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Synthesis and Characterization of Lohabhasmaby Infrared Spectroscopy

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Abstract

Ayurvedic system of medicine includes an important class of drugs of mineral origin under which there is as subclass known as ayurvedic bhasmas. These are derived from metals like gold, silver, copper, iron, lead, supreme medicines due to their extraordinary medicinal properties. However, according to the modern science, heavy metals referred above are difficult to absorb at cellular levels and therefore are toxic and harmful to human bodies. As against this according to ayurved, all these elements, after ayurvedic processes of bhasmikanarana not only lose their toxicity but miraculous medicinal properties are induced when they are transformed into what is called as bhasma state. In an attempt to elucidate the exact nature of this bhasma state, we found that a genuine Ayurveda bhasma possesses two characteristics (i) extremely tiny particle size, tending to nano level of the order of 20-90 nm and (ii) attachment of organic components to these nanosized bhasma particles. These findings are expected to be useful to throw light on the medicinal potential of ayurvedic bhasma. On this point of view, this work is concerned with analysis and study of samples of lohahhasma by Infrared spectroscopy method.

Keywords: Lohabhasma, Bhasmikanaran, Drug

1. Introduction

The art and science of *ayurvedic bhasmas* in general and metal-based *bhasmas* in particular is the subject of 'ayurved rasashastra', which is an extremely important and interesting branch of *ayurved*. The origin, history, developments in *ayurved rasashastra* is itself an attractive and promising area for research especially for chemists. Research in this subject will be also relevant and encouraging in coming years because *ayurved* and *ayurvedic* medicines will receive more and more appreciation and importance all over the world. Metal-based *ayurvedic* drugs being the superior drugs as compared to all other classes of drugs, there is an excellent opportunity to rejuvenate this original art with the help of modern scientific development. In standard Ayurvedic text 'Rasashastra', many extraordinary medicinal properties were derived from metal like mercury and many others (Called as *lohas*). Out of this some fundamental important properties and its adequate

superiority of this bhasma are listed below. [1-5]

- Fundamental property of these bhasmas is that it will act on root cause of the disease by destroying origin together with the removal of disorders and brings human health in the original form.
- The characteristic property of these bhasma is to act on target organ of human body with its potential ability. For example, *tamra* (copper) bhasma shows us action on liver and spleen. *Jasad bhasma* controls blood sugar level and *Swarna* (gold) bhasma acts on heart and brain.
- Very small quantity are enough (on mg scale) due to high potency of bhasmas. These bhasma's show extreme powerful action in minute or trace quantity.
- All these bhasma since originate from different metals has no expiry date, with proper packing. It can be stored and used for several decades. The oldest sample shows higher potencies on human body while their action. Bhasma are

important constituent of ayurvedic medicines from several centuries.[6-10]

2. Experimental Methods

The selected methods were as follows.

Method I:

This is based on the use of trifala extract (*Terminalia chebula* + *Terminalia bellirica* + *Phyllanthus emblica*) for special method of purification as well as for process of marana.

Method I: Using Trifala Extract

In this method, firstly the iron powder (500g) was subjected to general method of purification in which the powder was heated to red heat and then dipped successively in til oil, buttermilk, cow urine and aqueous extract of dolichos (kulith) and rice (kanji). Then special purification was done in trifala extract (aqueous extract of the powder of *Terminalia chebula* (hirada) + *Terminalia bellirica* (behada) + *Phyllanthus emblica* (awla) all taken in equal parts). The destruction of metallic character (marana) was done by triturating the purified iron powder in trifala extract for about six hours.

The process of bhasmikanara was also done using concentrated extract of trifala for which above processed powder was triturated in a mortar with trifala extract until a homogeneous paste is formed. This was then subjected to gaja-putain a closed crucible system. This entire process of bhasmikanara was repeated seven times to get the desired lohabhasma.

Method II: By using mercuric sulphide HgS and lemon juice

4. Results

Table 1 Significant IR Absorption peaks in Cm^{-1} of lohabhasmas

No	Sample No	Significant IR frequencies Cm^{-1} and their assignment		
		C-O Streaching	Si-O Streaching	Fe-O Streaching
1	Loha.1	1215.7	782.3	506.9
2	Loha.5	1218.1	767.4	499.7

This method involves the use of mercuric sulphide (*Hingul*) for the process of *marana*. The mercuric sulfide used in the form of *hingul* is purified prior to use (using the juice of *Kadu Nimb*).

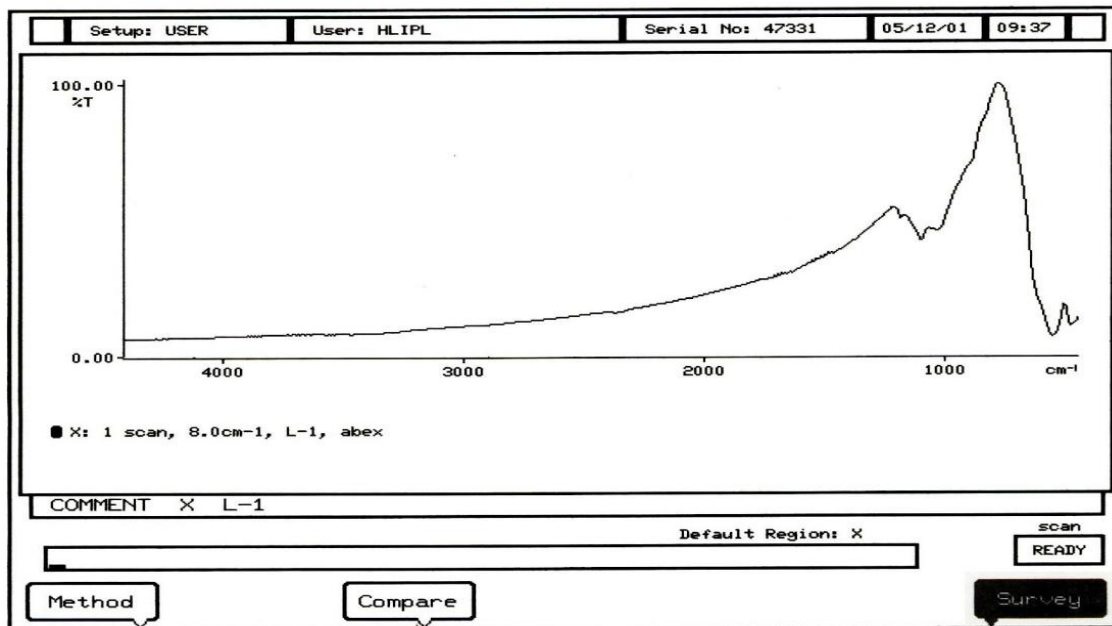
The purified iron powder is mixed with equal quantity of HgS and triturated in a mortar, until a homogeneous mixture is obtained. This is then transferred to a closed crucible system and subjected to *gaja-puta*. This process is repeated three times to ensure complete the process of *marana*.

3. Determination of IR spectra of habhasmasamples.

Procedure:

- One gram of dried sample was first mortared in an agate mortar to obtain microfine powder with homogeneous state.
- The samples were kept in oven for overnight at $100-110^{\circ}\text{C}$.
- Next day about 5miligram of this dried sample was mixed with potassium bromide in the mortar.
- This mixture was then transferred into the die for preparing a transparent pallet of about 0.01 mm thickness by applying a pressure.
- The infrared spectrum of this sample was then recorded on a FTIR Perkin-Elmer infrared spectrophotometer in the normal region ($4000-450$) cm^{-1} . Same procedure was used for another sample.

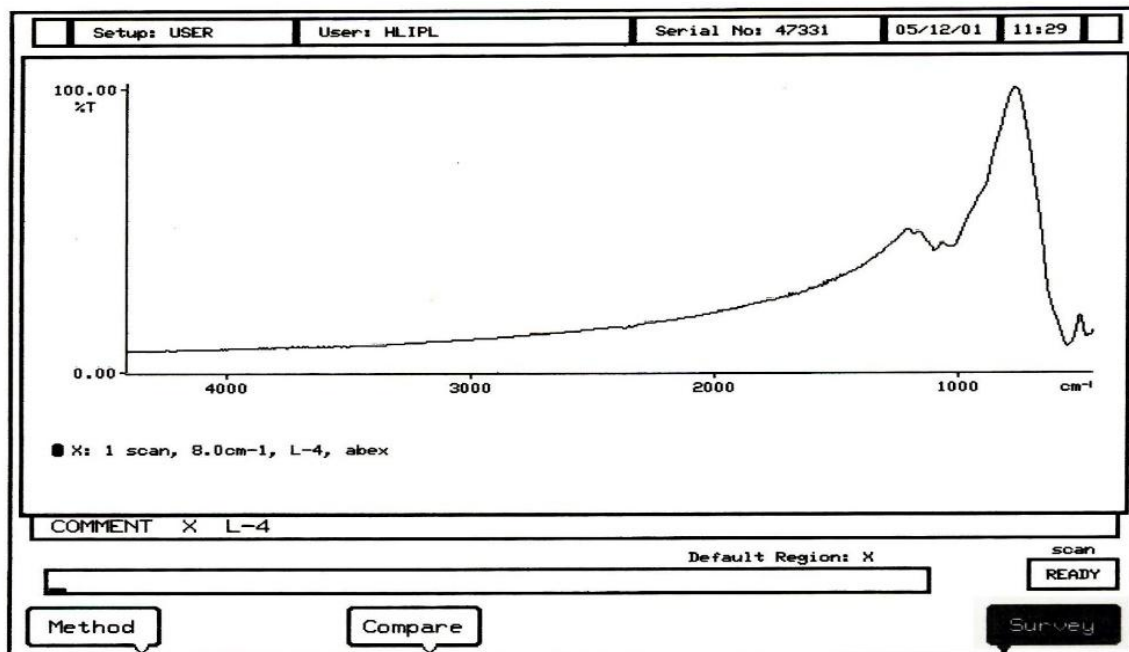
The significant IR absorption frequencies useful for structural study are given in Table 3.1



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PEAKTABLE X 4400.0 450.0
threshold 2.00%; emission band
cm-1 % cm-1 % cm-1 %
1215.7 54.77 782.3 100.00 506.9 19.07
3 peaks found
    
```

**Infrared Spectra of Lohabhasma
Fig. No.1Loha-01(Method-I)**



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PEAKTABLE X 4400.0 450.0
threshold 2.00%; emission band
cm-1 % cm-1 % cm-1 %
1208.4 50.22 772.0 100.00 504.7 20.01
3 peaks found
    
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Fig No.2 Loha-02 (Method-2)

Conclusion

There are three significant peaks in the infrared spectra of all the two samples of lohabhasma as shown in the table 3.1 out of these, the most important and characteristic peak is in the region (1205-1215) Cm^{-1} . This peak is absent in the infrared spectra of pure Fe_2O_3 (which is available in literature) and therefore it is more important and diagnostic in the structural study of these bhasmas. This peak is broad and has medium intensity in some spectra it appears as doublet. This region around 1205-1215 Cm^{-1} is known to represent C-O stretching or S-O stretching frequencies. Now, lohabhasma synthesized for these investigations contains significant amount of carbon as its important constituent and presence of sulphur is confirmed in E-DAX analysis. Therefore, the absorption peaks in the region 1205-1215 Cm^{-1} are assignable. To C-O, stretching overlapped by S-O stretching due to which it becomes broad or split into doublet. The second peak recorded in the region (765-785) Cm^{-1} is not resolved at all and therefore, it is difficult to make any assignment. The third distinct peak in the region (500-510) Cm^{-1} is also characteristic because its position and intensity is similar. In literature, this peak is assigned to Fe_2O_3 and its identity is confirmed in infrared spectra of Fe_2O_3 . Therefore, in structural analysis of lohabhasma, which is composed of Fe_2O_3 predominantly, this peak may be considered as a diagnostic peak for lohabasma.

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