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ANALYSIS OF IR – SPECTROSCOPY BY USING DIFFERENT *NELUMBO NUCIFERA* SAMPLES

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ABSTRACT

The present paper deals with the analysis of IR – spectrum by *Nelumbo nucifera* flower and silver nanoparticles. Sepcies of *Nelumbo nucifera* flower reportedly used in traditional systems of medicine. Natural products, especially plants have been used for the treatment of various diseases for thousands of years. Three different types of compound were separated to different time intervals (C – I, C – II and C – III) using column chromatography and synthesis of Silver nanoparticles from *Nelumbo nucifera* flower. These compounds and silver nanoparticles tested for disc diffusion method this samples compound III and silver nanoparticles gave a maximum zone of inhibition. That samples analysis of IR – spectrum.The results identify the different functional groups. This IR- results alkene group (1635.64) present in all samples.This work concludes the particular functional group identify. That alkene group function for the inhibit the pathogenic organisms.

Keywords: Silver Nanoparticles, Column Chromatography, IR – Spectrum Analysis.

INTRODUCTION

Nelumbo nucifera Gaertn is a monogeneric plant belongs to family Nelumbonaceae, commonly known as sacred Indian lotus, rose of India, sacred water lily or East Indian lotus. *Nelumbo nucifera*is a perennial ornamental water plant grown in Asian countries for its edible rhizomes and seeds. The species *nucifera*is the most important (commercially and culturally), it is critical to describe the American species,

Pharmaceutical Name: *Nodus Nelumbinis Rhizomatis*
Family : *Nymphaeaceae* –Water lily
Genus : *Nelumbo*
Botanical Name : *Nelumbo nucifera Gaertn*
Common Names : *Sacred Lotus, East Indian Lotus*

Unlike the side effects and bad trips that can be caused by the use of mind-expanding drugs to obtain mystical experiences, the lotus is "friendly" to the body. The effects are always positive and never negative. Regardless of one's place on the evolutionary ladder, the lotus always leads higher evolution.

MATERIALS AND METHODS

Collection of plant samples

The plant *Nelumbo nucifera* Gaertn was collected from moist regions of Tiruchirappalli District and identified by local flora (Jamal Mohamed College in Botany Department). The flower were separated from the collected plant and dried under shade. After drying, it was powdered and used for our studies

Chromatography

Column chromatography is used to purify liquids by separating an organic solvent from a mixture of solvent.

Preparation of leaf extract

The leaf extract was prepared by grinding the mixture in mortar pistol containing 22 ml of acetone, 3ml petroleum ether and calcium carbonate. The pigments was filtered and mixed with 20 ml petroleum ether and 20ml of 10% aqueous sodium chloride solution. The separating funnel was shaken carefully and the lower layer was allowed to drain in to the beaker.

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Preparation of column

A plug of cotton is placed to the bottom of the column so that silica and soil won't fall out. Slurry of silica was prepared and poured into the column carefully. It is allowed to settle and sand is added.

Loading of sample

The sample was added using a pasture's pipette carefully above the sand. The eluent is added on top of the sand .The mobile phase slowly flows down through the silica gel column by gravity leaving behind zone of colour and a component was eluted from the column.

Synthesis of silver nanoparticles using plant extracts and compound [1]

10 g of *Nelumbo nucifera* flower were boiled in 100ml of distilled water contained in the conical flask. The resulting filtrate (12ml) was taken and treated with 88ml of aqueous 1 mM AgNO3 solution and incubated in dark condition, at room temperature. Appearance of brownish yellow coloured solution indicates the formation of AgNPs.

IR Spectrum Analyses [2]

FTIR relies on the fact that the most molecules absorb light in the infra-red region of the electromagnetic spectrum. This absorption corresponds specifically to the bonds present in the molecule. The frequency ranges are measured as wave numbers typically over the range 4000-600 cm -1.

Procedure

FTIR spectrum of the compound obtain from column chromatography was done using Shimadzu IR Affinity 1instrument.

Silver nanoparticles IR spectrum Analysis

Procedure

FTIR spectrum of the compound with Ag-NPs obtain from column chromatography was done using Shimadzu IR Affinity 1instrument.

RESULTS

The present study showed that different compounds were separated from *Nelumbo nucifera* crude by using column chromatography by different time intervals (C-I,:30 mins, C-II :2 hrs and C-III :4 hrs). These compounds tested for antibacterial activity by disc diffusion method. Plate – 6 showed that compound III gave a maximum zone of inhibition on pathogenic organisms.

Silver nanoparticles

In the earlier study quite astonishing fact observed during reduction reaction of the reaction medium shows clear conclusion of silver nanoparticles. The colour of the reaction medium gradually started changing to dark brown, which is due to the excitation of the surface Plasmon resonance during reduction reaction.

In the present study colour change of the aqueous flower extract by the addition of 1 mM $AgNo_3$ after different the reaction periods Zero hr, 12 hr and 24 hr were depicted in (plate – 8). The verification of the presence of the silver nanoparticles was done by observing the visible in the UV – illuminator analysis result. The compound III by addition of 0.01 mM $AgNo_3$ after reaction period were depicted in (plate – 9). The silver nanoparticle obtained was purified by centrifugation at 15000rpm for 20 minutes. The verification of the presence of the silver nanoparticles was done by observing UV – illuminator.

Infrared spectrum analysis

In present study Table –I and Figure - I showed that analysis of Infrared spectrum by *Nelumbo nucifera* flower powder (crude)

Table – II and Figure - II showed that the analysis Infrared spectrum by Silver nanoparticles in *Nelumbo nucifera* flower, Table – III and Figure - III showed that the analysis Infrared spectrum byCompound obtained column chromatography.

Table – IV and Figure - IV showed that the compared with all the three tables, the Alkenes (1635.64) present for three samples.

Table 1. Infrared spectrum analysis by *Nelumbo nucifera* Flower powder (crude)

S.NO	Peak value	Stretching	Interpretation
1.	422.41	-	Benzine
2.	509.21	C-Br Stretching	Bromine
3.	574.79	C-Br Stretching	Bromine
4.	669.30	C-ClStretching	Chlorine
5	792.74	N-HStretching	Amino group
6	1045.42	C-FStretching	Fluorine
7	1116.78	C-FStretching	Fluorine
8	1384.89	C-HStretching	Alkynes
9	1517.98	N-HStretching	Amino group
10	1562.34	N-HStretching	Amino group
11	1635.78	C=CStretching	Alkenes
12	1647.21	C-CStretching	Alkane

13	1712.79	C=OStretching	Amide group
14	1797.66	C=OStretching	Ester group
15	1855.52	C=O Stretching	Phenol
16	1878.67	C=OStretching	Ester group
17	2374.37	-C=C-Stretching	Alkynes
18	2854.65	C-HStretching	Alkanes
19	2924.09	C-H Stretching	Alkanes
20	3414.00	-N-H Stretching	Amines
21	3768.91	C-Br Stretching	Bromine

Table 2.Infrared spectrum analysis by Silver nanoparticles in *Nelumbo nucifera* flower

S.NO	Peak value	Stretching	Interpretation
1.	501.49	C-Br Stretching	Bromine
2.	667.37	C-ClStretching	Chlorine
3.	835.20	N-H Rocking	Amino group
4.	1024.20	-C-O- Stretching	Alcohols, ethers
5.	1116.78	C-F Stretching	Fluorine
6.	1382.96	C-H bending	Alkanes
7.	1525.69	-C-C- Stretching	Aromatic rings
8.	1566.20	-C-C- Stretching	Aromatic rings
9.	1635.78	C=CStretching	Alkenes
10.	2374.37	-C=C- Stretching	Alkynes
11.	2854.65	-C-H Stretching	Alkanes
12.	2924.09	C-H Stretching	Alkanes
13.	3429.43	-N-H Rocking	Amines
14.	3774.69	-N-H Rocking	Amines

Table 3. Infrared spectrum analysis byCompound obtained column chromatography

S.No	Peak Value	Stretching	Interpretation
1.	482.20	-	Benzene
2.	1635.64	C=CStretching	Alkenes
3.	3266.70	-O-h stretching	Hydrogen bonded alcohols and phenol group

Table 4. Infrared spectrum analysis compared with all the three tables

S.No	Peak Value	Stretching	Interpretation
1.	1635.64	C=CStretching	Alkenes

Figure 1. Column Chromatography: Compound III isolation from column chromatophy

Figure 2. Dry Compound III

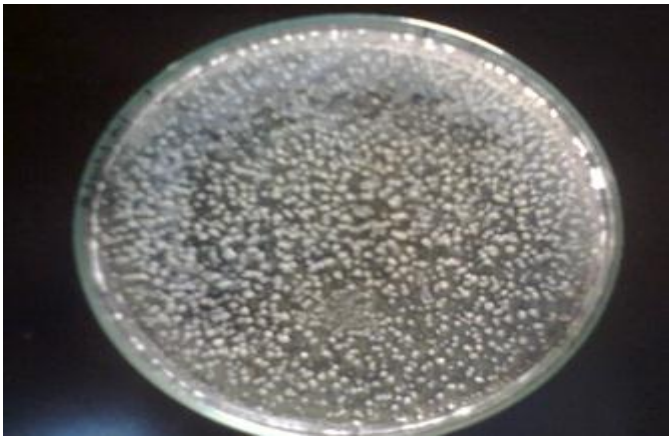
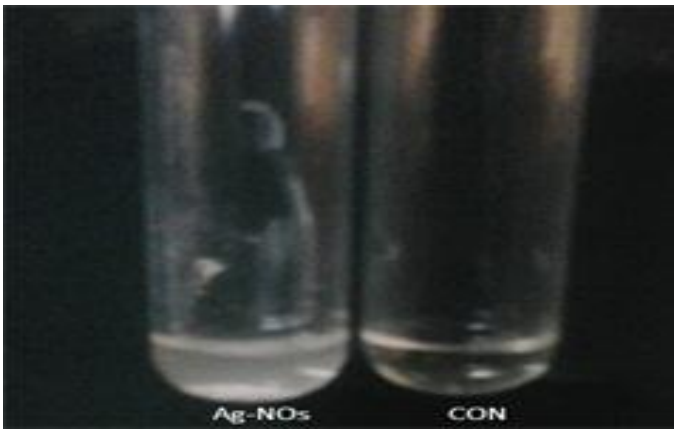


Figure 3. Synthesis of Silver nanoparticles from *Nelumbo nucifera* crude extract

CONTROL ZERO (hr) 12 – (hrs) 24 – (hrs)

Figure 4. Synthesis of Silver nanoparticles from *Nelumbo nucifera* compound III



Silver nanoparticles (Ag – NPs)

Figure 5. Infrared spectrum analysis by *Nelumbo nucifera* flower powder (crude)

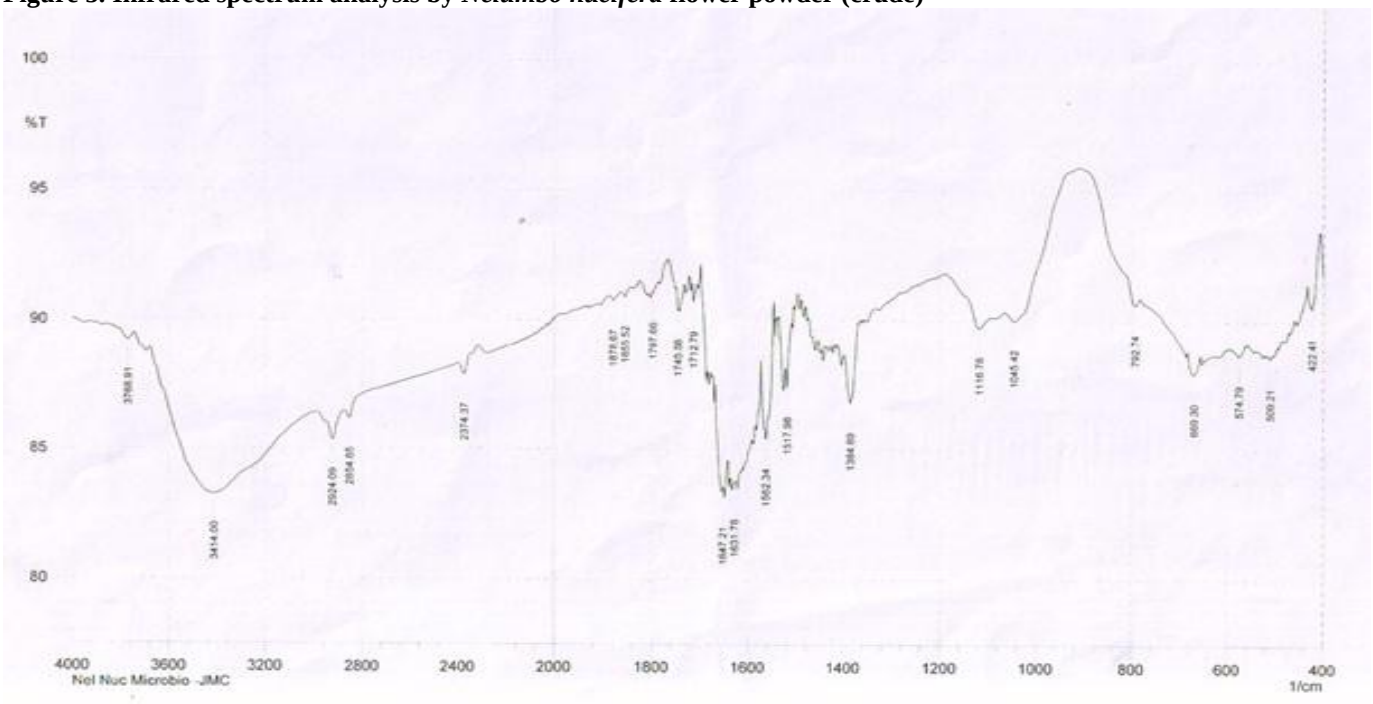


Figure 6. Infrared spectrum analysis by Silver nanoparticles in *Nelumbo nucifera* flower.

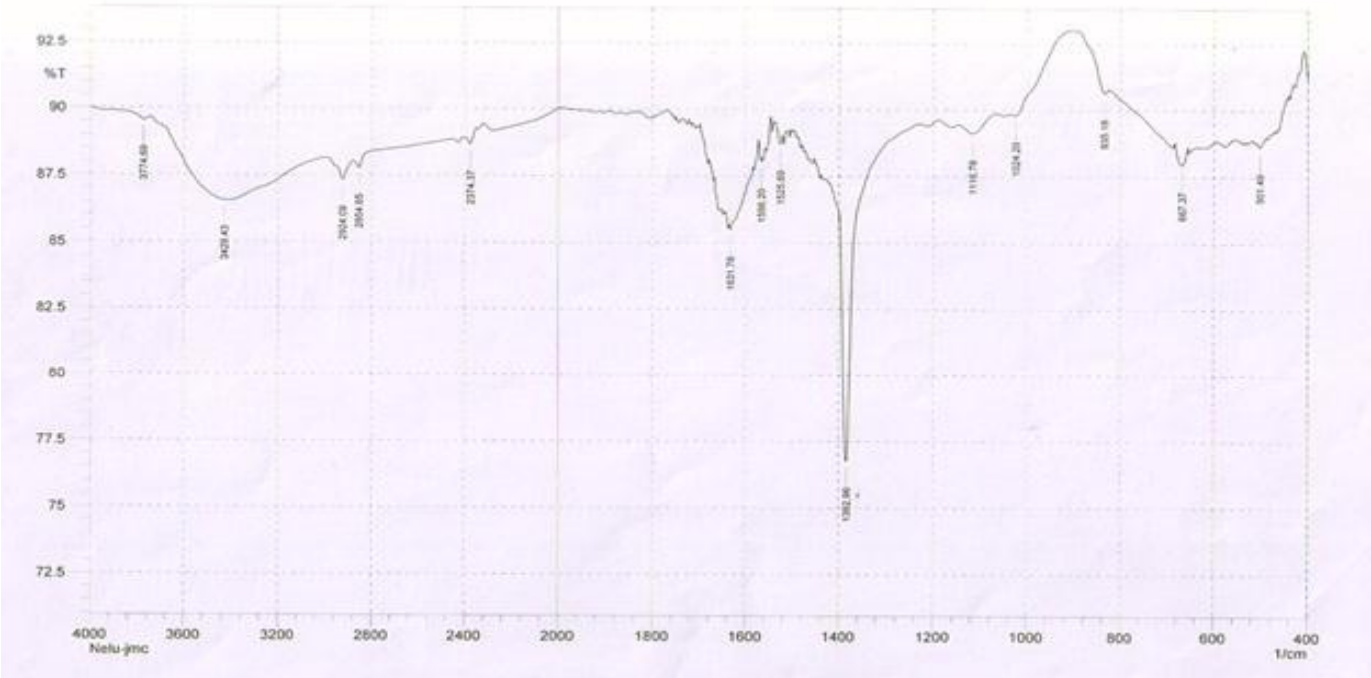
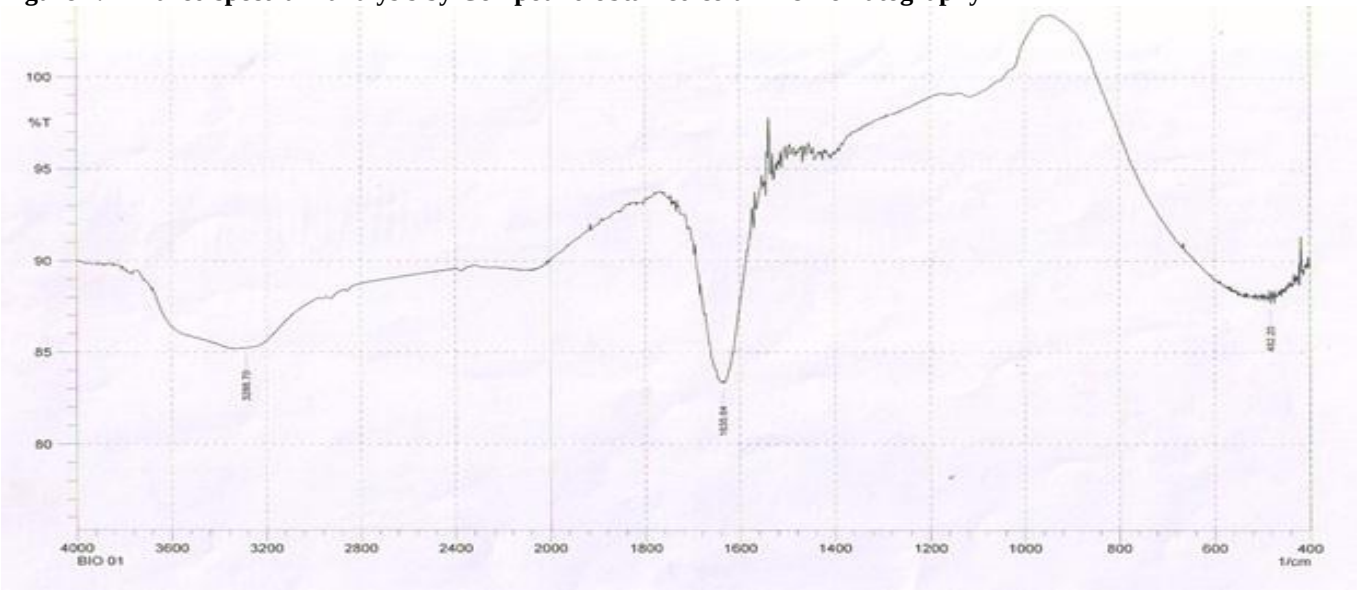


Figure 7. Infrared spectrum analysis by Compound obtained column chromatography



DISCUSSION AND CONCLUSION

In the earlier study Saengkhae *et al* [4,5]first found that the clarification activity Nelumbo *nucifera* flower has considerable reputation as a potent adjunct in the treatment of various ailments such as cancer, hypertension, diarrhoea, fever, weakness, infection and body heat imbalance.

In the earlier study quite astonishing fact observed during reduction reaction of the reaction medium shows clear conclusion of silver nanoparticles. The colour of the reaction medium gradually started changing to dark brown, which is due to the excitation of the surface Plasmon resonance during reduction reaction [6].

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