attenuation of light to properties of material. It means that the concentration of a chemical is directly proportional to the absorbance of a solution and the intensity of light is proportional to the wavelength.In this result showed thatthe absorption spectrum was evident that the maximum absorption peak is at 665 nm. The transmission measurement of the sample is highly transparent to near-infrared light at 665nm illustrated in Figure (6) and (7). The scanning ranges were applied from 200 nm to 1000 nm passes through a solution in a cuvette in the spectrophotometer. The result of energy band gap of nanomaterial from UV-Vis absorption data using Tauc Plot method was obtained 4eV and plotted in Figure (8).

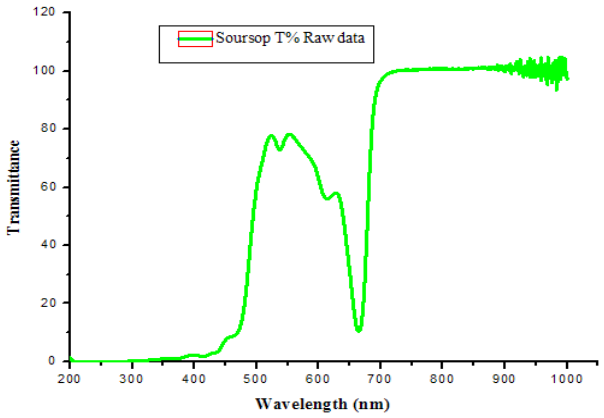


Figure .6 Treasmittision measurement of Soursop Raw Data

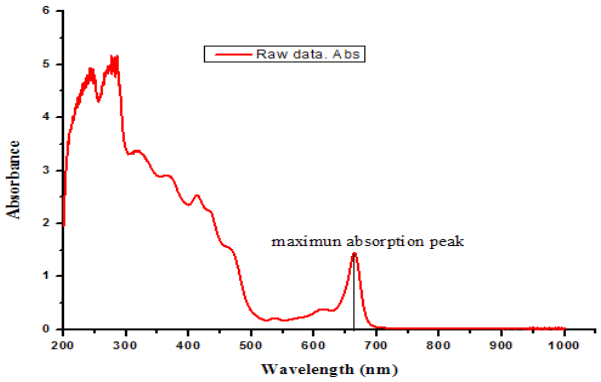


Figure .7 Maximum Absorption Peak of Soursop Leaves from Raw Data

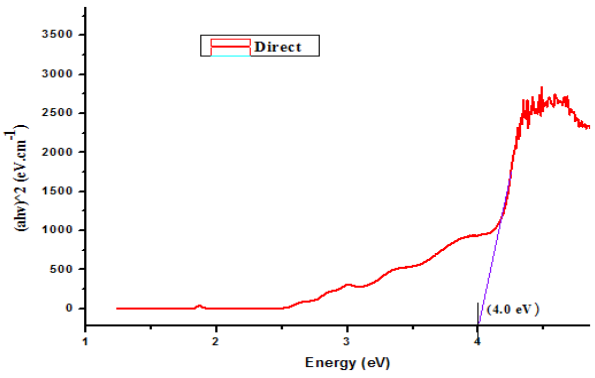


Figure.8 Energy band gap of nanomaterial from UV-Vis absorption data

In UV Visible spectrophotometer, a beam with wavelength varying between 180 nm and 1100 nm passes through a solution in a cuvette. The amount of light that is absorbed by the solution depends on the concentration, the path length of the light through the cuvette and how well the light absorbs at a certain wavelength. The intensity of light is proportional to the wavelength. The results showed that the concentration of a chemical is directly proportional to the absorbance of a solution. The value maximum absorbance is important for several reasons and the difference in energy between the valance band and the conduction band of a solid

material such as an insulator or semiconductor that consists of the range of energy value forbidden to the electrons in the material. In this observation, Sours of leaves have wide optical bend gap energy in the range between 2.5eV - 4eV,a useful predictor of wavelength of light that will absorbed by the material and concept to understand many phenomena associated with the nanomaterial.

V. CONCLUSIONS

The In this study, the observation of Soursop leaves in UV-Vis Spectrophotometer analysis, the result showed that amount of light that is absorbed by the solution depends on the concentration, the path length of the light through the cuvette and how well the light absorbs at a certain wave length. In this study the optical bad gap energy value of Guyabano leaves were estimated from absorption data using Beer's Lambert Law over Tauc plot method. The containing energy value in Guyabano leaves provide raw materials for many industries and herbal medicine promotion. Guyabano leaves offers ignificantly not only essential elements for living organisms but also medical benefits. Further studies will be conducted nutrient analysis and the potential of phytochemical constituents of Guyabano tree.

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