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An Analytical Study of *Swarnmakshik bhasma* in View of its Efficacy and Safety

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Abstract

Bhasma kalpana is backbone of *Rasaushdhi* which are consecrations from *Rasacharyas*. Swarnamakshik is one of the important *dravya's* classified into *Maharas varg* and is chemically known as Chalcopyrite. In the present study *Swarnamakshik bhasma* prepared, and analyzed to develop the standard manufacturing procedure. Each unit operative procedure was considered as an independent process and an attempt was made to validate each procedure. Raw *Swarnamakshik* and *Hingul* were taken according to classic text *grahyatwa.* The sample with higher percentage of Copper was taken for study. X-Ray diffraction technique was used to test its chemical components. *Shodhan* (Purification) and *Maran* (Incineration) was done as per references. The black reddish coloured *(rakt krishnabh) Hingulmarit Swarnamakshik bhasma* was obtained after subjecting to 9 *puta.* Finally, *bhasma* was subjected to physical and chemical analysis. In atomic absorption spectroscopy (AAS) Copper found to be 0.17%, Iron 61.92% and Sulphur 1.42%. Its Ph value was 5.9 and Ash Value was 98.88%.

Keywords

Bhasma, Swarnamakshik (SM), Hingul, Hingulmarit, Swarnamakshik

Greentree Group

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INTRODUCTION

The demand for Ayurvedic formulations have been raised globally due to increased response towards Ayurvedic systems of medicines. Due to commercialization of Ayurvedic drugs manufacturing standards, quality control and safety become an essential requirement. This is a need of the hour, standardization of Ayurvedic drugs will help in global acceptance of Ayurved formulations[1]. Hence defining standard operating procedures for Ayurved formulation is primary thing towards ensure its efficacy and safety.

Metals and minerals as such in elemental form cannot be used for the therapeutic use, as they are highly toxic and cannot be absorbed, but the *Ras Shatriya* pharmaceutical process like *Shodhan* (Purification/ Detoxification)[2], *Maran* (Incineration/ Calcinations) make them in such a form (compound) that they become highly effective[3].

Rashaushadhi are an integral part of Ayurvedic therapeutic medicines. The Rasaushadis are mainly Mercury containing preparations, which has excellent medicinal properties. The qualities of *Rasaushadhi's* are briefly described in *Rasgranthans*[4] as

अल्पमात्रोपयोगीत्वादरुचेरप्रसंगतः।

क्षिप्रमारोग्यदायीत्वादौषधीभ्योऽधिकोरसः। र. चं.

Swarnamakshik bhasma is an important content in some ayurvedic therapeutic medicines; The *Swarnamakshik* preparations are described in *Rasgrantha*s with excellent curative properties. *Hingulmarit Swanmakshik bhasma* is considered as more effective than prepared with others *marak dravyas*[5].

Aims and Objectives

1. To prepare *Hingulmarit Swarnamakshik bhasma*.
2. To study the physical and chemical analysis of the *hingulmarit Swarnmakshik bhasma* regarding its efficacy and safety.

Material and Methods

1. Selection of sample *Swarnamkshik* - According to *Grahyatwa* in *Rasgranthas*.
2. Its chemical component were checked and studied by XRD Analysis.**(Figure.7)**
3. Selection of *Hingul (Maran dravya)* – According to *Grahyatwa* in *Rasgranthas*.

Shodhan of *Swarnamakshik*

1. Ref.-*Rastarangini 21/15-17*
2. Principle – *Nirwapan* (Heating and dipping)
3. Material required – Raw *Swarnamakshik , Nimbu swaras*.

Observations

Effect on *Swarnmakshik* after every *Nirwapan* are shown in table1 **(Figure.1)**

Shodhan* of *Hingul

1. Ref – *Rastarangini* 9/16/17
2. Principle – *Mardan* (In *Khalwayntra*)
3. Material required – Raw *Hingul* and *Nimbu swaras.*

Observation

The color of *Hingul* became light red than original colour as before *shodhan*.**(Figure 2)**

***Maran* (Incineration)**

1. Ref – *Rastarangini*21,23-25
2. Principle – *Puta*
3. Material –*Shudhha Swarnmakshik, Shudhha Hingul, Nimbu swaras*.
4. *Maran* was done as per references, however with slight modification of method. Coal was used with cow dung cakes for *puta*.**(Figure 3)**

Observation (**Table 2)**

Physical Analysis (Table 3)

Bhasma Pariksha – *Swarnmakshik Bhasma* was subjected to the following tests.

1. *Rekhapurnatwa*
2. *Waritar*
3. *Nishchandratwa*
4. *Uttam*
5. *Nirdhum*
6. *Niswadu*
7. *Unam*
8. *Apunarbhaw*

Special tests for *Swarnamakshik*

1. Amla Pariksha

Test with	***Swarnamakshik*** Sample After 9 *puta*		
	24 hrs	48 hrs	72 hrs
Dahi (Curd)	+	+	+
Nimbu Swaras	+	+	+

2. Awami Pariksha

After 8 *puta*	After 9 *puta*
+	++

Swarnmakshik Bhasma was also tested for AAS (Atomic Absorption Spectrophotoscopy) for elemental assay of Cu and Fe.

Chemical Analysis - Results of chemical analysis are shown in Table 4

From the data analysis it is revealed that, *Hingul marit Swarnmakshik bhasm* can be

prepared in 9 *Puta* by Classical procedure, which can be use therapeutically.

DISCUSSION

The objective of the present study is to standardize the preparation method of *Swarnamakshik bhasma*. The *bhasma* prepared with *Parad* or *Parad* combination as a media (*maran dravya*) are considered superior to other *Bhasma*. In this study *Hingul* (Red sulphide of mercury) HgS was used as a media for *Swarnamakshik bhasma* preparation. XRD study of *Swarnamakshik*

Table 1 Purification of *Swarnmakshik (Shodhan)*

Days	Time taken for shodhan (Hrs)	PH of Nimbu Swaras		Chandrika	Appearance	Colour	Initial Weight (gms) 1200 gms	Weight loss (gms)
		Before	After					
1	3.3	2	6	Higher	*Alpa Bhangur*	Blackish red	1180	20
2	3	2	6	Higher	*Alpa Bhangur*	Blackish red	1172	08
3	2.3	2	6	Higher	*Madhyam Bhangur*	Redish black	1160	12
4	2.3	2	4	Higher	*Madhyam Bhangur*	Redish black	1153	07
5	2.45	2	4	Higher	*Bhangurtwa*	Redish black	1142	11
6	2.15	2	4	Higher	*Bhangurtwa*	Redish black	1130	12
7	2.3	2	4	Higher	Crude Powder	Redish black	1120	10
8	2.3	2	4	Medium	Crude powder	Light Redish	1104	16
9	2.3	2	4	Medium	Powder	Light redish	1095	09
10	2.3	2	4	Medium	Powder	Light redish	1080	15
11	2.3	2	4	Medium	Powder	Redish	1070	10
12	2.2	2	4	Medium	Soft powder	Redish	1065	5
13	2.3	2	4	Medium	Soft Powder	Redish	1050	15
14	2.15	2	4	Less	Soft powder	Redish	1045	05
15	2.3	2	4	Less	Soft powder	Redish	1030	15
16	2.3	2	4	Less	Soft powder	Redish	1025	05
17	2.1	2	4	Less	Soft powder	Redish	1010	15
18	2.15	2	4	Less	Soft powder	Redish	1004	06
19	2.2	2	4	Less	Soft powder	Redish	998	06
20	2	2	4	Less	Soft powder	Redish	989	09
21	1.3	2	4	Less	Soft powder	Redish	980	

Indicates the purity of sample and it was also supportive to *grahyagrahyatwa* according to classic texts. *Samanya shodhan* of *Swarnamakshik is done by Nirwapan*. *Swarnamakshik* was heated red hot and dipped into *Nimbu swaras*. This procedure repeated for 21 times as per text and each time *Nimbu swaras* was changed. When hot *Swarnamakshik* was dipped into liquid *Nimbu swaras* some sound produced and

Table 2 Incineration of Swarnmakshik (Maran)

Puta No.	**Heat (Agni Praman)**		**Rupa**	**Sparsh**	**Shabda**	**Ras**	**Gandh**	**SM + H (Total wt) gms**	**Wt gain (gms)**	**Wtl oss (gms)**
	Charcoal (Gms	Cow dung cakes								
1	750	8	Krushnabh	Khara	Dantogrey Kacha-kach	Niras	Nirgandh	551	357	194
2	750	8	Krushn Raktabh	Khara	Dantogrey Kacha	Niras	Nirgandh	402	343	59
3	750	8	Krushn Raktabh	Khara	Dantogrey Kacha	Niras	Nirgandh	385	340	45
4	750	8	Krushn Raktabh	Khara	Dantogrey Kacha-kach (Ishat)	Niras	Nirgandh	382	334	48
5	750	8	Rakta krushnabh	Shlakshna	Dantogrey Kacha-kach (Ishat)	Niras	Nirgandh	376	320	56
6	750	8	Rakta krushnabh	Shlakshna	Dantogrey Kacha-kach Abhav	Niras	Nirgandh	360	300	60
7	750	8	Rakta krushnabh	Shlakshna	Dantogrey Kacha Abhav	Niras	Nirgandh	338	290	48
8	750	8	Rakta krushnabh	Shlakshna	Dantogrey Kacha Abhav	Niras	Nirgandh	326	280	46
9	750	6	Rakta krushnabh	Shlakshna	Dantogrey Kacha Abhav	Niras	Nirgandh	315	262	53

SM-Swarnmakshik, *H- Hingul

Vapors were liberated from the media. *Swarnamakshik* becomes soft and changed to powder form in some last dipping.

Swarnamakshik loose its shine after every dipping. *The detailed observations are shown in* ***Table 1***

Incineration of *Swarnamakshik* with *Hingul*

Hingul shodhan done with *mardan* principle in *Khalwa yantra* as described in texts. It is observed that colour of *Hingul* becomes light red than original colour as before *shodhan. Maran* (incineration) was done according to *Rastarangini* reference. Total 9 Puta was given to *Swarnamkshik*, after every *puta* physical analysis of *bhasma* was done and *bhasma* rubbed after every *puta* for 3 hrs. Coal 750 gm and 8 cow dungcakes were used for each *puta*. Parameters of heat were decided according to quantity of *Swarnamakshik* and *Hingul*. Moreover, in *Rasgrantha* there is a reference of *Gajaputa* for preparation *Swarnamakshik bhasma*[5]. In such quantity of heat if we give it to 1000 gms of *Swarnamakshik* it turned into hard means *Satwapatana* happens. Hence experimental study reveals that to keep constant temperature for *Swarnamakshik* to prepared desired compound. Reports of chemical analysis reports in **Table 4/ Graph 1**.

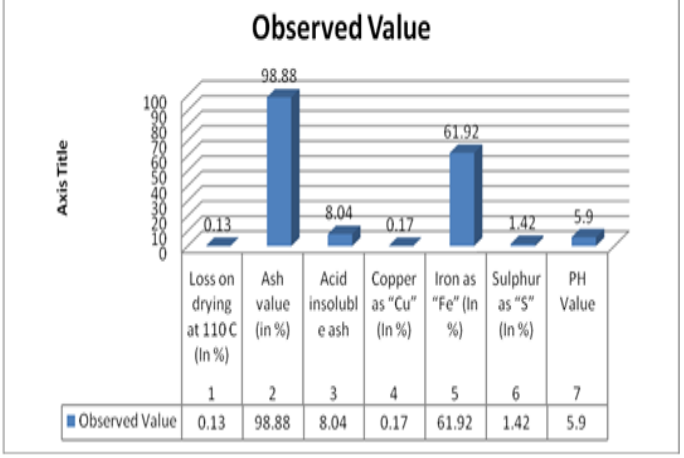
Physical Analysis –

The colour of *Swarnamakshik* obtained was dark reddish (*rakt krishnabh*) colour indicates the formation of specific compound. The dark red colour indicates the formation of either Oxide or Sulfide or both. Tests like *Rekhapurnatwa* (**Figure 4**) and *Waritartwa* **(Figure 5)** indicates the lightness and fineness of the prepared *bhasma*. *Awami* **(Figure 6)** nature of *Swarnamakshik bhasma* indicates that there is no free Copper or any unwanted compound like Copper Sulfate. Further no discoloration in curd test even after 72 hrs proves that there is no free Copper or Copper Sulfate in final product. *Awami* and

Table 3 Detection of copper and iron by atomic absorption spectrophotometer (AAS)

Sample	Element	Wave length (nm)	Concentration
SM+H	Cu	324.7	1700ppm
(Hinglul marit Swarn makshik)	Fe	248.3	61.92 %

Table 4 – Chemical analysis of Swarnmakshik bhasma



no discoloration in urd test should be considered as main test to assess the properly prepared *Swarnamakshik bhasma*[6].

Chemical Analysis

During the heat treatment for multiple time *puta* some Sulfide may get converted into Oxides, the reason is metallic Sulfides when heated in air get converted to Oxides of the Metal and Sulfur dioxide[9]. Therefore, *Swarnamakshik bhasma* was considered as a mixture oxides and sulfides. *Bhasma* analyzed through AAS (Atomic Absorption Spectrophotoscopy) for elemental assay of Copper, Iron and Sulphur and for particle size too. In this analysis wavelength for Copper concentration was 1700 ppm. Small particle size enhances the absorption hence the bio-availability and thus potency of the drug increases resulting in decrease in its dose. This finally results in lowering drug related side effect.

Adopted method in this study is convenient and heating temperature is also can be considered as standard. Curd test is the simplest test to detect presence to free copper in *bhasma*, the study proved that, after the 9 *puta*, the curd test was positive after 72 hours, which indicates that, the free copper is not present in the final product. To finalize the preparations of *Swranamakshik Bhasma* another two important tests mentioned in classical text viz., *Rekhapurnatwa* and *Waritaratwa* were found positive.

After 9 *puta bhasma* becomes so fine and reaches to micron level in XRD Analysis. Other elements also found in traces.

CONCLUSION

Fig -1 Purification of Swarnmakshik (After21 times nirwapan/dipping)

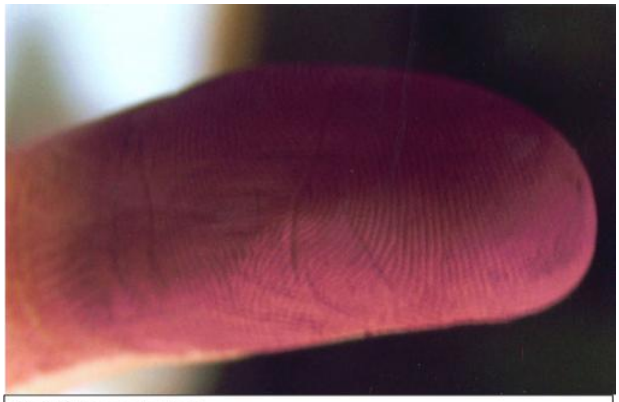


Fig-4 Rekhapurnatwa test

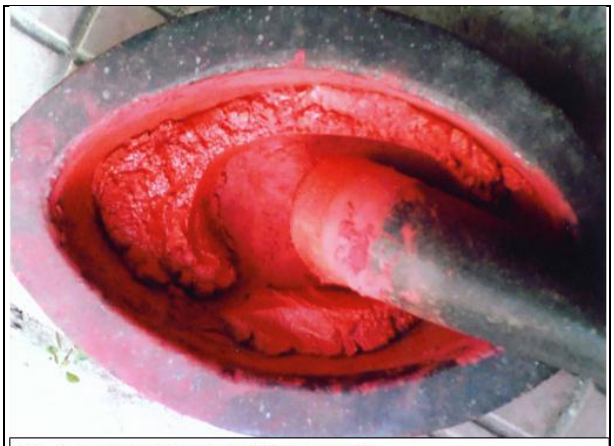


Fig – 2 Purification of Hingul (Rubbing / Mardan)

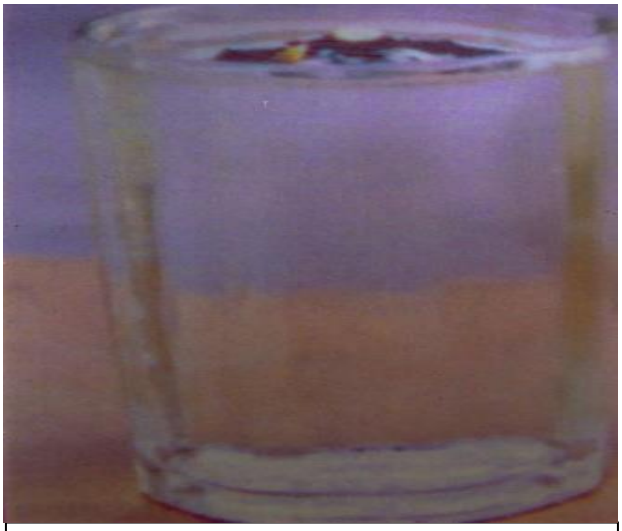


Fig 5 Waritar and Uttam / Unnam test

Fig- 3 Incineration of swarnmakshik (9th Puta)

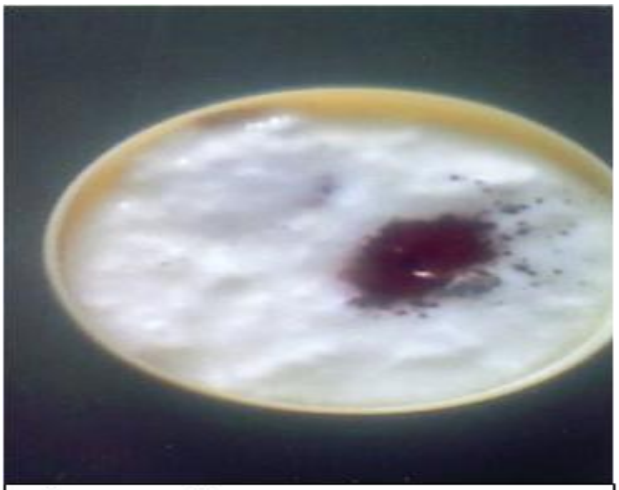


Fig – 6 Curd test

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