

## Ancient pharmaceutical techniques of Bhasma and its quality control with special reference to Swarna Makshika Bhasma

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### ABSTRACT

Ancient pharmaceutical techniques are rich enough for preparation of metallic/mineral *bhasmas*, a unique and important dosage form, administered internally in Ayurvedic practice. The quality control methods like *varitara*, *rekhapurna*, *niruttha* etc. described for different *bhasmas* in classical texts are very scientific and worthy even if in today's era. Both physical and chemical assessments of *bhasma* in naked eye observation are really due to the excellent perception of ancient Acharyas for authentication of prepared *bhasma*. *Swarna Makshika* is an important raw material containing copper; iron & sulphur as major ingredient have been used to treat different diseases in its *bhasma* form since many centuries. In current research work *Swarna makshika* is processed with lemon juice and by using conventional *puta* system of heating to achieve its *bhasma*. The *bhasma* thus prepared is validated by using ancient quality control techniques.

**Key words:** Bhasma, Swarna Makshika, Quality Control, Marana.

### INTRODUCTION

*Swarna Makshika* [SM] is a mineral which is frequently used in its *bhasma* form to treat so many diseases like anemia, diabetic syndrome, insomnia and also in diseases caused by high lipid profile. There are lots of pharmaceutical processing techniques for *Swarna makshika* are described in literature of Rasa Shastra (Indian alchemy/ pharmaceuticals). The *bhasma* of said material is prepared in two steps i.e. *shodhana* and *marana*. For both processes several techniques like roasting, heating & quenching etc. for *shodhana* and *puta* system of heating, *kupipakwa* mode of heating etc. for *marana* are available by using different auxiliary materials (i.e. other than [SM]). Lemon juice as ancillary material for both *shodhana* and *marana*, roasting technique for *shodhana* and *puta* system of heating for *marana* are frequently used for [SM]. Quality controls for *bhasmas* are well described in classical texts in very systematic manner, covering

all aspects to assess the *bhasma* physico-chemically. The naked eye, favorable observations for *bhasma Pariksha* in Rasa Shastra is hallmark of its confirmation for clinical practice.

### Pharmaceutical Processing's of Swarna Makshika

#### *Shodhana* of Swarna Makshika<sup>1</sup>

#### Principle

Roasting with frequent addition of lemon juice

### MATERIALS AND METHOD

#### Materials

#### Raw materials

Raw *Swarna Makshika* (Procured from the Ayurvedic Pharmacy, I.M.S, BHU)

Lemon juice (lemon is procured from the market and juice is extracted)

**Equipments**

Iron mortar & pestle, heating device; iron *kadhai*, ladle, pyrometer, weighing balance.

**Method**

- At first *Swarna Makshika* was made into powder by iron mortar & pestle and taken in a clean and dry iron *kadhai* (pan), heated on the charcoal furnace at about a temperature of 850°C-900°C with frequent addition of lemon juice.
- During the process an iron plate was covered over the iron *kadhai* to avoid the loss of material due to dusting. This process was carried out till cessation of sulphur fumes and appearance of red colour in the material.
- The above procedure was carried out for three days.

**Observations**

- During the heating of *Swarna Makshika*, fumes of sulphur odor was observed.
- During the addition of lemon juice to the heating iron *kadhai*, containing *Swarna Makshika* dusting of the material was observed.
- Initially the colour of *Swarna Makshika* was observed greenish black that gradually become purple and finally reddish brown colour was observed after completion of the process.
- Total duration of 3 days was required for completion of *shodhana* process. After completion of the process loss in weight of raw material was observed.

**Marana of Swarna Makshika<sup>2</sup>****Principle**

*Putra* system of heating with 04 kg. Cow dung cake.

**MATERIAL AND METHODS****Materials****Raw materials**

- Suddha Swarna Makshika* (prepared in the above stated process).
- Lemon juice q.s. (lemon is procured from the market and juice is extracted)

**Equipments**

Stone mortar with pestle, spatula, earthen casseroles (*sarava*), rag & mud (*kapad miti*), cow dung cake, *puta* system of heating, pyrometer.

**Method**

The whole process of *marana* is completed in following sub steps, those have very significant role towards the quality of finished product.

**Bhavana (Wet Trituration)**

- Accurately weighed *suddha swarna makshika* powder was taken into a clean and dry stone mortar. Then freshly prepared lemon juice was poured into the mortar (*khalva*), till it causes complete dipping of all the material in the mortar (*khalva*).
- Continuous trituration was done by adding lemon juice when required, till the paste formed become sufficiently smooth and features of proper *bhavana* were observed. The same procedure was executed for each firing till the desired quality of *bhasma* is achieved.

**Pelletisation**

After completion of the *bhavana* process the paste thus formed is subjected to pelletisation. In this step pellets of uniform size and thickness were prepared and dried in sun shine.

**Sarava Samputikarana**

- Properly dried, weighed, pellets were arranged inside the *sarava* so as to facilitate proper distribution of heat to all the pellets.
- Then another *sarava* was covered over it so as to fit perfectly by mouth to mouth, then the joint was sealed by turning the *kapad miti* for seven times and dried in sun shine.

**Putra system of heating**

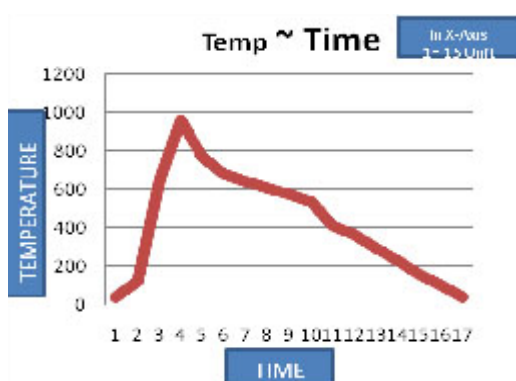
- Properly sealed and dried *samputa* was subjected to *puta* system of heating with four kg cow dung cake in each time.
- During heating in *puta* system the dried *samputa* containing pellets was kept in between the cow dung cakes and cow dung cakes were arranged properly so that the uniform heat could be provided to the



Raw swarna makshika

Shodhita swarna makshika

Swarna makshika bhasma



**Fig. 1: Graph: Temperature ~ Time, Recorded during puta System of Heating**

*samputa* from all corner.

Pyrometer was set at the base of the *samputa* to record the temperature pattern during the process.

### Observations

The white fume with sulphur odor was observed during the early firings.

Gradually flame was appeared and reached around 1ft high, then slowly declined.

Temperature pattern was recorded through the pyrometer; on every 15 min. 980°C was observed the highest peak temperature and was retained for about 05 min.

Initial greenish-black pellets were turned to brownish-black after 3<sup>rd</sup> *puta*, from 3<sup>rd</sup> to 8<sup>th</sup> *puta* colour of product was observed blackish-brown and testing parameters did not sustain.

After 11<sup>th</sup> firing the colour of the product was

observed Reddish brown and found competent with all the *bhasma parikshya* including *amla parikshya*.

After completion of the process finally weight gain was observed.

### Ancient quality control parameters followed for evaluation of *Bhasma* [3]

#### *Rekhapurnatvam*

A pinch of *bhasma* was taken in between the thumb and index and rubbed. It was observed that the *bhasma* enters into the lines of the finger which was not easily cleansed out from the cleavage of finger lines. It signifies the smaller particle size of *bhasma* even if in the nano-range.

#### *Vritaratavam*

Small amount of the prepared *bhasma* was taken and sprinkled over the silent water taken into a beaker. It was found that the *bhasma* particles float over the surface of the water. It indicates the lightness of *bhasma*.

#### *Uttama*

The prepared *bhasma* was found to with stand on floating on water surface when one rice particle was placed over it. It confirms the very lightness of *bhasma*

#### *Nisvadutvam*

The prepared *bhasma* was found tasteless when a small amount was kept over the tongue. This test signifies the tastelessness of *bhasma* and facilitates its palatability for all.

**Dantagre na kach kacha iti**

When a small amount of the *bhasma* was placed between the teeth, no any sandy feeling was appreciated. This test proves the smoothness of the *bhasma*

**Nischandratvam**

The prepared *bhasma* must have loss of shining and metallic luster even on observing through magnifying glass. This indicates absence of free metal.

**Amla Parikshya**

A pinch of prepared *bhasma* was mixed with little amount *dadhi* (curd) taken in a clean and dry Petridis, kept for 24h. and then observed for any colour change. No colour change of *dadhi* (curd) was observed. The same procedure was followed with lemon juice taken in a test tube and same observation was found. This test confirms absence of free metal.

**Avami**

Intake of small amount of the *bhasma* prepared did not produce any nausea / vomiting.

**Table 1: Showing Temperature pattern Observed in Puta System of Heating, for 4 kg. Cow dung cake**

S. No.	Time (min)	Temperature (°C)
1.	0	40
2.	15	120
3.	30	650
4.	45	980
5.	60	770
6.	75	680
7.	90	640
8.	105	605
9.	120	576
10.	135	535
11.	150	410
12.	165	365
13.	180	295
14.	195	230
15.	210	160
16.	225	100
17.	240	40

**Specific Taste with Lemon juice and curd**

As one of the composition of raw material is copper, the prepared *bhasma* was subjected to lemon juice and curd taste. It was found that after mixing prepared *bhasma* with both lemon juice and curd intimately there was no colour change observed both in short term as well as long term reaction indicates *bhasma* prepared properly.

**DISCUSSION**

Literatures of Rasa Shastra are enriched with pharmaceutical processing techniques of metals and minerals. Amongst different processing techniques like roasting, heating and quenching, pounding etc. roasting with lemon juice is found suitable for *swarna makshika shodhana*. For *marana* 04 kg. cow dung cake as fuel is found suitable for preparation of its *bhasma* in a total of 11 number of firings (*putas*). The quality controls of metallic *bhasmas* are well defined in ancient texts and cover all the aspects of its internal administration so far as safety and efficacy is concerned. The assessments are based on naked eye observation but these are very minute and close surveillance to confirm the quality of *bhasma*. Sustaining with all the prescribed physical assessment like *varitara*, *rekhapurna* etc. and chemical assessment like *amlapariksha* substantiate the *makshika bhasma* for its clinical practice.

**CONCLUSION**

Roasting with frequent addition of lemon juice is found suitable for *shodhana* of *swrana makshika*

*Putas* system of heating with 04 kg cow dung cake in each firing and in total of 11 firing is essential for preparation of *swarna makshika bhasma*.

Ancient quality control parameters for metal/mineral *bhasma* are very systematic, easy and low cost with confirmation of its safety and efficacy which is time tested and also proved by different researches<sup>[4]</sup> in current language.

The modern tools and techniques are essential for standardization and validation of *bhasma* in terms of current language.

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