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**Phytochemical Screening by FTIR Spectroscopic analysis of *Tinospora cordifolia* plant Extract**

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**Dr. Prakash Solanki**

Department of Chemistry, Dr. Raghuvver shing Govt.College Sitamau Dist. Mandsaur M.P.

**Corresponding Author – Dr. Prakash Solanki**Email- [Enu.piyu04@gmail.com](mailto:Enu.piyu04@gmail.com)DOI- [10.5281/zenodo.10559227](https://doi.org/10.5281/zenodo.10559227)

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**Abstract:**

In the present research work, the extract of *Tinospora cordifolia* plant is studied by FTIR spectroscopy. Through FTIR spectroscopy, various functional compounds found in the extract are studied on the basis of peak values<sup>[1]</sup>. In this analysis, methanol was used to prepare the plant extract. Through this analysis, alcohol, secondary amine, alkane, carbon dioxide, aromatic compound, anhydride, conjugated ketone, nitro compound, carboxylic acid and sulphate have been identified in the extract of *Tinospora cordifolia* plant on the basis of their peak values. The results of the Present study generated the FTIR spectrum profile for the medicinally important plants of *Tinospora Cardifolia* can be used in the industry.

**Introduction:**

Medicinal plants are the richest bio-resources of folk medicines and traditional systems of medicine, and food supplements, pharmaceuticals industries and chemical entities for synthetic drugs<sup>[2]</sup>. Ayurveda has immense importance in India, Nepal and Sri Lanka, where about 85% of the population uses Ayurveda in the treatment of various diseases. Ayurveda is an ancient medical system through which the human body is protected from various diseases. The science that tells the best path for a healthy person and a patient is called Ayurveda. Turmeric and spices have been used in Ayurvedic medicine from ancient times till present. Medicinal Plant: Medicinal plants are those from which medicines are made from any part. Various types of medicinal plants have been used since ancient times for the treatment of human diseases. Some plants are wild from which medicines are obtained. Plants are a gift given by nature which play a special role in the human life cycle. Root, leaf, fruit, flower, stem, bark and seeds of the plant are used for the treatment of various diseases. The FTIR analysis of aqueous methanolic

plants extracts of *Tinospora cordifolia* for phytochemical compounds was done by.<sup>[3]</sup>

**Material and Methods****Plant materials and Extraction:**

The first step in performing the plant is preparing to sample to preserve the phytochemical of plant part (cell) before the extraction. The whole plant part is collected and kept in a dried polybag. *Tinospora cordifolia* plant part were collected from tahsil Pansemal, district Barwani M.P. India. *Tinospora cordifolia* plant part were separately cleaned and separately washed with distilled water. After completion of the cleaning and washing activity, the *Tinospora cordifolia* plant part were collected in a separately beaker. *Tinospora cordifolia* plant part were dried in Laboratory Room. *Tinospora cordifolia* plant part are converted into powder form with the help of a homogenized instrument and stored in the separately air-glass bottle till future use.

Soxhlet Extractor Method was used in ethanol extract preparation. The extract was filtered with Whatman paper. The liquid was collected and stored in a glass bottle.

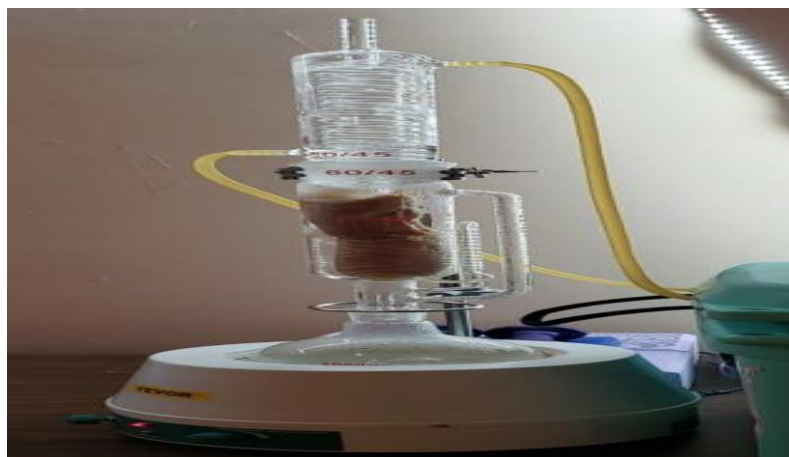
**Figure 1: A Plant Called *Tinospora Cordifolia***



**Figure 3. Tinospora Flower**



**Figure 3. Tinospora Stem**



**Figure 04. Soxhlet Extractor**

#### **Fourier Transform Infrared Spectrophotometer (FTIR):**

FTIR spectroscopy equipment is used to identify compounds. FTIR covers many synthetic applications, particularly for polymers and substance items. It is broadly utilized for anything from clear compound ID to process and administrative checking. The range of FTIR applications is broad overall. The quality control of incoming and departing goods; the reformulation of polymers, rubbers and other materials using thermogravimetric infrared GC analysis; are some of the more popular uses.

- Analysis of thin films and coatings;
- Microanalysis of tiny sections of materials to detect impurities.

- Failure analysis and emissions monitoring for cars or smokestacks for instance, Many parts of autos, including epoxies, oil coatings on parts, fuel, elastic seals And o-rings, tires, paints, materials (fire retardants) and exhaust discharges are Excellent candidates for FTIR investigation.

#### **FTIR Procedure:**

##### **1. Sample preparation (For liquid sample):**

By turning the screw counterclockwise and holding it in place in the instrument's Sample holder, you can fix an empty NaCl or KBr plate between plate holders. Consider the ambient spectrum. Place a standard or sample between two NaCl or KBr plates, screw the plates into the plate holders by turning the screw Counterclockwise until a consistent film forms between the plates (remove any air Bubbles if they are visible in the film), and

then place the plate assembly in the Sample holder. Consider the standard/sample IR spectrum. Following analysis, The cell is first cleaned with dry tissue paper before being treated with carbon Tetrachloride. Install the NaCl cell device with fixed thickness as needed. Place the cell in a Cassette and choose an appropriate background (such as the air background). Insert the plug into both holes after injecting the liquid diluent or sample via one Hole in the cell until the liquid emerges from the other hole and forms a thin Layer. Use tissue paper to wipe the cell. Consider the IR range. After analysis, or with the solvent suggested in the monograph, clean the cell by First wiping it with tissue paper and then with carbon tetrachloride.

## 2. Solid sample preparation (DRS/KBr pellet):

For DRS: Take about 5 milli gram of sample and std and 100 milli gram Spectroscopy grade KBr in the mortar & triturate to make a homogeneous Mixture with pastel unless otherwise specified in the individual monograph. For KBr pellets: Take about 1 – 2 mg of sample/standard and 300 – 400 mg Spectroscopy grade KBr (or as per mentioned in individual monograph or Respective STP) in the mortar and triturate to make a homogeneous mixture with Pastel. Transfer mixture to pellet maker and prepare pellet using appropriate Pressure to ensure that pellet is made satisfactory (apply pressure as Recommended the manufacture of pellets maker). If peak observed at approx. 2200nm then flush the IR instrument with nitrogen, to remove peak due to carbon dioxide.

**Results and Discussion:** FTIR results is indicated that the sample extract of *Tinosporacordifolia* is

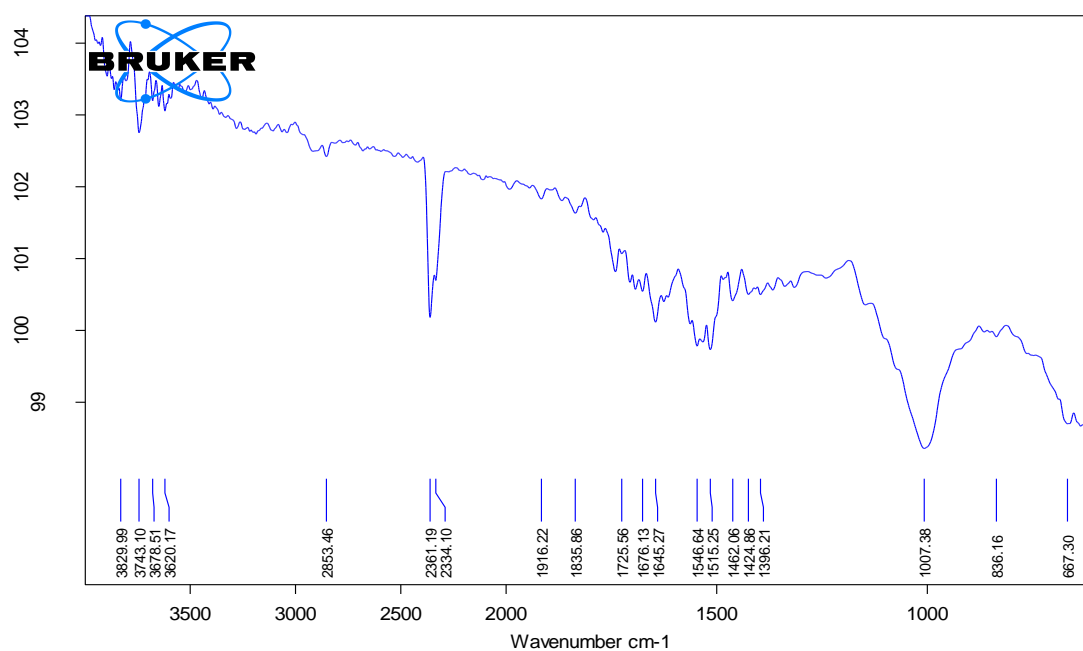
satisfactory and complies with per predetermine criteria.

Observation and results are referred for graph no.01 and table no. 01.

To distinguish the different utilitarian gatherings contained in the example, FTIR spectroscopy was employed. Different functional groups absorb IR radiation at particular frequencies. The plant of *T. cordifolia* were extracted with ethonol, and their FTIR spectra shown in figure. The most effective method for determining the functional groups contained in various *T. cordifolia* preparations is FTIR. The functional groups of the active ingredients present in various extracts can be determined using the absorption maxima in the IR spectra.

FTIR was utilized to break down the practical gatherings of mixtures. It showed four Significant pinnacles, the principal significant pinnacle appearing (C-H) fragrant ring With a pinnacle worth of 1916.22, trailed by essential, optional amines, and amides (N-H) With a pinnacle worth of 2361.19, formed ketone with a pinnacle esteem at 1676.13. The Last pinnacle esteem showed the presence of Alkane with a pinnacle worth of 2361.19. The significant pinnacles and capability of dynamic compound gatherings were examined and results were contrasted and a standard Infrared graph. This study is like “Phytochemical Screening, FT-IR and Gas Chromatography-Mass Spectrometry Examination of *Tinosporacordifolia* (Thunb.) Miers”.

**Graph No. 01 : FTIR results of *T. Cordifolia***



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**Table 01: Functional group/Assignment & Wave number (cm-1) of T. Cordifolia**

Functional group/assignment	Wavenumber (cm-1)
Alcohol	3829.99
Alcohol	3743.10
secondary amine	3678.51
Alcohol	3627.17
Alcohol	3620.17
Alkane	2853.46
Alkane	2361.19
Carbon dioxide	2334.10
Aromatic compound	1916.22
Anhydride	1835.86
Conjugated anhydride	1725.56
conjugated ketone	1676.13
conjugated ketone	1625.27
Nitro compound	1546.64
Nitro compound	1515.2
Carboxylic acid	1462.06
Carboxylic acid	1424.86
Sulfate	1396.21

The various functional groups observed in the different extracts probably indicate the presence of carbohydrates, carotenoid, glycogen, amino acids, amides, starch, calotropin, Calotropogenin, phosphates, lipids, glycogen and cellulose. Spectral differences are the objective reflection of componential differences. By using FT-IR spectrum, we can confirm the functional constituent's presence in the given parts and extract, identify the medicinal materials from the adulterate and even evaluate the qualities of medicinal materials. The results of the present study coincided with the previous observations observed by various plant biologists and taxonomists. Many researchers applied the FTIR spectrum as a tool for distinguishing closely associated plants and other organisms<sup>[4-8]</sup>. The results of the present study developed novel phytochemical markers to identify the medicinally important plant. Further advanced spectroscopic studies are required for the structural elucidation and identification of active principles present in the leaves of *Tinospora cordifolia*.

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