
**Evaluation of *Lauha bhasma* on classical analytical parameters –
A pilot study**

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Abstract

Lauha Bhasma is the most widely used *bhasma* preparation in therapeutics, but till date the temperature pattern to prepare *Lauha Bhasma* in electric muffle furnace is not fixed. So in this pilot study an attempt has been made to confirm the appropriate temperature pattern to prepare *Lauha Bhasma*. And emphasis has been given to evaluate this prepared *Lauha Bhasma* on classical analytical parameter, which reflects the physical and chemical properties of the *Bhasma*.

Introduction

Lauha is one of the oldest known metals to the human civilization. Descriptions about uses of *Lauha* are available in the oldest written treatise, the *Veda*. *Lauha Bhasma* is the most widely used *bhasma*

preparation by Ayurvedic physicians in practice, and it is considered as best remedy to treat disease like *Panduroga* correlated to anaemia.

There are many methods mentioned in different texts to prepare *Lauha Bhasma*. *Gajaputa* is the quantum of heat required for its preparation. Now a day the methods of preparing *Ayurvedic* medicines have changed tremendously due to commercial interest of the pharmacies preparing these formulations. The use of electric muffle furnace to prepare *Bhasmas* in pharmacies is increasing. But the main hurdle with muffle furnace is the fixation of temperature pattern as to what would be the appropriate temperature and duration to prepare *Bhasmas*.

Ancient scholars of *Rasashastra* have mentioned the analytical parameters for standard and quality in the product. All these parameters are dealt with different standpoints to test the perfectness of *Bhasmas*. Although most of these tests are based on organoleptic methods of examination, but some tests indicate specific chemical assessment.

Objectives :

- (1) To establish a definite temperature pattern in electric muffle furnace to prepare *Lauha Bhasma*.
- (2) To evaluate *Lauha Bhasma* by classical analytical parameters.

Pharmaceutical Conceive :

Materials and Methods :

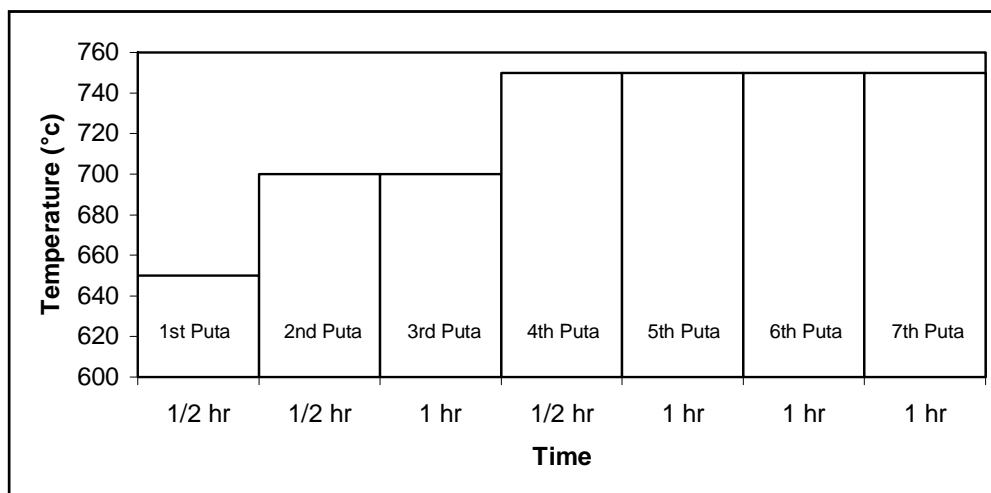
Raw *Lauha* (iron scrap) was collected from the pharmacy of Gujarat Ayurved University. It was subjected to different *Samskaras* like *Shodhana* and *Marara* to prepare *Bhasma*. *Shodhana* (purification) was done in *Triphala Kwath*¹ *Nirvapa* (heating the metal upto red hot and quenching in liquid media) was performed in *Triphala* decoction seven times. This decoction of *Triphala* for the process was prepared by boiling *Triphala* with 8 times water and reducing to 1/4th. After *Nirvapa*, properly dried coarse powder of *Lauha* was mixed with 1/12th parts of *Shuddha Hingula* (purified cinnabar) and was lavigated by *Kumari Svarasa* (aloe gel), continuously for 6 hours. After which it was subjected to horizontal muffle furnace for incineration. This method was repeated

for 7 times. To find out the suitable temperature pattern in muffle furnace, highest temperature and duration at highest temperature was changed in each *Putra*. It was started from highest temperature of 650°C and duration at highest temperature 1/2 h, and gradually was increased in each *Putra* until obtaining of suitable temperature range.

Observations and Result :

After *Shodhana* colour of the *Lauha* became black, and the iron scrap became coarse powder form. After first 3 *Putras* the colour of the pellets of *Lauha* was brown and these were very hard in consistency, metallic luster was observed on the surface of pellets. After 4th *Putra* colour of pellets were purple but these still remained hard. After 5th *Putra* colour became purple, pellets became soft and metallic lusture was not visible. After 7th *Putra* colour of *Lauha Bhasma* was purple (*Pakwa Jambu Phala Varna*), soft and smooth in touch and became metallic lustureless.

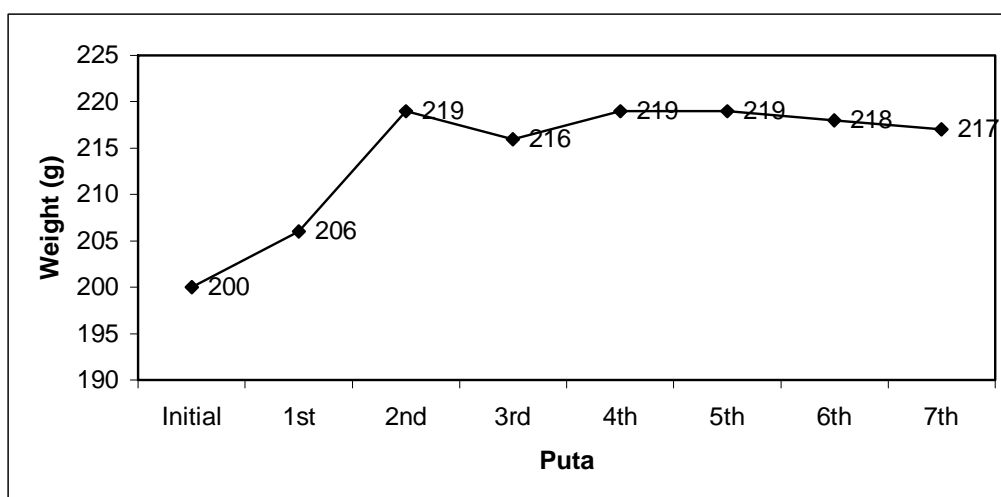
Fig.- 1: Temperature (°C) pattern during *Marana* in EMF.



In first *Putra* 650°C as highest temperature for 1/2 h was given. In 2nd *Putra* highest temperature was increased to 700°C and duration was kept same. In third *Putra* highest temperature was maintained same but duration was increased to 1 h. In 4th

Putra highest temperature was increased to 750°C and duration was reduced to 1/2 h. In 5th *Putra* highest temperature was maintained same but duration was increased to 1 h. In final 2 *Putra* highest temperature and duration was kept same as 5th *Putra*.

Fig.- 2: Change in weight (g) of *Lauha* during *Marana*



After *Shodhana* the weight of iron (200 g) remained same. After 1st *Putra* it was increased to 206 g and after 2nd

Putra it was again increased to 219 g. After 3rd *Putra* it was decreased to 216 g. After 4th *Putra* it was increased to

219 g. After 5th *Putra* the weight remained same. After 6th and 7th *Putra*, 1 g and 2 g weight lost was measured respectively and 217 g *Lauha Bhasma* was achieved. So, the ultimate gain in weight was 17 g.

ANALYTICAL CONTRIVE :

Materials and Methods

The prepared *Lauha Bhasma* was evaluated on the basis of classical analytical parameters. Various analytical techniques, which are mentioned in our classics, were adopted³; which reflects the physical as well as chemical characteristics of the *Lauha Bhasma*.

- Varitara*⁴ : A little amount of *Lauha Bhasma* was sprinkled on stagnant water surface and observed, whether the *Bhasma* floats water surface or not.
- '*Unam*' Test : A grain of rice was kept carefully on the layer of floated *Lauha Bhasma*.
- Rekhapurnata*⁵ : A little amount of *Lauha Bhasma* was taken in between index finger and thumb and rubbed.
- Nirchandrata*⁶ : *Lauha Bhasma* was taken on palm and observed in the sunlight.
- Slakshnata* : *Lauha Bhasma* was touched by the finger tips.
- Gatarasatwa* : Small amount of *Lauha Bhasma* was taken and tasted.
- Apunarbhavata*⁷ : 20 g. of *Lauha Bhasma* was mixed with equal quantity of *Mitra Panchaka* (Seeds of *Abrus precatorius*, Honey, Ghee, Borux and Gaggery) and it was sealed in *Sarava Samputa* (Earthen pots), there after, the similar grade of heat used for the preparation of the particular *Bhasma* was applied and after self cooling, product was observed.
- Niruttha*⁸ : 50 g of *Lauha Bhasma* was mixed with a fixed weight (0.3958g) of silver (Ag). It was kept in a *Sarava Samputa* (Earthen Pots) and similar grade of heat was applied as for preparation of *Bhasma*, and after self cooling, weight of silver was taken.

Observations and results :

- Varna (colour)** : The colour of the Bhasma is purple ('Pakwa Jambuphala Varna')
- Varitara** : Lauha Bhasma floated on the stagnant water surface.
- 'Unam' Test** : The grain remained as it is on the layer of floated Bhasma.
- Rekhapurnata** : The Lauha Bhasma filled the minute furrows of the finger tips.
- Nischandrata** : No Chandrika (lustered particle) was observed in sunlight.
- Slakshnata** : The Lauha Bhasma was soft and smooth on touch.
- Gatarasatwa** : The Bhasma was tasteless.
- Apunarbhavata** : No accumulated hard mass was felt and no lustered particle was observed after this test.
- Niruttha** : Weight of the silver piece was remained almost same (0.3952 g). It was not increased.

Sr. No.	Parameters	Result
1	Varitara	+ve
2	'Unam' Test	+ve
3	Rekhapurnata	+ve
4	Slakshnata	+ve
6	Gatarasatwa	+ve
5	Varna (colour)	Pakwa Jambuphala Varna (Purple)
7	Nirchandrata	+ve
8	Apunarbhavata	+ve
9	Niruttha	+ve

Discussion :

In this modern era, when the method of preparation has been altered due to commercialization of Ayurvedic pharmacies, it is very much needed to fix a particular temperature pattern in the modern instrument like electric muffle furnace for giving Puta.

The highest temperature in the first Puta was selected at 650°C, because cinnabar (Hingula) dissociates to mercury (Hg) and sulphur (S) above 650°C, and in this temperature, mercury evaporates and escapes, sulphur part combines directly with

iron in this temperature to form ferrous sulphide (FeS)⁹.

But after *Putra* the pellets remained hard, so the highest temperature and duration of highest temperature was increased. At a highest temperature 750°C for a duration of 1 h. the desired characteristics of iron pellets were achieved, means the consistency of the pellets become soft and its colour become purple. So, this temperature pattern is taken as a standard to prepare *Lauha Bhasma*.

After *Marana*, weight of *Lauha* increases because during incineration it may combine directly with sulphur (dissociation product of cinnabar) to form ferrous sulphide. Some part of *Lauha* is also oxidized to ferrous-ferric oxide, during red hot stage. Inorganic content of aloe gel (total ash) also causes increase in weight.

Before clinical application, it is necessary to analyze the *Bhasma*, to know whether, the *Bhasma* is properly prepared or not. Ancient scholars of *Rasashastra* have mentioned some parameters to assess the standard and quality of a *Bhasma*. Although most of the parameters are based on organoleptic examination, some parameters indicate particular physical and chemical characteristics.

Specific colour of the *Bhasma* indicates formation of particular metallic compounds, because each chemical compound possess specific colour.

Tastelessness of *Bhasma* indicates, transformation of the particular

metallic taste to tasteless compounds, i.e. a new entity resulted due to unique pharmaceutical processes.

Nischandrata test indicate change of the specific metallic lusture to lustureless compound after incineration.

Rekhapurnata indicate micro fineness of *Bhasma*. The particles of *Bhasma* should be so small size that it can fill the furrows of the finger tips.

Varitara test indicate lightness and micro fineness of *Bhasma*. It is a floating character of *Bhasma* on water surface. This test can be considered, based on law of surface tension. Here the particles of *Bhasma* attain so much lightness and become fine in character that they can not break the surface tension of stagnant water.

'*Unam*' test is the further re-assessment of '*varitara*' test.

Apunarbhavata test indicates stability of the *Bhasma*. All the materials used in this test may act as source of carbon on that temperature in which this test is performed. An unstable metallic compound (oxide) can reduce to metallic state during this test by carbon reduction process, but a stable metallic compound should not be changed on the particular temperature in which it is formed.

Nirutthata test also indicates stableness of the *Bhasma*. A more electro positive metal helps in accumulation of free metal in *Bhasma*, if it remains. But a proper *Bhasma* can not be retrieved.

Silver (Ag) when heated, combines directly with sulphur to form the sulphide Ag_2S . But it is not affected by oxygen and has a low chemical reactivity¹⁰. So silver is used in this test, and if the *Bhasma* contains any free sulphur, then the sulphur reacts with silver on heating and causes increase in weight of sulphur. A complete *Bhasma*, which is properly prepared, should not contain any free sulphur, so there will not be any increase in the weight of silver.

The prepared *Bhasma* passed all the physico-chemical parameters of ancient classics. So the *Bhasma* is considered as properly prepared.

References :

- 1,3,4,5,7,8, Vagbhat Acharya, Kulkarni D.A. Hindi commentary, Rasa Ratna Samucchaya, Meharchand Lachhmandas Publication, New Delhi. 1998, 5/103, 8/26, 8/27, 8/28, 8/29.
2. Bhatta K. G., Tripathhi I.D. Hindi commentary, Rasendra Sara Samgraha, Chaukhamba Orientalia, Varanasi, 2003, 1/336-357.
6. Madhav Upadhyay, Ayurveda Prakasha, Mishra G.S. Hindi commentary, Chaukhamba Bharati Academy, New Delhi, 1994, 2/105.
- 9,10 Dutt P.K., General and Inorganic Chemistry, Sarat Book House, Calcutta, Vol.-II, 1996, 320, 193.

Conclusion :

The temperature pattern (highest required temperature $750^{\circ}C$, duration at highest temperature; 1 h) in electric muffle furnace to prepare *Lauha Bhasma* should be taken as standard.

The *Bhasma* should be considered as meeting quality standards laid down in classical texts.