IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

SYNTHESIS AND CHARACTERIZATION OF AYURVEDIC MICA (ABHARAK) BHASMA (POWDER) BY DIFFERENT METHOD

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Abstract

Raw Abharak grinded pieces taken as a starting material to synthesize Abharak Bhasma(Mica) in powder form.After herbal treatment known multiple incinerations are given at higher temperature (950^0C) in natural putta Bhatti (red fire) then then the bhasma is ready for the intended purpose. Meticulous attention has to be provided in use of ayurvedic bhasma preparation in modern time. It is time tested medicine for various diseases. Ayurveda proclaim to be infallible science.

This Abharak Bhasma is very useful in treating iron deficiency, act as anti-diabetic, improves cognition. Useful for females to maintain Iron level during menstruation cycle. Naturally helpful to improve immunity.It treats cough and cold,improves heart health.

Ashudha Mica powder is initially treated with juice of Ficus amplissima (Pimpri) , Triphala decoction and calotropis leaves used for purification & to remove impurities from it. This herbal juices treatments is known as bhavana. Allopathy medicines can be replaced with mica as iron supplement . Chemically manufactured substances has side effects. Abharak Bhasma synthesized by natural process.

The preparation of Abharak Bhasma is followed step by step shodhan, special shodhan and marana. Process of maran is carried out at higher temperature 950^0C. The Bhasma formed at 950^0C $\pm 20^0$C to meet all quality parameters & analysis performed to evaluate quality of bhasma. This way Nishchandra abharak bhasma is prepared by using the appropriate method. Three samples prepared shows consistency in result observations.

Advanced analytical instrumentation used to evaluate the quality of Abharak bhasmas such as ICP-OES, FTIR, XRD. The physico chemical tests, Ayurvedic parameters are also analysed to evaluate purity of the product which gives high degree assurance of final product which is used as ayurvedic medicine. There is no side effects or negligible after use of this Bhasma[2].

Keywords: Bhavana, Shodhan, Marana.

1.0 Introduction

Abharak is a powerful mineral compound which comprises of essential minerals such as silicon, iron, calcium, magnesium, potassium etc.

Abharak Bhasma for iron supplement has no or negligible side effects[1].Allopathy medicines can't diminish importance of ayurved medicines[1]. ,Abharak helps to improve chronic heart diseases[2].

Ayurvedic herbal medicines are ancient known science and has many health benefits[3]-[4]
The effective dosage of Abharak bhasma may vary from person to person depending upon the age and health condition of the person. Generally 100 to 200 mg of Abharak bhasma powder can be taken twice a day or as directed by physician with honey,milk or lukewarm water. Metal bhasma is also known as herbomineral preparations[5-6]. It also show immunomodulatory activity.[7]
Side effects: Allopathy iron supplements used such as ferrous fumarate, ferrous gluconate, ferrous sulfate , ferric ammonium citrate etc. has side effects we can replace these with alternate ayurvedic medicine[7].

During Covid-19 need for alternate medicine arised and Indian Ayurvedic science has strength for immunomodulatory medicines as bhasma preparations.[8]

Mica is an essential for body that is included in many over-the-counter multivitamin and mineral supplements and is used therapeutically in mg doses to treat or prevent Madhumeha[9], Cramps. Used as iron supplements ,to improve immunity[10-11]. When taken at the usual recommended daily allowance or in replacement doses, Mica has very little or no adverse effect on the liver[12-13]. It is used to cure diseases such as anaemia[14], liver disorders. Abharak Bhasma is one such complex mineral preparation contains iron and other essential minerals (Ca,K,Mg etc.)[15] which are a crucial element for human body.

2.0 Materials and Method:

RAW MICA SHUDDHI

Batch Qty : 50 gm,**Yield :**. 99.5%

Formula : Table 1

Sr.No.	Ingredients	Qty in gms
1	Ashuddha Mica	100.0
2	Bhavana:-Triphala	25.0
A	Water	100 ml
B	Ficus Amplissima(Pimpri)leaves extract	30 ml
C	Calatropis Leaves extract	30 ml

Purification stages:

Take Triphala in a steam-jacketed evaporating pan. Add water (16 times i.e. 400 ml.) to it and reduce it to half. Strain the extract. Grind the pieces of Ashuddha Abhrak (Mica) to fine powder. Heat it on Bhatti (Furnace) with the help of Acacia wood (temperature $950^0C \pm 20^0C$). When Abhrak is red-hot, dip it slowly in the extract of Calotropis leaves and second cycle in Ficus Amplissima(Pimpri)leaves extract. Allow the powder of Abhrak to settle at the bottom and decant the extract in another vessel. Repeat the same procedure for 3more times by diping red hot Abarak in Triphala extract . Then put Abhrak powder in drier and dry it completely. Use this Shuddha Abhrak for further processing.

Abhrak Bhasma Further Processing:

Yield : 100%

Composition:

Sr.No.	Ingredients	Qty in gms
1	Shuddha Mica (Active)	100.0
2	Bhavana:Rui mool rasa (s.q.) Kadalikand rasa (s.q.) Vatapraroha Kwath (s.q.)	30.0 x 3 30 x 2 30 x 2

Steps of Preparation.: Clean all the equipment's and ensure that they are clean before using them.

1. Weigh all the ingredients as per batch quantity.
2. Add ingredient no. 1 to the khal (triturating machine) and run the khal.
3. Clean ingredient (Rui mool) manually to remove the rotten and/or contaminated parts, if any.
4. Extract the juice from rui mool. Note the yield (Not less than 30 ml)
5. Add the juice to khal. Continue trituration till all the juice is digested into the bulk and khal becomes difficult to run.
6. Collect the bulk in the sharava (flat earthen pots) in the qty of approx. 2.4 gm to 2.5 gm per sharava
7. Cover each sharava by placing another sharava on it mouth to mouth. The assembly is called as 'Sharava Samputa'.
8. Arrange approx. 110 no. of cow dungs (1 gunnies) in layers in Gajaputa - Bhatti.
9. Place seven 'Sharava Samputas' on cow dungs in a circular manner. 3 sharava samputas will form the circumference & the 4th will be in the centre.
10. Again, cover the sharava samputas by approx.70 cow dungs (1gunnies) to form a heap of cow dungs.
11. Fire the bhatti . Note the temperature.
12. On cooling take out the sharavas & add the Bhsma to the Khal.
13. Repeat steps no. 3 to 12 for 3 more times.
14. Reat steps no. 3 to 13 for two times using Kadalikand in place of Rui mool (Total two bhavanas of Kadalikand rasa followed by Gajaputa).
15. Clean ingredient no. 4 (Vatapraroha) manually to remove the rotten and/or contaminated parts, if any.
16. Take Vatapraroha in a steam vessel. Add water (3 times) to it.
17. Prepare an extract with help of steam heating. Reduce the extract to half.
18. Strain the extract through 80 mesh.
19. Repeat step no. 3 to 13 for two times using Vatapraroha Kwath in place of rui mool rasa (Total 3 bhavanas of Vatapraroha kwath followed by Gajaputa).
20. Then add water (Approx. 100ml) to Abhrak bhasma in Khal. Run the Khal for 48 hrs.

21. When Khal becomes difficult to run, collect the bulk in clean s.s.trays in the quantity of Approx.6 gm per tray.
22. Dry the material at $70^0C \pm 5^0C$.
23. After drying add the whole bulk again to the Khal. Run the Khal to get fine powder.
24. Pass the Bhasma through 80 mesh.
25. Powder the remainder coarse powder again in same Khal and again pass through 80 mesh.
26. When whole batch is passed through 80 mesh, note the yield (Not less than 50 gm).
27. Follow amritikaran take 50 gm in frying pan add 10% ghee to it heat frying pan at low heat till fumes goes off mix well . Cool the material at room temperature.
28. check following parameters:
    a) General Apperance: Colour, Odour, Taste, Texture
    b) L.O.D. at 110^0C .
    c) Loss on ignition.
    d) Acid insoluble ash.
    e) Ayurvedic parameters like Rekhapurnatra, Varitaratva and Nishchandratva.
    f) Elemental assay for Fe.

Take 15gm in separate lot of Abharak bhasma add honey in frying pan heat at low temperature till honey get evaporated then go for amrutikaran.

2.2 Organoleptic Evaluation

Organoleptic evaluations like colour, taste and texture of the samples of Abharak bhasma analyzed as preliminary quality check.

2.3 Physico-chemical Tests:

In Physico-chemical Parameters such as Loss on Drying (LOD), Ash, Acid Insoluble ash (AIA), as per The Ayurvedic texts. Below table shows three samples analysis data.

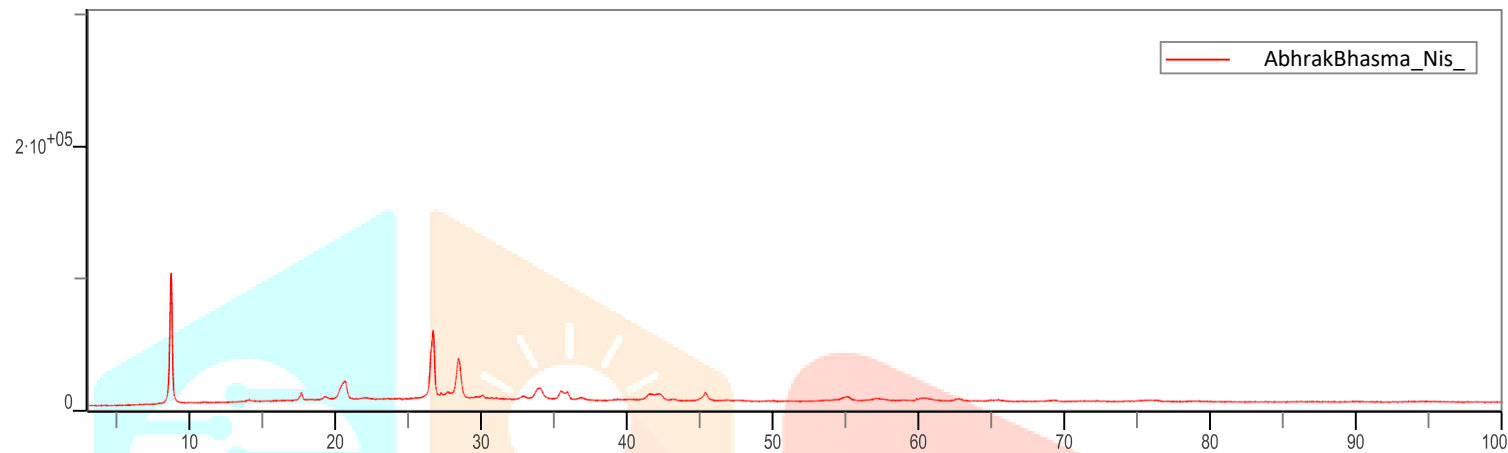
Table 3:

Product Name: Abharak Bhasma	**Test observations**	**Limits**
Description	**Light brown coloured fine powder,odourless,tasteless**	**light brown coloured fine powder,odourless,tasteless**
% LOD	**0.21, 0.28 ,0.23**	**NMT 0.5%**
% Loss on ignition	**1.15, 1.18, 1.22**	**Not more than 4.0%**
% Acid insoluble Ash	**91.82, 81.84, 91.23**	**Not more than 93.0%**
XRD	**Confirms the phase Fluorophlogopite and Polylithionite**	**Shows Fluorophlogopite and Polylithionite**
FTIR	**Confirms Fe-O**	**Shows Fe-O peak**
Elemental % Iron (Fe) by ICP-OES	**16.7, 14.06, 15.55**	**Not less than 10.0%**
Elemental % Magnesium (Mg) by ICP-OES	**3.28, 2.95, 3.08**	**Not Less than 2.0%**
Ayurvedic Parameters:		
Rekhapurnatva	**Passes**	**Passes**
Varitaratva	**Passes**	**Passes**
Kachkach abhav	**Passes**	**Passes**
Unmantva	**Passes**	**Passes**

3.0 Results and Discussion

Abharak bhasma characterized as dark brown coloured powder.The Physico-chemical test Loss on drying (LOD) less than 0.5%. Abharak bhasma all 3 samples shows Loss on Ignition not more than 4.0 %, Acid insoluble ash (AIA) not more than 93 %. Samples found to comply ayurvedic parameters such as Rekhapurnatva,Varitaritva, Kachkach abhav,Unmanatva. Loss on drying (LOD) is used to measure the amount of water and volatile matters in a sample when the sample is dried under specified conditions. The XRD profile of Abharak bhasma confirms presence of Fluorophlogopite and Polylithionite chemical phases[12]. FTIR confirms the presence of FeO (Iron oxide phase). ICP-OES ensure the percentage of Fe and Mg.

XRD Profile:



3.1 X-ray Diffraction (XRD) Profile

X-ray diffraction (XRD) analysis of Abharak bhasma carried out using Rigaku Miniflex 600 X-ray diffractometer with operating at 40 kV and 30 mA. The XRD Pattern was recorded for angle ranging from 3^0 to 100^0 at a scanning rate of 3^0/min. and scan step of 0.01^0. The of Fluorophlogopite and Polylithionite phase is confirmed.

3.2FTIR:

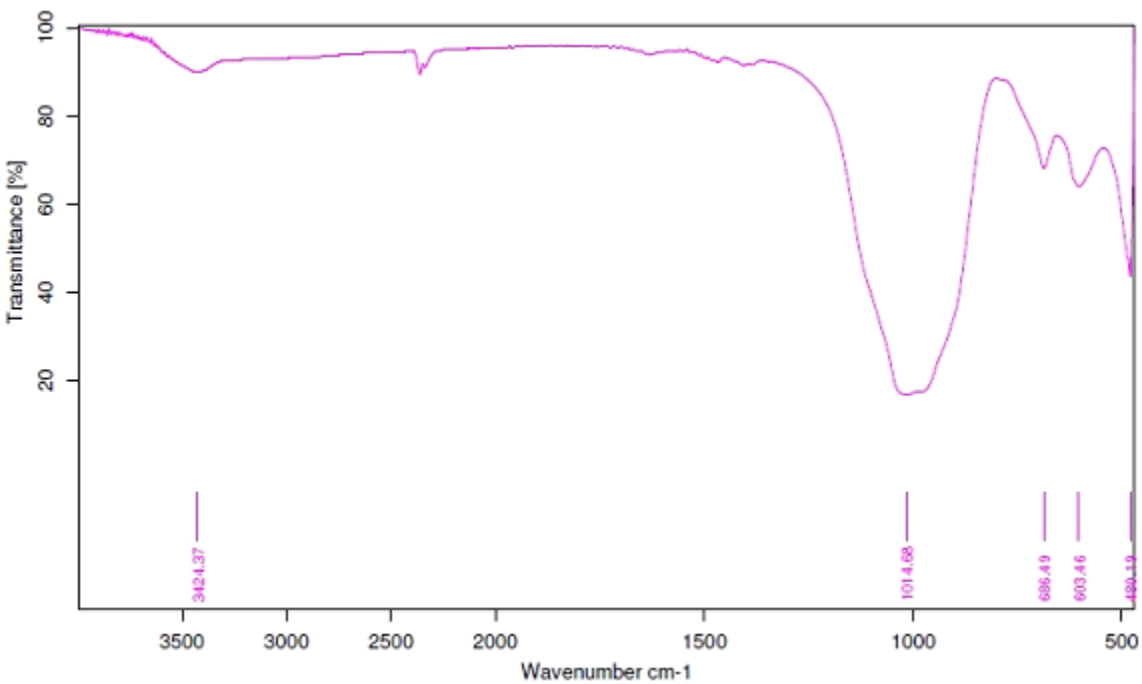


Table 4:

Name of The Product	Abharak Bhasma
Wavenumber (cm^{-1})	**686** = Fe-O bond , **480=** Oxide phase
Remark	FTIR spectra of Abharak bhasma shows the characteristic peaks at 562-cm^{-1} for Fe-O.

3.3 Elemental analysis by Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES)

The samples of Abharak bhasma digested in a MARS 6 microwave digestion system (CEM corp., USA) equipped with Teflon closed vessels (Easy Prep Plus vessel) for safe operation under 800 psi. The instrumental conditions used for digestion of samples are given in **Table 6**. After completion of digestions elemental content Fe, Mg determined by Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES). The instrumental conditions of ICP-OES used for Elemental analysis are given in

Table 5: **ICP-OES operating parameters**

Element	Wavelength	Plasma (L/min)	AUX (L/min)	Neb (L/min)	Power (watts)	View Dist.	Plasma View
Iron (Fe)	238.204	10	0.2	0.60	1300	15	Radial
Magnesium	285.213	10	0.2	0.60	1300	15	Radial

Table 6 : CEM MARS 6 microwave digestion system operating parameters

Instrumental Parameters	Iron (Fe),Mg
Acid used for Digestion	HCL
Method	Fe,Mg
Temperature	170^0C
Pressure	650 psi
Ramp Time	20 min.
Hold Time	10 min.
Cooling Time	15 min.

Calculation: Elemental Assay by ICP-OES:

Abharak Bhasma-FBA-001

$$\frac{8.183 \times 100 \times 25}{5 \times 1000 \times 24.5} \times 100 = \textbf{16.70 \% of Iron}$$

$$\frac{1.605 \times 100 \times 25}{5 \times 1000 \times 24.5} \times 100 = \textbf{3.28 \% of Magnesium}$$

Abharak Bhasma-FBA-002

$$\frac{6.946 \times 100 \times 25}{5 \times 1000 \times 24.7} \times 100 = \textbf{14.06 \% of Iron}$$

$$\frac{1.459 \times 100 \times 25}{5 \times 1000 \times 24.7} \times 100 = \textbf{2.95 \% of Magnesium}$$

Abharak Bhasma-FBA-003

$$\frac{7.745 \times 100 \times 25}{5 \times 1000 \times 24.9} \times 100 = \textbf{15.55 \% of Iron}$$

$$\frac{1.534 \times 100 \times 25}{5 \times 1000 \times 24.9} \times 100 = \textbf{3.08 \% of Magnesium}$$

Table 7: Results of Elemental analysis in Abharak Bhasma samples

Product Name	Batch no	Iron (Fe) in %	% Magnesium
Abharak Bhasma	AB-1,AB-2,AB-3	16.70, 14.06, 15.55	3.28, 2.95, 3.08
Abharak Bhasma	M1	13.29	2.15
Abharak Bhasma	M2	13.91	2.3

AB-1,2,3:Sample prepared by our method. M1,M2,-Other market samples.

4.0 Conclusion:

To maintain the absolute trust in Ayurveda, it's necessity to ascertain the quality, efficacy & safety of Ayurvedic preparations on scientific lines with the use of modern techniques. The attempt of present work has been made to characterize with modern techniques such as Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES),FTIR,XRD. The Abharak bhasma prepared by this method shows higher % of Fe and Mg content as compared to other market samples. Traditional ayurvedic medicines are safe to use and efficacious[2].

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