



## A PHARMACEUTICAL AND ANALYTICAL STUDIES ON SWARNA MAKSHIKA BHASMA

**Dr. Akhilesh Sahu<sup>1\*</sup> Dr. Shivhar Ophale<sup>2</sup>, Dr. Chandreshwar Prasad Sinha<sup>3</sup> and  
Dr. Amit Kumar Sharma<sup>4</sup>**

<sup>1</sup>Lecturer, Dept of RSBK, Rajiv Lochan Ayurveda College and Hospital, Chandkhuri, Durg.

<sup>2</sup>Reader, Dept of RSBK, Rajiv Lochan Ayurveda College and Hospital, Chandkhuri, Durg.

<sup>3</sup>Reader, Dept of Kayachikitsa, Rajiv Lochan Ayurveda College and Hospital, Chandkhuri,  
Durg.

<sup>4</sup>Lecturer, Dept of Shalya Tantra, Rajiv Lochan Ayurveda College and Hospital, Chandkhuri,  
Durg.

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### \*Corresponding Author

**Dr. Akhilesh Sahu**

Lecturer, Dept of RSBK,  
Rajiv Lochan Ayurveda  
College and Hospital,  
Chandkhuri, Durg.

### ABSTRACT

Swarna Makshika (Chalcopyrite) is one of the main ores of Copper. It is also known as Copper pyrite. Swarna Makshika Bhasma is one such a drug, which is being used since ancient days. The classical texts of Ayurveda mentioned Swarna Makshika in the cure of various disorders. The present study aims at evaluation of Swarna Makshika Bhasma which was prepared by selected Sodhana (Purification) and Marana (Incineration) process. The prepared Swarnamakshika was analyzed with standard parameters. It was also characterized by using Particle size analyzer, The results are discussed in this paper.

**KEYWORDS:** Process, Sodhana, Marana, Puta, Analysis.

### INTRODUCTION

As Swarnamakshika Bhasma is one of the most important drugs in Rasashastra Formulation. We can found number of formulations of Swarnamakshika Bhasma in the Ayurvedic Samhita, which are useful in many disease. Swarna makshika is included under Maharasa, Uparasa, Upadhatu by various authors. Since Samhita Kala till today it has occupied an important place in Ayurvedic system of healing. It has a great importance in alchemical and therapeutic point of view. This is well explained in Rasa Ratna Samuchaya.<sup>[1]</sup>

Swarna Makshika has a typical chemical composition of Copper, Sulphur and Iron. These three elements are essential and play a vital role in the formation of Haemoglobin. Due to this it can cure various diseases alone and as a compound drug. Swarna Makshika Bhasma is considered therapeutically superior to other bhasmas of the iron group. It is also considered therapeutically superior because it has a yogavahi guna meaning that this drug has synergetic action.

In the Era of Globalization, to meet international standards, Good manufacturing practices are necessary. They can provide essential quality assurance of the drugs. So variations in the Bhasma preparation have become major problem. In order to over come variation in the Agnipaka, this study is a steps towards the standard preparation of Bhasma.

### **AIMS AND OBJECTIVES**

- Preparation of Swarnamakshik Shodhan as per reference Rasatarangini.
- Preparation of Swarnamakshik bhasma by puta as per reference Rasatarangini.
- To compare analytical study of Suddha Swarnamakshik and Swarnamakshik bhasma.
- Evaluate how much temperature required in puta Kalpana.

### **MATERIALS AND METHOD**

Hence detail practical study was carried out in this research work.

1. Pharmaceutical Study.
2. Analytical Study.

Raw Swarna makshika was procured from the copper mines Govt of India, khetri, Rajasthan. Other allied material i.e. Gandhaka, Parada and Lemon is procured from the local market.

### **Shodhana of Swarna Makshika**

Reference: Rasa Tarangini- 21/17

Principle: Nirvapana

Ingredients: Raw Swarna Makshika: 1 kg & Lemon juice: q.s.

Equipments: Iron pan, Spatula, Kosthi, Khalva yantra

### **Procedure**

1. Swarnamakshika pieces were taken in an iron pan.
3. Pieces of Swarnamakshika were heated in strong fire flame till they Became red hot.

4. The pieces of Swarnamakshika were turned up and down with an iron ladle to give equal exposure of heat from all Side.
5. When Swarnamakshika pieces became completely red hot, they were Quickly dipped into the vessel containing Nimbu Swaras.
9. The procedure was repeated for 21 times and every time new Nimbu Swaras was used.

### Observation

After 21 Nirvapa the Shodhit Swarnamakshika was having small, Soft and less sharp particles, Luster was decreased , Colour became black to more bright red and it was turned mostly in powdered form.

Colour of Nimbu Swaras became faint yellowish to greenish black.

Bluish scum was found over surface but it was not thick.

### RESULTS

- Initial weight of Swarnamakshika – 1kg
- Weight of Swarnamakshika after Shodhana – 780gm.
- Loss of weight after Shodhana - 220gm.

### Marana of Swarna Makshika

Reference: R T- 21/21,22

Principle: Puta paka

Ingredients: Shodhit Swarnamakshika - 390gm

Shodhit Gandhak – 390gm

Nimbu Swarasa – 400 ml

Equipments - Khalvayantra, Multani miti, Muslim cloth, Waging machine, Plastic sheet, S.S.Spatula, 2 Equal size Sharava. Cow dung cake, Knife, Pyrometer etc.

### METHOD

The whole method of Swarnamakshika marana was completed in following stages.

Bhavana

Preparation of chakrikas

Preparation of Sharava Samputa.

Puta Prakriya

Sudha swarnamakshika added equal quantity of sudha gandhak , given bhavan with nmibu swaras then it prepared chakrika and subjected to 12 Gajaputa.

## RESULTS

Initial weight of Swarnamakshika – 390 gm

Weight of Swarnamakshika after Bhasma– 229gm

Loss of weight after Bhasma – 81 gm

Sample collection – 80 gm

### Observation of Marana of Swarnamakshika.

Putra No	No of cow dung (B/A sharava)	Wt of SM + Gandhak before puta in gm	Wt of SM After Put in gm	Loss of wt SM + Sample wt	Date of Ignition	Date of Completion	observation
1	120 85/35	390 +390	374	16 +10	24.9.12	26.9.12	Chakrikas hard,Black
2	120 85/35	364 +364	360	4 +10	27.9.12	29.9.12	Chakrikas hard
3	120 85/35	350 +350	337	13 +7	3.10.12	5.10.12	Chakrikas Soft Blackish
4	120 85/35	330 +330	318	12 +8	8.10.12	10.10.12	Chakrikas Soft Blackish
5	120 85/35	310 +310	305	5+5	11.10.12	13.10.12	Chakrikas soft ,Red
6	120 85/35	300 +300	293	7 +8	15.10.12	17.10.12	Chakrikas Soft, redish
7	120 85/35	285 +285	281	4+6	18.10.12	20.10.12	Chakrikas soft, radish
8	125 90/35	275 + 275	265	3 + 5	22.10.12	24.10.12	Chakrikas soft redish
9	125 90/35	265+265	262	3+7	27.10.12	29.10.12	Chakrikas soft radish
10	130 95/35	255 +255	251	4+6	30.10.12	1.11.12	Chakrikas Swelled,
11	130 95/35	245 + 245	241	4 + 6	7.12.12	9.12.12	Chakrikas Swelled, Crispy
12	130 95/35	235 + 235	229	6+9	11.12.12	13.12.12	Chakrikas Swelled, Crispy

## Showing Temperature Pattern of Puta at 15 minutes interval (Traditional Method)

Time in Hrs	Put a-1	Put a-2	Put a-3	Put a-4	Put a-5	Put a-6	Put a-7	Put a-8	Put a-9	Put a-10	Put a-11	Put a-12
Initial	27	29	28	30	28	27	30	29	27	30	26	29
0.15	200	185	213	195	178	217	234	167	212	198	212	204
0.30	396	387	393	388	369	399	402	389	387	288	400	388
0.45	587	555	590	565	583	566	549	577	497	534	521	562
1.00	734	698	733	687	673	732	698	787	722	676	712	677
1.15	830	758	856	743	765	787	765	857	811	788	804	745
1.30	822	854	848	803	843	844	806	844	859	812	837	805
1.45	853	822	811	865	812	802	852	801	834	853	861	861
2.00	780	795	791	809	788	790	807	788	811	809	803	811
2.15	762	766	777	793	765	758	790	765	793	788	793	789
2.30	736	737	742	755	742	737	768	754	766	762	753	764
2.45	728	729	734	732	725	722	748	741	739	743	722	743
3.00	714	716	722	698	701	709	718	712	709	712	711	718
3.15	702	692	709	678	687	683	701	691	687	697	700	697
3.30	691	687	688	658	666	671	687	672	653	683	672	673
3.45	676	673	677	641	648	657	667	654	643	672	652	654
4.00	659	653	651	627	632	642	647	637	628	652	638	628
4.15	648	651	648	611	617	622	629	617	605	643	619	611
4.30	639	629	632	597	598	603	610	588	576	632	593	592
4.45	629	609	599	567	586	587	588	553	548	589	578	568
5.00	615	598	587	545	563	566	564	538	524	561	556	547
5.15	602	577	574	527	542	541	537	521	511	541	535	533
5.30	580	560	535	489	504	527	514	507	497	523	512	509
5.45	543	544	512	464	487	501	498	484	464	503	500	486
6.00	506	511	498	442	462	487	467	458	438	477	481	468
6.15	476	488	478	428	444	440	451	436	421	453	460	444
6.30	442	463	443	411	423	419	432	414	402	432	429	438
6.45	405	411	422	387	403	381	401	397	367	408	411	417
7.00	387	389	392	357	383	355	377	359	345	388	396	400
7.15	354	366	351	336	363	336	334	341	321	375	353	376
7.30	307	312	339	306	342	311	315	320	307	338	319	327
7.45	287	293	307	267	311	278	288	293	267	286	277	269
8.00	258	265	287	244	284	246	256	265	243	256	243	232
8.15	235	238	245	213	243	222	225	234	217	233	212	209
8.30	211	214	222	187	209	202	211	219	189	204	188	187
8.45	195	197	199	163	177	179	187	185	156	187	165	161
9.00	187	179	180	134	156	134	152	153	122	163	137	141
9.15	163	166	163	122	137	125	138	139	114	143	128	127
9.30	145	147	153	102	111	103	114	119	102	124	105	111
9.45	132	138	142	96	87	91	101	102	85	98	95	94
10.00	108	111	129	67	72	65	90	91	51	65	65	77
10.55	96	97	102	54	51	42	78	87		50	43	51
10.30	81	83	92				54	65		43		39
10.45	67	68	79					47				
11.00	60	58	58									
11.15	52	48	39									

**BHASMA PAREEKSHA (Ayurvedic Parameters of testing Bhasma)****Varitara**

A little amount of prepared Swarnamakshika Bhasma was put on the surface of water and observed. It was found that the bhasma particles float on surface of the water. Surface tension is the principle of Varitara Pareeksha.<sup>[5]</sup>

**Rekhapurnata**

A pinch of bhasma was rubbed in between the thumb and the index finger. It was observed that the bhasma particles enter in to the furrows of the fingers.<sup>[6]</sup>

**Nischandratva**

The bhasma was taken in a Petri dish and observed for luster in daylight through magnifying glass. No luster was observed.

**Nisvadu**

The prepared Swarnamakshika bhasma was found to be tasteless when a small quantity was kept on the tongue.

**Avami**

Ingestion of 5 – 10 mg of bhasma did not produce any nausea or vomiting.

**Amla Pariksha**

A small quantity of bhasma was mixed with little amount of curd in a Petri dish and observed for any colour change. No colour change was observed. Hence the bhasma prepared is of good quality according to Ayurvedic parameters.

**Analysis of Swarnamakshika**

Sr. no	Test	Raw Swarnamakshika	Sodhit Swarnamakshika	Swarnamakshika Bhasma
1	pH	6.59	4.20	2.59
2	Total Ash Value	68.92	87.52	97.21
3	Water Soluble Ash	68.92	54.17	65.77
4	Acid in Soluble Ash	38.47	38.34	79.40
5	loss on Drying	0.39	0.71	0.83

**Assay of Element Swarnamakshika**

Sr. n.	Constituents	Raw Swarnamakshika	Sodhit Swarnamakshika	Swarnamakshika bhasma
1	Cu	6.47	9.43	12.70
2	Fe	11.23	13.23	23.43
3	S	6.98	2.26	1.58

**Particle size**

Sr.n.	Constituents	Raw Swarnamakshika	Sodhit Swarnamakshika	Swarnamakshika Bhasma
1	$\mu\text{m}$	415.39	130.79	69.37

**DISCUSSION**

In this study, nimbu swarasa were used for sodhana of swarna makshika by Nirvapan method. In this procedure blackish powder of swarna makshika turns to reddish brown. During the process sulphur burns out which are evident from the fact that the sulphur smell is felt.

In the marana process, added equal quantity of sudha gandhak, given bhavan with nimbu swaras and Gaga puta was given. The colour of chakrikas were initially reddish brown and changes to slight brown by 5th puta and to brown colour by 10th puta. Amla rasa was not seen after 11th puta. Chandrika (luster) was lost by 12 putas. It attained rekhapurnata in 11th puta and varitara in 10th puta. By the end of 12th puta all the bhasma lakshanas like nisvadu, varitara, rekapurnata etc.

The total ash of the final product was 97.21% which shows the presence of more inorganic matter. Sieve Analysis and Particle Size Analysis confirms the presence of micron sized particles.

**CONCLUSION**

The process of sodhana and marana play a vital role in the conversion of raw swarna makshika in to absorbable Swarna Makshika Bhasma. Among the different methods of sodhana and marana of swarna makshika, specific methods were selected and adopted in this study. According to the classics, 5–8 putas are sufficient to attain bhasma. But in contrast to the classics, the desired bhasma lakshanas were obtained after 12th puta only. The increase in number of putas decreases the doshas. Subsequently the gunas of Swarna Makshika Bhasma increases therapeutically. There is a notable difference found in the particle size of the final product. It facilitates the easy absorption and assimilation of the drug in to the body

system. Thus, the prepared Swarna Makshika Bhasma satisfies both ayurvedic and modern parameters of analysis.

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