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### ANALYSIS OF *MANDURA BHASMA* BY NAMBURI PHASED SPOT TEST

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**Abstract:** *Mandura* is the slag of Iron and is therapeutically used after proper *Shodhana* and *Marana* processes (calcinations). Chemically *mandura* is the combination of ferric oxide (59.10%), ferrous oxide (26.4%), chlorides (4.2%), magnesium (3.6%), sodium (1.8%) and few other trace elements. Its final product defined as *Mandura Bhasma*, and it is playing a pivotal role in therapeutics of *madhumeh* (Diabetes), *pandurog* (anemia) and other associated disorders. Its hypoglycemic property on experimental models is under progress. Two samples (A&B) of *Mandura bhasma* was prepared by *Ayurvedic* classical methods. *Mandura bhasma* is mainly used in *Prameha* (Diabetes). The prepared *bhasma* was subjected to various *parikshas*, including the Namburi Phased Spot Test (NPST), which is one of the qualitative tests described for various *Ayurvedic* preparations. NPST helps in identifying, various samples of *bhasmas*. It depends upon the pattern of the spot, which develops after a specific chemical reaction.

**Keywords:** Namburi phased spot test, *Mandura bhasma*, Ayurveda, Potassium ferrocyanide, Potassium iodide



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## INTRODUCTION

*Ayurveda* is the science of life dealing with health care of living beings since antiquity. The *Ayurvedic* medicines are formulated by using plant products, animal products, metals and minerals. The drug should be assimilated specially by affected tissues for producing therapeutic efficacy. But metals and minerals when used in raw or unprocessed form not get assimilated to the tissue elements of the body and produce serious toxic effects. To overcome these problems different types of pharmaceutical processes like *Shodhana*, *Marana* (Incineration) etc were invented and they play a great role in converting the material into easily digestible and assimilable form which is homogenous to the body cells as well as non toxic and more potent. This transformation of metals and minerals into acceptable form i.e. *Bhasma* is the unique technology of *Ayurveda*. Methods of *Shodhana* and *Marana* for the same material are described in different texts. Hence this work was planned to study the effect of methods used in *Shodhana* and *Marana* of *Mandura* on the final product obtained i.e. *Mandura Bhasma*.

As *mandura* is used abundantly in practice of *Ayurveda* in *Bhasma* form and it is a metallic preparation. Various references are available for preparation of *Mandura bhasam* in classical texts viz. *Rasatarangini*, *Rasaratnsamuchchay*. Two samples of *Mandura Bhasma* were prepared according to classical text.

The Namburi Phased Spot Test (NPST), a spot test based on a chemical reaction, is a new technique for assessing the quality of a prepared *bhasma*. When a drop of clear solution of a substance under examination (*Bhasma*) is put on specially prepared chemical reacting papers, a spot appears which manifests a series of colour and pattern changes. In chemistry, techniques involving spot tests or chromatography are widely used. The NPST involves observations of the spot and its colour, at three successive phases spread over three different time intervals. It thus has the advantage of measuring sensitivity of reactions at different time intervals. In other words, it constitutes a method to study or detect, every second or even fraction of a second, continual chemical reactions taking place gradually between two chemical substances on static media. The technique was developed and standardized by Dr. Namburi Hanumantha Rao in 1970, it has been accepted by CCRAS, New Delhi.

## MATERIAL AND METHODS:

- Obtaining samples of *Mandura bhasma*: prepared by classical methods .
- Subjecting all samples to classical *bhasma parikshas*

### Preparation of *Mandura Bhasma*

Reference : *Rasa Tarangini* (R. T. 20/129)<sup>[1]</sup>

Principle adopted : *Putapaka* (Incineration)

Bhavana dravya : (Media for lavigation): *Triphala kwatha* (Decoction)

Equipments required : Earthen pot, Electric muffle furnace, Mortar and pestle etc.

Ingredients : *Shodhita Mandura churna* - Sample- A & Sample -B

Triphala kwatha : QS (450-800 ml)

1. Above mentioned quantity of *Shodhita Mandura churna* was taken in mechanized *kharal*.
2. Sufficient quantity (450 ml) of *Triphala Kwatha*<sup>[2]</sup> was added to it and lavigated thoroughly.
3. When the doughy mass became suitable for pelletization it was subjected to make *chakrika* (pellets). Small amount of levigated doughy mass was taken in hands and round flat pellets were made.
4. Maximum precautions were taken to make *chakrikas* of uniform size.
5. *Chakrikas* were then dried in sunrays till they completely loss the moisture content.
6. There after these pellets were collected into small earthen pot (*sarava*) and placed uniformly, and this earthen pot was covered by another earthen pot of same size and *samputa* like structure was prepared.
7. This *samputa* was kept in electric muffle furnace and temperature gradually increased up to 650<sup>0</sup>C, Frequency 30 and maintained for one hour. Then the furnace was switched off and left for self cooling.
8. On the next day after the self cooling the *samputa* was taken out and internal pellets were collected and grinded to prepare fine powder.
9. Same process of *puta* was repeated till proper *Bhasma* was prepared (total 23times).

**Bhasma Parikshas<sup>3,4</sup>:**

**Table No. 1**

Sr. No	Parameter/Test	Mandura Bhasma	
		Sample A	Sample B
1	Colour	Dark Brown	Dark light Brown
2	Odour	Odourless	Odourless
3	Luster	Dull	Dull
4	Transparency	Opaque	Opaque
5	Touch	Smooth, soft	Very smooth, & soft
6.	<i>Rekha poornatvam</i>	Positive	Positive
7.	<i>Varitaratvam</i>	Positive	Positive
8.	<i>Unama</i>	Positive	Positive
9.	<i>Nischandrata</i>	Positive	Positive
10.	<i>Nirdhuma</i>	Positive	Positive

**THE NAMBURI PHASED SPOT TEST (NPST):**

The Sample of *Mandura bhasma* (ferric oxide from slag of iron, old) was taken for spot study.

- Subjecting all samples to NPST<sup>[5]</sup>.
- 5N HNO<sub>3</sub>, 5% HCL, 5% Potassium ferrocyanide paper, 10% Pot.iodide paper, Test tube

**PROCEDURE**

Took 0.25gm. of each sample into a test tube and added 0.5ml of HNO<sub>3</sub>, to one set and 5% HCL v/v to another set of sample.

1. Quantity of *bhasma* : Each 0.25 gms

2. Reagents : 5N HNO<sub>3</sub> and 5% HCL v/v
3. To be heated : Each sample was heated in the test till the bottom appears red before treating with its reagents. Cooled the sample and treated with the reagent and heated again for a while shacked now and then till two hours before they are treated with the chemical reacting paper.
4. Time allowed to react: Treated on 5% Pot. ferrocyanide paper, 10% Pot.iodide paper the bhasma were allowed 40 hours to react with their reagent and 72 hours treat with 10% Pot.iodide paper for a second test.
5. Solution ready for use: After 40 hours studied on 5% Pot. Ferrocyanide paper and 72 hours to 10% Pot.iodide paper.

### Observation :

The solution were used for treating the chemical reacting paper on completion of 40 hours after their preparation.

#### 1. Reaction on 5% Pot.ferrocyanide paper fig no. 1

- **Mandura bhasma** – Sample A & B in 5% HCL v/v. A deep blue central solid spot forms with wide light blue periphery. A blue scrrated margin encircles the periphery over which another green irregular ring encircles.
- **Mandura bhasma** - Sample A & B in 5N HNO<sub>3</sub> v/v. A deep blue central solid surrounded by a narrow light blue area forms. Around this blue and brown scrrated margin encircle.

#### 2. Reaction on 10% Pot.iodide paper. fig no. 2

- **Mandura bhasma**- Sample A & B in 5% HCL v/v. White central zone, Dark brown middle segment, Light brown peripheral segment
- **Mandura bhasma**- Sample A & B in 5N HNO<sub>3</sub> v/v. White central zone Dark brown middle segment, Light brown peripheral segment.

### Observation & inferences:

Bhasma solution was prepared in 5% HCL v//v developed blue central solid spot with light blue periphery followed by blue and green outside margin and bhasma solution was prepared in 5N HNO<sub>3</sub> developed a deep blue solid spot without a blue periphery but with blue brown margin indicate that it is mandura bhasma.

### Observations during Namburi phased spot test of *Mandura Bhasma* Samples A & B

#### ➤ Spotting on 5% potassium ferrocyanide paper :

Phase I (5 minutes) : Darker (blue) central spot, light blue peripheral segment

Phase II (30 minutes) : Darker (blue) central spot ,White middle segment, Light blue  
Peripheral segment

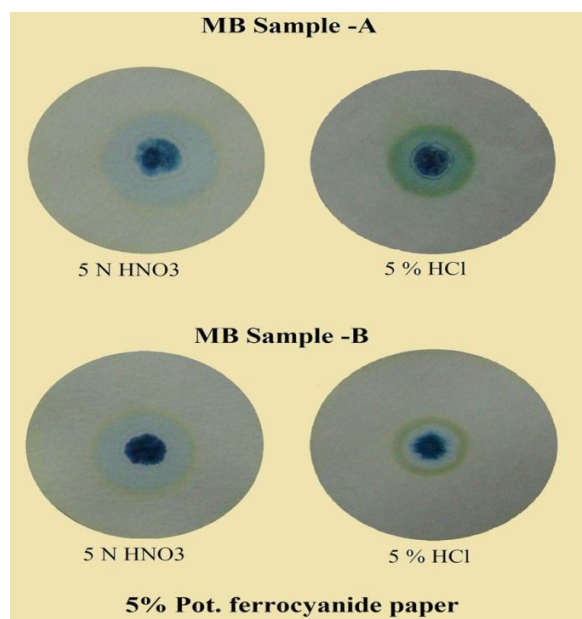
Phase III (40 hr.) : Darker (blue) central spot surrounded by light blue ring.  
White middle segment surrounded by light blue ring  
Green peripheral segment (figure 1)

#### ➤ Spotting on 10% Potassium Iodide Paper :

Phase I (5 minutes) : Dark brown central zone, Light brown peripheral segment

Phase II (30 minutes) : White central zone, Dark brown middle segment,  
Light brown peripheral segment

Phase III (72 hr.) : White central zone Dark brown middle segment,  
Light brown peripheral segment (figure 2)



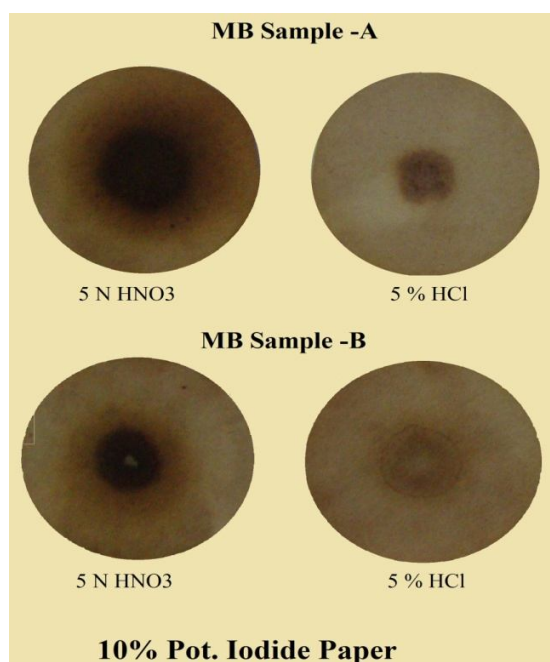


Figure 1

Figure 2

#### DISCUSSION AND CONCLUSION:

The colour of the two samples of *bhasmas* varying from light brown to dark brown. The difference in colour may be due to the number of *puta* given. The touch of the *bhasma* showed that samples are fine. Both the samples passed the *varitara test*, *unama test*, *nichandrata*, *nirdhum* and *rekhapoornatvam tests*. The *apunarbhava* and *niruttha* tests were also conducted which showed that chemically the *bhasma* was totally formed. If these tests had been negative then it would have indicated the presence of a metallic part in the *bhasma*. In NPST the desired results were seen in both the samples, [figure 1&2]. The results seemed to be similar, but were not the same - an advantage of conducting NPST over other classical *bhasma parikshas*. The classical tests cannot differentiate between *bhasmas* chemically, but in NPST, as the test is chemical reaction-based, with specific results for specific *bhasmas*, we can differentiate between *bhasmas* clearly. This technique is very helpful for quality assessment of *bhasma* as per the standards of G.M.P.. In other words, *bhasmas* can be identified by their name given in *Rasa Shastra* by virtue of their quality differences, but not chemically. It is such a simple test that it can be carried out with minimum set up and requirements. CCRAS has also accepted the monograph of NPST, and so the quality of *bhasma* can be checked before being used therapeutically.

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