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Determination of the Effect of Sound on *Pandanus amaryalifolious* Leaves Extracts Using Spectroscopic Techniques

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ABSTRACT

In this work two samples of a (*Pandanus amaryalifolious*) leaves extracts, were exposed to sound waves length of (528 nm and 741 nm) while the third sample of the leaves was left without exposure to any sound. The effect of different wave lengths absorption shows a dramatic difference at the organic compounds and sulfur compounds of each sample, these differences were detected using spectroscopic techniques.

Introduction

Most of the information about our physical surrounding comes to us through our senses of hearing and sight, sound and light are waves. A wave is carries energy from one place to another without a transfer of mass. Sound is a mechanical wave produce by vibrating bodies, when (source)is set in to vibrational motion the surrounding air molecules are disturbed and are forced to follow the motion of the vibrating body. the vibrating molecules in turn transfer their motion to adjacent molecules causing the vibrational disturbance to propagate away from the frog when the air vibration reach the ear (receives)they cause the eardrum to vibrate, this produces nerve impulses that are interpreted by the brain [1,2].

The sound is transmitting according to a material medium between the source and the receiver and the distant. The sound transfer by compression and rarefaction in the medium initially by the vibrating sound source ,intensity of sound are determined by the magnitude of compression and rarefactions in the medium and frequency is measured in cycles per second and designated by (hertz)(1 Hz = 1 cycle per second).The distance between the nearest equal points on the sound wave is called the wave length (λ), we can circulate the speed of sound wave (v) by know the material that propagate the sound, in air at 20◦C the speed of sound is about 3.3 X 10^4 cm \sec and in water it is about 1.4 X 10^5 cm \sec , in general the relationship between frequency .

There are four important phenomena which described a sound waves reflection refraction, interference, and diffraction [3,4].

Material & Method

Apparatus

-Laser Source

Output power <200 mV, Wave length 405 nm

- USB 2000 Spectrometer

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Experiment Setup

The three leaves plant samples were placed as shown respectively at the USB2000 spectrometer.

The samples using USB2000 device to take the readings

Method

The three plants leaves were exposed to laser source, then the USB 2000 spectrometer were used as shown above. The USB2000 Spectrometer connects to a notebook or desktop PC via USB port or serial port. When connected to the USB port of a PC, the USB2000 draws power from the host PC, eliminating the need for an external power supply. Then readings were taken Spectroscopic techniques discipline that uses mathematics, statistics and formal logic (a) to design or select optimal experimental procedures; (b) to provide maximum relevant chemical information by analyzing chemical data; and (c) to obtain knowledge about chemical systems. Spectroscopic techniques excel by their possibility to gain rapid and accurate information from the high-resolution spectra of solid and liquid samples, The Spectroscopic techniques region of the electromagnetic spectrum extends from the end of the visible spectral region to the beginning of the fundamental infrared. The most prominent absorption bands occurring region are spectroscopic techniques related to the overtone and combination bonds of the fundamental molecular vibrations of C–H, N–H, O–H, and S–H functional groups observed in the mid-IR spectral region, most chemical and biochemical species exhibit unique absorption bands in the spectral region that can be used for both qualitative and quantitative purposes.

Conclusion

The results of signals wavelength detected from sample (1) and sample (3) showed great congruence fig (1) and (2). while sample (2) signal wave length has great stretching fig (3), this stretching is at combinations of (Ar –CH) in wave length (758nm), (N-H) third over tone at wave length (797 nm) and (N-H) third over tone at wave length (837 nm). The last fig. (4) shows the wave lengths for the three samples.

Item	Name	Description
1	SMA Connector	The SMA Connector secures the input fiber to the spectrometer. Light from the input fiber enters the optical bench through this connector.
2	Slit*	The Slit is a dark piece of material containing a rectangular aperture, which is mounted directly behind the SMA Connector. The size of the aperture regulates the amount of light that enters the optical bench and controls spectral resolution. You can also use the USB2000 without a Slit. In this configuration, the diameter of the fiber connected to the USB2000 determines the size of the entrance aperture. Only Ocean Optics technicians can change the Slit.
3	Filter*	The Filter is a device that restricts optical radiation to pre-determined wavelength regions. Light passes through the Filter before entering the optical bench. Both band pass and long pass filters are available to restrict radiation to certain wavelength regions. Only Ocean Optics technicians can change the Filter.
4	Collimating Mirror	The Collimating Mirror focuses light entering the optical bench towards the Grating of the spectrometer.Light enters the spectrometer, passes through the SMA Connector, Slit, and Filter, and then reflects off the Collimating Mirror onto the Grating.
5	Grating*	The Grating diffracts light from the Collimating Mirror and directs the diffracted light onto the Focusing Mirror. Gratings are available in different groove densities, allowing you to specify wavelength coverage and resolution in the spectrometer. Only Ocean Optics technicians can change the Grating.
6	Focusing Mirror	The Focusing Mirror receives light reflected from the Grating and focuses the light onto the CCD Detector or L2 Detector Collection Lens (depending on the spectrometer configuration).
7	L2 Detector Collection Lens*	The L2 Detector Collection Lens (optional) attaches to the CCD Detector. It focuses light from a tall slit onto the shorter CCD Detector elements.The L2 Detector Collection Lens should be used with large diameter slits or in applications with low light levels. It also improves efficiency by reducing the effects of stray light. Only Ocean Optics technicians can add or remove the L2 Detection Collection Lens.
8	CCD Detector (UV or VIS)	The CCD Detector collects the light received from the Focusing Mirror or L2 Detector Collection Lens and converts the optical signal to a digital signal.Each pixel on the CCD Detector responds to the wavelength of light that strikes it, creating a digital response. The spectrometer then transmits the digital signal to the OOIBase32 application

Results

Table 1. Wavelengths in (nm) and wave numbers in (cm^{-1}) of some near-infrared bands of organic compounds and sulfur compounds of sample 1

Stander Wavelength (nm)	Sample Wavelength (nm)	Stander Wavenumber(cm^{1})	Sample Wavenumber(cm^{-1})	Assignment
450–550	539	22222– 18182	18552.9	combination S–S stretching
600–700	643	16667–14286	15552.1	combination C–H stretching
600–700	663	16667–14286	15082.9	combination C–H stretching
600–700	689	16667–14286	14537.7	combination C–H stretching
701-849	714	14262-11779	14005.6	combination Ar-CHstretching
701-849	755	14262-11779	13245	combination Ar-CHstretching
775–850	775	12903–11765	12903.2	third overtone N–H stretching
775–850	796	12903–11765	12562.8	third overtone N–H stretching
775–850	837	12903–11765	11947.4	third overtone N–H stretching

Table 2. Wavelengths in (nm) and wave numbers in (cm^{-1}) of some near-infrared bands of organic compounds and sulfur compounds of sample 2

Stander Wavelength (nm)	Sample Wavelength (nm)	Stander Wavenumber(cm^{1})	Sample Wavenumber(cm^{-1})	Assignment
450–550	536	22222– 18182	18656.7	combination S–S stretching
450–550	572	22222– 18182	17482.5	combination S–S stretching
600–700	664	16667–14286	15060.2	combination C–H stretching
600–700	689	16667–14286	14537.7	combination C–H stretching
701-849	758	14262-11779	14513.8	combination Ar-CH stretching
701-849	797	12903–11765	12547.1	third overtone N–H stretching
775–850	837	12903–11765	11947.4	third overtone N–H stretching

Table 3. Wavelengths in (nm) and wave numbers in (cm^{-1}) of some near-infrared bands of organic compounds and sulfur compounds of sample 3

Stander Wavelength (nm)	Sample Wavelength (nm)	Stander Wavenumber(cm^{1})	Sample Wavenumber(cm^{-1})	Assignment
450–550	534	22222– 18182	18726.5	combination S–S stretching

450–550	568	22222– 18182	17605.6	combination S–S stretching
600–700	684	16667–14286	14619.8	combination C–H stretching
701-849	711	14262-11779	14064.7	combination Ar-CH stretching
701-849	766	14262-11779	13054.8	combination Ar-CH stretching
775–850	796	12903–11765	12562.8	third overtone N–H stretching
775–850	834	12903–11765	11990.4	third overtone N–H stretching

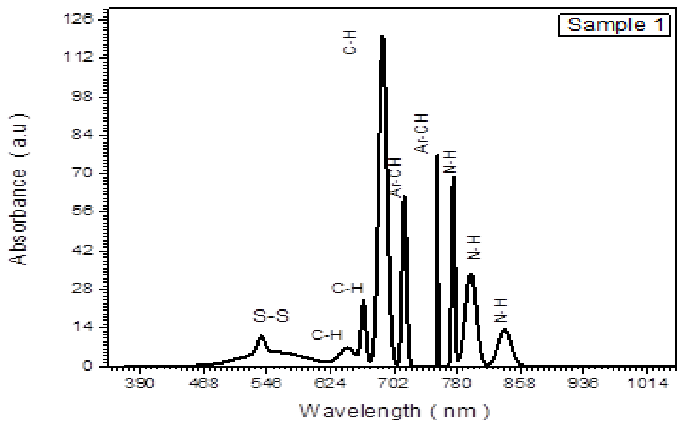

Fig 1.Wavelength spectra of plant (1) signals detected with laser. See the similarity of the signals produced with laser and those detected at room light.

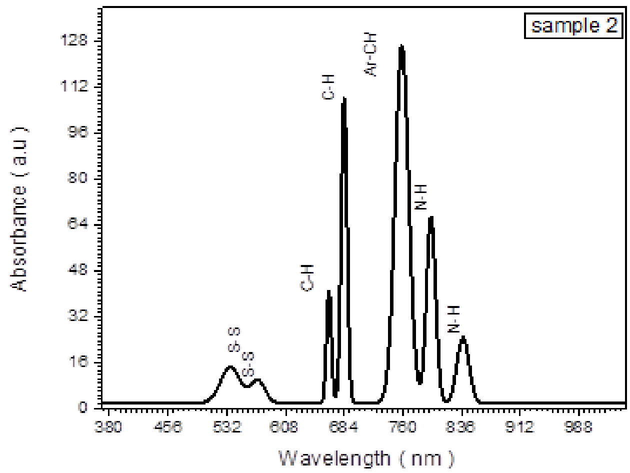

Fig 2. Wavelength spectra of plant (2) signals detected with laser. See the similarity of the signals produced with laser and those detected at room light.

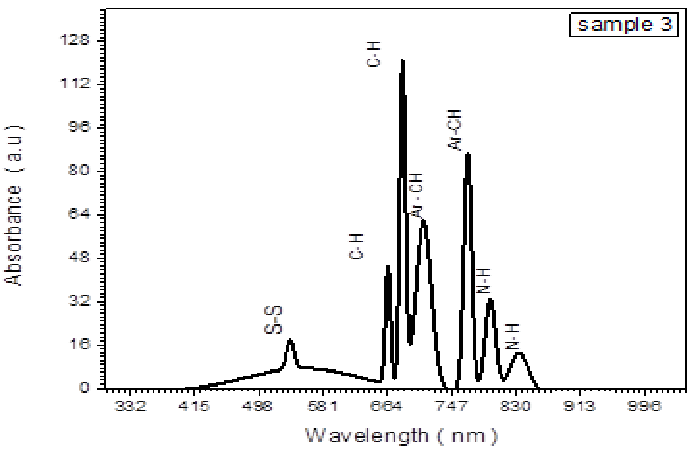

Fig 3. Wavelength spectra of plant (3) signals detected with laser. See the similarity of the signals produced with laser and those detected at room light.

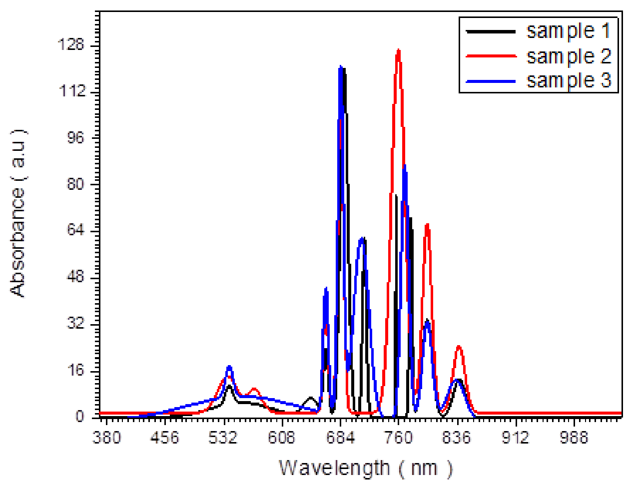

Fig 4. Wavelength spectra of three different sample of plant (1,2 and 3) exposit by different dose of radiation. Signals detected with laser. Note the similarity of the signals produced with laser and those detected at room light.

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