



## Scientific Application of Bhasma Pareeksha

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### Research Article

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### Abstract

Even after Shodhana, the Rasadravya's are not easily absorbable and assimilable because of their inorganic properties and non-homogeneity, so need to conversion of original metal / mineral into oxide or sulphide form to maintain of alkalinity and neutralizing the harmful acids. In Classics, Bhasma pareeksha are mentioned for the prepared bhasma before administration of the bhasma. These tests are considered as a basic quality control tests for Ayurvedic bhasmas. These tests are included many years ago but those tests having scientific base to assess particle size, lightness etc. By this it can be conclude with the modern parameters like Nano particle, chemical composition etc.

**Keywords:** Bhasma Pareeksha; Particle Size; Modern Parameters

### Introduction

Knowledge of use of metals, minerals was seen since ancient period in Indian history. Initially these were used for preparation of instruments etc. later Ayurvedic acharyas found therapeutic qualities of some of these metals and minerals specified in classics. After the resolution of Rasashastra, many pharmaceutical procedures were chronologically developed for process/ conversion of the naturally available therapeutically effective Metals, Minerals, Marine products, Gemstones, Animal products for internal administration. These procedures convert them into safe, medicinal form, and easy assimilation.

Naturally available drugs are not indicated therapeutically because of inorganic nature and heterogeneity. So conversion of drugs is needed to get drug into organic form, homogeneity, reduction of alkalinity and also nullification of poisonous effect of drug.

शोधितान् लोहधातुवादीं वमिर्धुयं स्वरसादभिःि अग्निसंयोगतो  
भस्मीकरणं मारणं स्मृतम् ॥

Bhasmikanarana means shodita metals, minerals etc drugs are triturated with herbal juice etc liquids and specific heat is applied is bhasmikanarana the procedure is called as Marana. The product is known as Bhasma/ Mrutaloha (killed one or physical and chemical change of original metal). As it was manufactured by metal/minerals and processed with herbs and specific heat falls under unique preparation of the Rasashastra (for the easy assimilation and bioavailability).

### Significance of Bhasma

मृतानि लोहानि रसीभवन्ती नघिनन्ती युक्तानि महामयाश्च ।  
अभ्यासयोगाद् दृढदेहसर्दिर्धा कुरुवन्ती रूजन्मजरावनिशम् ॥ RRS  
5/139

The loha bhasma prepared with paarada is having the

rasaayana guna on conjunction it will mix up with the rasa raktaadi dhaatu & it will act immediately. It destroys the disease and increases the strength of the body [1].

पुटाद् ग्राब्णो लघुत्वं च शीघ्रव्याप्तश्च दीपनम् । RRS10/49

Putra causes laghuta in Bhasma because of this guna it quickly absorbs and spreads all over the body. It increases digestion capacity [2].

अल्पमात्रोपयोगतिवाद् रचेरप्रसङ्गतः ।  
कषपिरमारोग्यदायतिवाद्दौषधेभ्योऽधिको रसः ॥ रसेन्द्रसार संग्रह  
1/4, पारद नामानि

The Bhasma is effective in lesser quantity, not having any taste, it cures disease very quickly and it is best among the chikitsa [3].

### Different Methods of Bhasma Preparation

लोहानां मारणं श्रेष्ठं सर्वेषां रस भस्मना ।  
मूलीभरिमध्यमं प्रायुःकनषिष्ठं गन्धकादभिः ।  
अरलोहेन लोहस्य मारणं दुर्गुणप्रदम् ॥ RRS 5/14

It is the best to perform Marana of metal with the help of Parada Bhasma. The Marana of such metal carried out with the assistance of herbal drugs is supposed to be medium & with the help of Gandhaka, it is said to be inferior. However the Marana of the metal is performed with the help of arilohas caused bad effect [4].

### Importance of Bhasma Pareeksha

Siddha lakshana's (confirmatory features) are explained for all preparations in Ayurvedic classics. As Bhasma is one of the Ayurvedic unique dosages, Bhasma pareeksha procedure are described to know properly processed Bhasma.

The bhasma pareeksha's are considered as quality control parameters of Bhasma. If Bhasma passes these pareeksha indicates it is safe, effective and fit for administration. The parameters preferred for Bhasma pareeksha by using sophisticated equipments are elemental analysis, characterization of bhasma, particle size and distribution of the particles, detection of free metals etc....are often looked in.

### Methodology

#### Classical Parameters of Bhasma Pariksha

1. Varna
2. Rekhapurnatva
3. Varitara
4. Unnama

5. Amladadhi pareeksha
6. Nirutthikarana
7. Nirdhoom
8. Nishchandrikarana
9. Niswadu
10. Avami
11. Dantagre kachakachabhava

### Varna

Varna (Color) is a basic and first criterion for the identification of any Bhasma. After the incineration of metals or minerals that has to be get the specific colour mentioned in classical text. Bhasma of specific metals or minerals should exhibit the same colour which is specified in classics. If it does not reach the specified colour indicates substandard in quality of ingredients /process.

### Acharya Yogaratnakara Mentioned the Standard Colour For the Dhatu's (Metals)

Swarnam champakavaranaabham krushnatwam  
taarataamrayoh ।  
Kamsyam dhoosaravarnam syannaagah paaraavataprabham  
।  
Vangam shubhratwaamaayaati tikshnam jambuphalopamam  
।  
Abhrakm cheshtikaabham syaaddhaatunaam varnanirnayah  
। (Table 1)

S. No	Dhatu	Varna
1	Swarna	Champaka
2	Rajata & Tamra	Krushna
3	Kamsya	Dhoosara
4	Naga	Paaravata prabha
5	Vanga	Shweta
6	Tikshna loha	Jambu phala
7	Abhraka Bhasma	Ishtika varna

Table 1: Colour of Bhasma for different Rasadravya [5].

### Varitara

These tests are mainly indicated for the fineness and lightness of the particles.

मृतं तरतयित्तोये लोहं वारतिरं हित् ॥ RRS 8/26

Prepared Bhasma is sprinkled on the surface of stagnant water it floats on the surface of water [6].

### Unnama

तस्योपरि गुरु द्रव्यं धान्यं चोपनयेद् ध्रुवम् ।  
हंसवत्तीर्यते वारिण्युत्तमं परकीर्यति ॥ RRS 8/29

Unnama is a further step of Varitara by keeping dhanya on floating bhasma and observe for sink [7].

### Hygroscopic Natured

These particles will not float for more duration. They absorb water and sink.

Ex: Kasisa Bhasma

### Rekhapurnatva

अङ्गुष्ठतरजनीघृष्टं यत्तदरेखान्तरे वशित् ।  
मृत्लोहं तदुदधिशिष्टं रेखापूर्णाभिधानतः ॥ RRS 8/27

Bhasma should be taken in between Angushtha (Thumb) and Tarjani (index) finger and rubbed. Then furrows of fingers should be observed for the particle size [8].

### Nirutthikarana

रौप्येण सह संयुक्तं ध्रुमात् रौप्येण नो लगेत् ।  
तदा नरित्थमतिरुक्तं लोहं तदपुनर्भवम् ॥ RRS 8/30

The piece of Rajata (Silver) is to be kept in a sharava containing bhasma and this should be subjected to heat. After cooling the Rajata is weighed. If the weight increases it shows apakwa bhasma preparation [9].

### Amladadhi Pareeksha

This test mainly indicated for Tamra, Swarna makshika and Tutthha bhasma. Bhasma should be sprinkled on amla dadhi and observe for development of green colour around the dadhi, if color develops it indicates the apakwa bhasma.

### Nirdhoom

Little quantity of bhasma sprinkle over the burning coal, properly prepared bhasma will not produce smoke.

### Nishchandrikarana

Prepared Bhasma to be taken and observed in bright sunlight. If shining particles are present then it is consider as apakwa Bhasma.

### Niswadu

This test is mainly indicated for sudhavarga. As Sudhavarga contain more kshareeyata, so puta should be

given till it become tasteless.

### Avami

Prepared Bhasma should not produce nausea or vomiting when administered internally.

### Dantagre kachakachabhava

When the Bhasma is taken in mouth and press in between teeth it should not produce Kachakach sound? If Bhasma is not become finer then it produces sound. So further incineration to be done (Table 2).

S. No	Bhasma	Pareeksha
1	Abhraka Bhasma	Nischandrikarana
2	Makshika, Tuttha and Tamra Bhasma	Amladadhi pareeksha
3	Haratal and Manashila Bhasma	Nirdhooma
4	Loha Bhasma	Varitara
5	Sudhavarga	Niswadu
6	Tamra / Rajat Bhasma	Apunarbhava

**Table 2:** Specific Bhasma pareeksha for particular bhasma.

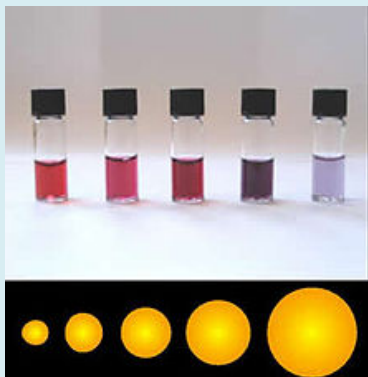
## Modern Parameters

### Nano Particles

Colloidal gold [10] is a suspension of submicrometre – size particles of gold in a fluid, usually water. The liquid is usually either an intense red colour (for particles less than 100 nm) or blue/purple (for larger particles) (Figure 1).

Gold nanoparticles can be used to,

- Optimize the bio distribution of drugs to diseased organs, tissues or cells, in order to improve and target drug delivery.
- It includes drug targeting of difficult, unstable molecules and delivery to the difficult sites.
- Nano drug delivery system ensures that the active drug is available at the site of action at correct time and duration.
- Diagnosis of the tumors.
- Gene therapy Swarna Bhasma (gold ash) has been characterized as globular particles of gold (56-57 nm). Mercury compound contains mercury sulfide (crystalline size 25-50 nm).



**Figure 1:** Colour changes acc to Particle size.

### Bhasma VS Nanotechnology

Nanotechnology is a technology dealing with smaller dimension of material ranging of 1 – 100 nm. Reduction of particle size given most important to get assimilate in blood and increase of bioavailability. The development of Nanotechnology is made possible by analysis of material by different instrumental analysis like,

- Transmission Electron Microscope.
- Scanning Electron Microscope.
- Inductively Coupled Plasma Atomic Emission Spectrometer.
- X – Ray Florescence.

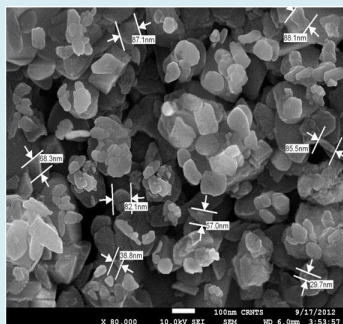
### Transmission Electron Microscope

Magnification is more than 10,000 than Electron microscope

- Micro structural analysis.
- Crystal structure.
- Small region elemental analysis.

### Scanning Electron Microscope

Imaging at all directions through (3D) rotation of sample (Figure 2).



**Figure 2:** Field Emission Gun- Scanning Electron Microscopic features of Abhraka Bhasma.

### Inductively Coupled Plasma Atomic Emission Spectrometer

- Most common techniques for elemental analysis.
- Its high specificity, multi-element capability and good detection limits result in the use of the technique in a large variety of applications.

### X – Ray Florescence

- To identify the elemental abundances of the sample.
- Identifies both major and trace elements.

### Discussion

Even though many pareeksha's mentioned in the classics but we are fail to standardise Bhasma only bases on these parameters. It may be due to faulty performances or not knowing exact method for testing.

### Varna

The colour of the bhasma depends upon the active content of the bhasma. When the crude drug converted into oxide or sulphide forms it gives rise to colour of converted form.

Ex: Louha bhasma – Pakwa jambu phala Varna i.e brown brick red colour because of Ferrous oxide.

Tamra bhasma – Krishna Varna, Black colour due to cupric oxide and cupric sulphide.

### Varitara and Unnama

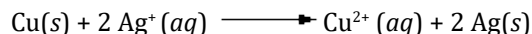
#### Why Bhasma floats on the surface of water? [11]

- When the prepared bhasma is less dense than water then it floats on the surface of water.
- These tests are also based on surface tension. Surface tension is a contractive tendency of the surface of a liquid that allows it to resist an external force and the inward force at its surface cause's water to behave as a stretched elastic membrane. Because of this the particles present over the surface floats on the surface.
- Flotation of objects denser than water occurs when the object is non-wet table and its weight is small enough to be borne by the forces arising from surface tension.

### Niruttha

A demonstration of oxidation-reduction reactions involves placing a piece of copper wire into an aqueous solution of the  $Ag^+$  ion. The reaction involves the net transfer of electrons from copper metal to  $Ag^+$  ions to produce

whiskers of silver metal that grow out from the copper wire and  $\text{Cu}^{2+}$  ions [12].



The  $\text{Cu}^{2+}$  ions formed in this reaction are responsible for the light-blue color of the solution. Their presence can be confirmed by adding ammonia to this solution to form the deep-blue  $\text{Cu}(\text{NH}_3)_4^{2+}$  complex ion (Figure 3).

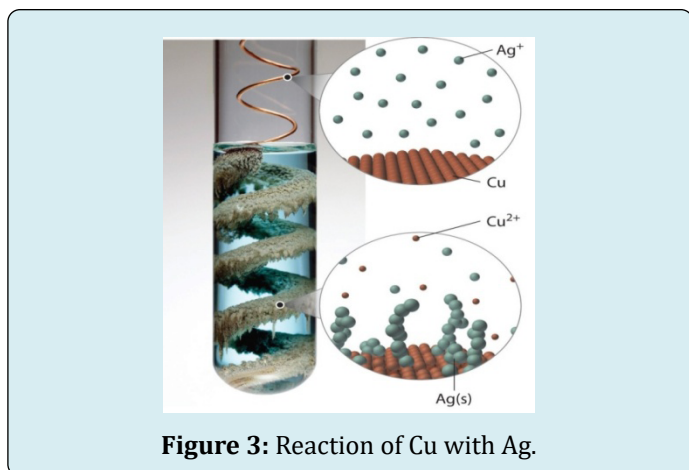


Figure 3: Reaction of Cu with Ag.

In Niruttikarana mentioned that heat should be given, how much temperature and duration is not mentioned, in modern they mentioned immediate reaction by changing the colour of aqueous solution. The form of silver is used in the test are different so standardisation is required.

### Amladadhi Pareeksha

Curd contains Lactic Acid which reacts with the copper producing soluble copper salts [13].

Metal + acid Metal salt + hydrogen

Copper salts are poison to human being when taken internally because when they react with water in the body, they produce copper oxide which is insoluble in water and organic solvents.

### Nirdhoom

**Bhasma (Calyx)** is created by heating of metal / minerals to high temperatures in the absence of oxygen. When the metal / mineral put it in a sealed sharava (clay sausser) and heat it to about 1,000 degree Celsius. This process drives off all of the volatile organic compounds and leaves behind the carbon and the minerals (ash). When light the bhasma, what is burning is the **pure carbon**. It combines with oxygen to produce carbon dioxide, and which is an invisible finess of the particles depends upon the nature of the material, in

some hygroscopic particles the softness feels early compared to drugs [14,15].

### Conclusion

- Bhasma pareeksha is one of the quality control parameter mentioned in the classics for the standardization of Bhasma.
- These tests are helpful in the assessment of safety and efficacy of the drugs.
- Modern parameters are helpful to analyses the partical size and distribution of particals qualitatively and quantitatively.
- The modern parameters give more accurate results in particle size compared to rekhapurnatva. So we have assessed Bhasma's both classically and contemporarily.

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