



## Phytochemical Screening by FTIR Spectroscopic analysis of Bacopa Monnier plant Extract

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### Abstract:

In the present research work, the extract of Bacopa Monnier plant is studied by FTIR spectroscopy. Through FTIR spectroscopy, various functional compounds found in the extract are studied on the basis of peak values. 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 Bacopa Monnier 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 Bacopa Monnier can be used in the industry.

**Keywords:** FTIR, Extract

### Introduction:

India is a recognized hub of mega variety and home to several medicinal plant species, each of which is likely to involve important genetic and chemical variants. More than a thousand plant species out of the estimated 17,000 higher plant species in India have been used for decades in India's four major traditional medicinal practices. They are Siddha, Unani, Ayurveda, and Amchi. At the time of their creation, the only three medical systems were Ayurveda, Greek medicine, and Chinese medicine [1]. One of the oldest and most well-known medical practices still in use today decades is Ayurveda. Ayurveda holds the title of "oldest known medical system to man and the world's oldest and most extensive spiritual teachings" [2].

The tremendous information on nature-based medication, the connection between the construction and capability of the human body and nature and the components of the universe that interact and have an impact on living things ensure that this system will continue to thrive for centuries to come. These Ayurvedic principles were collected and organized in Charak Samhita, Sushrut Samhita and Ashtanghridayam [3]. The Rigveda, which was composed somewhere in the range of 4500 and 1600 BC, contains the earliest reference to using plants as medicine. Ayurveda knowledge has been ingrained in India's distinctive culture for millennia and this legacy is now being passed down [4]. It may be claimed that India is a mega diversity hub since it has a large number of different plant species. India is a country rich in biodiversity. In this way, one of India's critical assets and the establishment for all

upcoming bio-industrial advancements is its rich and diverse plant diversity, particularly the genetic diversity of medicinal and aromatic plants. More than 7000 plant species are used by rural and tribal populations in India [5]. India has a wide variety of wildlife. More than 3/4 of the herbal medications and fragrance products used worldwide are produced in India. Therefore, India's vast and diversified plant diversity, particularly the genetic variety of restorative and fragrant plants is one of its essential assets and the foundation for all prospective bio-industrial breakthroughs. Man depends on plants for his survival [6]. All plant phyta including Thallophyta, Bryophyta, Pteridophyta and Spermatophyta have species that provide important official and unofficial therapeutic products. Since the dawn of human civilization, medicine has existed.

The vast natural flora that has been given to India is where her treasure is kept. India has a vast array of medicinal plants at its disposal. One of the world's twelve megadiversity countries, India has a wide variety of biotic resources [7]. India features two significant hotspots out of the 34 recognized hotspots: the Eastern Himalayas and the Western Ghats. India is home to 47000 plant types of which 17,000 are angiosperms. The number of therapeutic plant species documented by Ayurveda alone is around 2000 followed by Siddha and Unani. The restorative plant industry is a piece of a long history that is still profoundly respected today in India, one of the nations with the widest range of medical and cultural practices in the world [8]. Three-quarters of the world's population depends on traditional medicines, largely herbal ones for health care, and

the World Health Organization (WHO) considers medicinal plants to be the greatest source for a range of pharmaceuticals and chemicals. [9]. The primary natural sources for potentially safe pharmaceuticals that have a significant role in human health by serving as herbal medicines are believed to be medicinal plants. In addition to decreasing inflammation and having antibacterial and antifungal properties such flora frequently demonstrates a wide range of biological and pharmacological actions. These plants' root, bark, leaves, flowers and fruit extracts are used to make syrups and infusions in traditional medicine. 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 *Bacopa Monnieri* for phytochemical compounds was done by.

#### **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. *Bacopa Monnieri* plant part were collected from tahsil Pansemal, district Barwani M.P. India. *Bacopa Monnieri* plant part were separately cleaned and separately washed with distilled water. After completion of the cleaning and washing activity, the *Bacopa Monnieri* plant part were collected in a separately beaker. *Tinospora cordifolia* plant part were dried in Laboratory Room. *Bacopa Monnieri* 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.



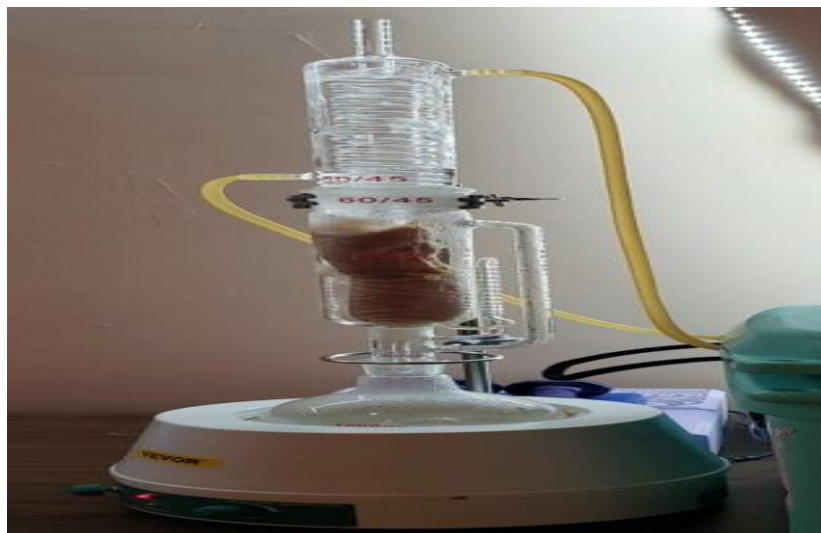
**Figure 1: Bacopa Monnieri Plant**



**Figure 3. Bacopa Monnieri Flower**



**Figure 3. Bacopa Monnieri Leaf**

**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 Bacopa Monnier is satisfactory and complies with per predetermine criteria.

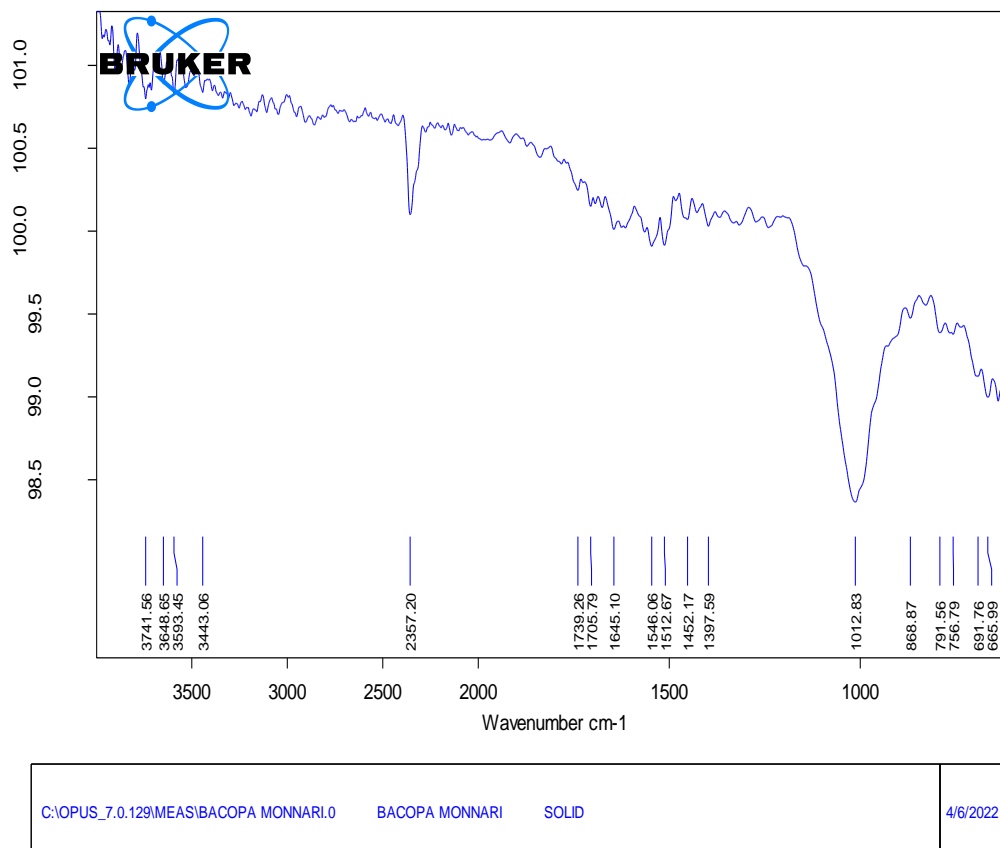
Observation and results are referred for graph no.01 and table no. 01.

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 Bacopa Monnier were extracted with ethonol, and their FTIR spectra shown in figure. The most effective method for determining the functional groups contained in various Bacopa Monnier 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.

**Graph No.01 : FTIR results of Bacopa Monnier**



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**Table 01: Functional group/Assignment & Wave number (cm-1) of Bacopa Monnier**

Functional group/assignment	Wavenumber (cm-1)
Alcohol	3741.56
Alcohol	3648.65
Alcohol	3593.45
Alcohol	3443.06
Aromatic compound	1739.26
Anhydride	1705.79
Imine / oxime	1645.1
Nitro compound	1546.06
Ntro compound	1512.67
Alkane	1452.1
Phenol	1397.59
Anhydride	1012.83
Alkene	868.87
Alkene	791.56
Alkene	756.79
halo compound	691.76
Halo compound	665.99

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