



Synthesis And Characterization Of Ayurvedic Suvarnamakshik Bhasma (Powder) By Different Method

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Abstract

Grinded Copper pyrite powder taken as a starting material to synthesize Suvarnamakshik Bhasma in powder form. Further purification is followed by using different herbal juice treatments to soften malleability of the metal. After herbal treatment known multiple incinerations are given at higher temperature (600⁰C) in natural putta Bhatti (red fire) then the bhasma is ready for the intended purpose.

This Suvarnamakshik Bhasma is very useful in treating iron deficiency, Anemia, also acts as hematinic. It is essential to maintain daily iron level need in human body. Equally useful in females to maintain Iron level during menstruation cycle. Naturally helpful to improve immunity.

The preparation of Suvarnamakshik Bhasma s followed step by step shodhan, special shodhan and marana.Process of maran is carried out at 600⁰C and 800⁰C to compare the quality of final product. The Bhasma formed at 600⁰C found in proper colour & meeting all quality parameters than 800⁰C.

Advanced analytical instruments tools are used to evaluate & assure the quality of Suvarnamakshik bhasmas such as ICP-OES, FTIR, XRD. The physico-chemical tests, ayurvedic parameters are also checked to evaluate purity of the product which gives high degree assurance of final product which is used as ayurvedic medicine. There are no side effects or they are negligible after use of this Bhasma.

Keywords: Bhavana, Shodhan, Marana.

1.0 Introduction

Suvarnamakshik(SK) bhasma is a powerful mineral compound which comprises of essential minerals such as silicon, iron, calcium, magnesium, potassium etc.

Mica is an essential for body that is included in many over-the-counter multivitamin and mineral supplements and is used therapeutically in higher mg doses to treat or prevent Madhumeha, Cramps, iron supplements to improve immunity also useful in chronic heart diseases¹. When taken at the usual recommended daily allowance or in replacement doses, iron has little or no adverse effect on the liver².

SK Bhasma is one such complex mineral preparation made of iron which is a crucial element for human body. Micron³ particles of this transition metal are used to cure diseases such as anemia, liver disorders, worm infestation, chronic skin ailments, irregular fat metabolism, and rhinitis.

The effective dosage of Suvarnamakshik bhasma(SK) may vary from person to person depending upon the age and health condition of the person. Generally 100 to 200 mg of SK bhasma powder can be taken twice a day or as directed by physician with honey or lukewarm water. Black pepper, ginger can also be taken with it. Metal bhasma is also known as herbomineral preparations⁵⁻⁶.

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 medicine⁷. SK bhasma for iron supplement has no or negligible side effects¹. Ayurvedic herbal medicines are ancient known science⁸⁻⁹. It also show immunomodulatory activity.¹⁰

During Covid-19 need for alternate medicine arised and Indian Ayurvedic science has strength for immunomodulatory medicines as bhasma preparations.¹⁰⁻¹¹

2.0 Materials and Method:

Iron Pyrite shuddhi

Batch Qty : 50 gm, Yield :. 99.5%

Formula : Table 1

Sr.No.	Ingredients	Qty in gms
1	Ashuddha Copper Pyrite	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:

Suvarnamakshik Shuddhi:

1. Take raw material in a Iron pan.
2. Heat till it becomes red hot.
3. Make a solution of mosambi juice & sprinkle on it.
4. Number of repetition to follow till it becomes red in colour.
5. Dip red hot SK in Citrus aurantifolia juice (Matulunga)
6. Collect the material for next processing of Bhasmikaran.

Suvarnamakshik Bhasma: Table 2

Sr.No.	Ingredients	Qty
1	Suvarnamakshik Bhasma	50.0 gms
2	Bhavana: Ficus amplissima (Pimpri) leaves extract 25ml	25.0 ml
3	Kulith kadha from Kulith	25 ml 6.25 gm
4	Butter milk from Godugdha	20 ml 10 ml
5	Gomutra	25.0 ml

Steps of Mfg.:

Clean all the equipment's to ensure that they are clean before use.

1. Weigh all the ingredients as per batch quantity.
2. Add Suvarnamakshik shudda to the khal (triturate) and run the khal.
3. Take ficus amplissima leaves extract reduce to half qty by heating .Filter through muslin cloth.Triturate with suvarnamakshik till it becomes difficult to run.
4. Heat the mass in Bhatti at 600 deg C. Allow to cool.
5. Clean Kulith manually to remove the rotten and contaminated parts, if any.
6. Take Kulith in a steam vessel. Add water (50 ml) to it.
7. Prepare an extract with help of steam heating. Reduce the extract to half.
8. Strain the extract through 80 mesh. Note the yield (Not less than 25 ml.). Check Brix (2.5 to 3.5).Add extract to Khal.
9. Continue trituration till all the liquid is digested into the bulk and khal has become difficult to run. The process is known as 'Bhavana'.
10. Collect the bulk in the Sharavas (Flat earthen pots) in the quantity of approximately 2.4 g to 2.5 g per Sharava.(Approx. 2 Sharavas are used).
11. Cover each Sharava by placing another Sharava on it mouth to mouth. The assembly is called as 'Sharava Samputa'.
12. Arrange approximately 120 no. Of cow-dungs (2 gunnies) in layers in Gajaputa- Bhatti.
13. Place eight 'Sharava- Samputas' on cow-dungs in a circular manner. Seven Sharava- Samputas will form the circumference and eighth will be in the centre.
14. Again, cover the Sharava – Samputas by approximately 80 nos. Of cow dungs (1 gunnies) to form a heap of cow dungs.
15. Fire the bhatti. Note the temperature on pyrograph.
16. On cooling take out the Sharavas and add the Bhasma to the Khal.

17. Take Godugdha in clean container. Add curds to it and mix thoroughly. Keep the mixture undisturbed 24hrs to get curd ready to use. Add 15 ml of drinking water to it and churn it to get buttermilk. Add buttermilk to Khal.
18. Repeat steps no. 7 to 14.
19. Add Gomutra to Khal.
20. Repeat step no. 7 to 14.
21. Then add water (approx. 20 ml.) to Khal. Run the Khal for 2 days.
22. When Khal becomes difficult to run, collect the bulk in clean S.S. trays in the quantity of approx. 6 g. Per tray.
23. Dry the material at $70^{\circ}\text{C} \pm 5^{\circ}\text{C}$.
24. After drying, add the whole bulk again to the Khal. Run the Khal to get the fine powder.
25. Pass the Bhasma through 80 mesh.
26. Powder the remainder coarse powder again in same Khal and again pass through 80 mesh.
27. When whole batch is passed through 80 mesh, note the yield (Not less than 50 g)
28. Check following parameters:
 - a) General appearance : Colour, Odour, Taste, touch
 - b) L.O.D. at 110°C
 - c) Loss on ignition
 - d) Acid insoluble ash
 - e) Ayurvedic parameters like Rekhapurnatva, Varitaratva, Nischandratva.
 - f) Assay for Fe.

Amritikaran :

29. Take a lot of 10 g. Bhasma in a frying pan. Add 10 % quantity. (1 g for this lot) of cow ghee to it.
30. Heat the frying pan on low flame. Move the bulk in frying pan continuously. Fumes of ghee start coming.
31. As soon as fumes of ghee stop coming, put off the flame and continue moving of the bulk. The process is called as 'Amritikaran'.
32. Then allow the Bhasma to cool on its own.
33. Check following parameters:
 - a) General appearance : Color, odor, taste and touch
 - b) L.O.D. at 110°C
 - c) Loss on ignition
 - d) Acid insoluble ash
 - e) Ayurvedic parameters like Rekhapurnatva, Varitaratva, Nischandratva.
 - f) Assay for Fe.

2.2 Organoleptic Evaluation

Organoleptic evaluations like colour, taste and texture of the samples of SK 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.

Table 3:

Product Name:	Test observations	Limits
Suvarnamakshik Bhasma		
Description	Light brown to dark brown coloured fine powder, odourless, tasteless	Light brown to dark brown coloured fine powder, odourless, tasteless
% LOD	0.21, 0.28, 0.23	NMT 1.5%
% Loss on ignition	1.15, 1.18, 1.22	Not more than 14.0%
% Acid insoluble Ash	91.82, 81.84, 91.23	Not more than 94.0%
XRD	Confirms the phase Iron oxide (Hematite)	Shows Hematite
FTIR	Confirms Fe-O	Shows Fe-O peak
Elemental % Iron (Fe) by ICP-OES	46.18, 45.45, 49.05	Not less than 40.0%
Elemental % Copper (Cu) by CP-OES	13.61, 15.8, 14.92	Not Less than 12.0%
Elemental % Sulphur (S) by CP-OES	4.29, 5.19, 5.01	Not Less than 4.0%
Ayurvedic Parameters:		
Rekhapurnatva	Passes	Passes
Varitaratva	Passes	Passes
Kachkach abhav	Passes	Passes
Unmantva	Passes	Passes

3.0 Results and Discussion

Suvarnamakshik bhasma characterized as dark brown coloured powder. The Physico-chemical test Loss on drying (LOD) less than 1.5%. SK bhasma shows Loss on Ignition not more than 14.0 %, Acid insoluble ash (AIA) not more than 94 %. 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 SK bhasma

confirms presence of not less than 40.0% Hematite chemical phase. FTIR confirms the presence of FeO (Iron oxide phase). ICP-OES ensure the percentage of Fe i.e 13.83.

XRD Profile:

3.1 X-ray Diffraction (XRD) Profile

X-ray diffraction (XRD) analysis of SK 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° to 100° at a scanning rate of $3^{\circ}/\text{min}$. and scan step of 0.01° . The of iron oxide, chalcocynite phase is confirmed.

The XRD profile of **Suvarnamakshik** bhasma confirms presence of Hematite, chalcocynite.

3.2 FTIR:

Table 4:

Name of The Product	Suvarnamakshik Bhasma
Wavenumber (cm^{-1})	570 = Fe-O bond , 490= CuO
Remark	FTIR spectra of Suvarnamakshik bhasma shows the characteristic peaks at 562-cm^{-1} for Fe-O, at 490 cm^{-1} for Cu-O.

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

The samples of **Suvarnamakshik** 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 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

Table 6 : CEM MARS 6 microwave digestion system operating parameters

Instrumental Parameters	Iron (Fe)
Acid used for Digestion	HCL
Method	Fe

Temperature	170°C
Pressure	650 psi
Ramp Time	20 min.
Hold Time	10 min.
Cooling Time	15 min.

Calculation: Elemental Assay by ICP-OES:

Suvarnamakshik Bhasma- FBS-001

$$4.692 \times 250 \times 25$$

$$\text{-----} \times 100 = \mathbf{46.18 \% \text{ of Iron}}$$

$$2.5 \times 1000 \times 25.4$$

$$1.383 \times 250 \times 25$$

$$\text{-----} \times 100 = \mathbf{13.61 \% \text{ of copper}}$$

$$2.5 \times 1000 \times 25.4$$

$$(0.609 - 0.173) \times 250 \times 25$$

$$\text{-----} \times 100 = \mathbf{4.29 \% \text{ of Sulphur}}$$

$$2.5 \times 1000 \times 25.4$$

Suvarnamakshik Bhasma- FBS-002

$$4.400 \times 250 \times 25$$

$$\text{-----} \times 100 = \mathbf{45.45 \% \text{ of Iron}}$$

$$2.5 \times 1000 \times 24.2$$

$$1.529 \times 250 \times 25$$

$$\text{-----} \times 100 = \mathbf{15.80 \% \text{ of copper}}$$

$$2.5 \times 1000 \times 24.2$$

$$(0.675-0.173) \times 250 \times 25$$

$$\text{-----} \times 100 = \mathbf{5.19 \% \text{ of Sulphur}}$$

$$2.5 \times 1000 \times 24.2$$

Suvarnamakshik Bhasma- FBS-003

$$4.925 \times 250 \times 25$$

$$\text{-----} \times 100 = \mathbf{49.05 \% \text{ of Iron}}$$

$$2.5 \times 1000 \times 25.1$$

$$1.498 \times 250 \times 25$$

$$\text{-----} \times 100 = \mathbf{14.92 \% \text{ of copper}}$$

$$2.5 \times 1000 \times 25.1$$

$$(0.676-0.173) \times 250 \times 25$$

$$\text{-----} \times 100 = \mathbf{5.01 \% \text{ of Sulphur}}$$

$$2.5 \times 1000 \times 25.1$$

Suvarnamakshik Bhasma (Final Bulk)

#	Parameters	FBS-001	FBS-002	FBS-003
1	Description	Dark brown powder.	Dark brown powder.	Dark brown powder.
2	Iron (Fe) (%) by ICP-OES	46.18% w/w	45.45% w/w	49.05% w/w
3	Copper (Cu) (%) by ICP-OES	13.61% w/w	15.80% w/w	14.92% w/w

4	Sulphur (S) (%) by ICP-OES	4.29% w/w	5.19% w/w	5.01% w/w
Comparative Data: Table 8				

Table 7: Results of Elemental analysis in Suvarnamakshik Bhasma samples

S:Sample prepared by our method. A,B,C,-Other market samples.

Product Name	Sample	Iron (Fe) in %	Sulphur (S) in %	Copper (Cu) in %
Suvarnamakshik Bhasma	Our sample	45.45	5.19	15.80
Other market sample	A	41.02	4.22	N.D
Other market sample	B	40.32	4.14	N.D
Other market sample	C	39.86	3.68	N.D

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 Suvarnamakshik bhasma prepared by this method shows higher % of iron,copper and sulphur content as compared to other market samples. Traditional ayurvedic medicines are safe to use and has no toxic effect.

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