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**RESEARCH ARTICLE**

# Pharmaceutical Processing and Quality Control of Bhasma with Special Reference to AbhrakBhasma

**Richa Pathak[1]*, Neeraj Kumar[2]**

*[1]Research Scholar, [2]Professor, Department of Rasa Shastra, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Varanasi – 221005, India*

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## ABSTRACT

Minerals and metals are the most widely dealt part in Ayurvedic pharmaceutical science, processing technique like shodhan and maran is adopted for drugs of metallic and mineral origin with a view to make them adoptable, non toxic and efficacious.Quality control methods like nischandratva, varitaratva, rekhapurnatva described for different bhasma in ayurvedic text proves to be very scientific and trust worthy. The Iron based Indian traditional drug 'Abhrakbhasma' is administered for various ailments since long.In current research work Abhrak is processed with Erandapatraswaras&guda and then repeated calcination at $900^0$ C in electric muffle furnace to achieve its bhasma.Thebhasma thus prepared is validated by using ancient quality control techniques.

**Key words:**Shodhan, Maran, Abhrak, Bhasma, Quality control.

## INTRODUCTION

Abhrak is important and potent mineral in Rasa Shastra which occupies second position next to parad (mercury). Among all the four varieties of Abhrak , Krishna vajrabhrak[1]is used for preparation of Abhrakbhasma and known for hepatoprotective effect[2] for medicinal purposes.It is a mineral that contains several elements such as Si, Fe, Al, Mg, K and frequently used in many ayurvedic formulations.

Shodhan (purification) is an intermediary process during their conversion into bhasma and is essential to remove the external impurities as well asto make the drug ready for other pharmaceutical processes, it is a process of purification and detoxification by which physical chemical blemishes and toxic materials are eliminated and substances are subjected for further processing. Similarly another important pharmaceutical processing is Maran(incineration/calcination)i.e. converting in to ashes, in this material is incinerated either in electric muffle furnace or conventional puta resulting in to oxidation and micronization of substance, which makes the finished product in edible form having therapeutic characteristics and devoid of toxic features.

### Pharmaceutical processing's of Abhrak

### Shodhan of Abhrak[3,4]

Principle:Nirvapa in triphalakwath for seven times.

## MATERIALS AND METHODS

### Materials

Raw materials

- Krishnavajrabhrak – 1 kg(Procured from the Ayurvedic pharmacy. I.M.S, BHU)
- Triphalakwath- 25 litre

Equipments

Charcoal burner, electric blower, pyrometer, Iron pan, metal tongs, steel vessels, charcoal, cow dung cakes, measuring cylinder and weighing balance.

### Methods

- At first 1 kg of Abhrak was taken on iron pan and kept on charcoal burner whose peak temperature was maintained with the help of electric blower. Abhrak flakes were turned up and down with metal tongs so as to give equal exposure of heat to both the surfaces.

***Corresponding Author:**Richa Pathak, **Email:** docricha@yahoo.com

- When it reached the stage of red hot, it was quickly quenched in to the triphalakwath and triphalakwath was separated by filtering it through iron sieve and soft pieces of Abhrak were collected in iron pan to subject it for next nirvapa.
- Process was repeated for 7 times with changed triphalakwath at every nirvapa process.

**OBSERVATIONS**

- During the nirvapa process the striated structure of Abhrak was destroyed to form small pieces and its brittleness and lusture was increased.
- Along with that Abhrak produces fumes in initial stage of heating from $2^{nd}$ to $7^{th}$nirvap.
- Floating of Abhrak pieces started after complete shodhan and more to long distance from the place of shodhan.
- Colour was changed to dark black and after completion of the process loss in weight of raw material was observed.

**Maran of Abhrak**[5, 6]

Principle:Puta system of heating in electric muffle furnace

**MATERIALS AND METHODS**

**Materials**

- ShodhitAbhrak ( after completion of shodhan process as stated above)
- Liquid extract of leaves of Eranda( Ricinuscommunis)
- Guda (Jaggery)
- VataPatra ( leaves of Ficusbengalens)

**Method**

Whole process of Maran is further subdivided into four stages which has very significant role in the quality of finished products.

**Bhavana (Stage of levigation)**

- Accurately weighed ShuddhaAbhrak was levigated with measured amount of liquid extract of Erandapatraswaras and guda in a clean and dry stone mortar (khalva) till it cause complete dipping of all the material in the mortar.
- Continuous levigation was done by adding Erandapatraswaras when required till the formation of smooth, thick sticky black coloured paste and features of proper bhavana were observed. This process is repeated till the desired quality of bhasma is achieved.

**ChakrikaNirmana(Stage of pelletization)**

After completion of bhavana process, the paste is made in to pellets of uniform size, thickness, shape so as to increase the surface area and dried in sunlight.

**SaravSamputikarana**

Properly dried, weighed pellets were arranged in the saravso as to get uniform distribution of heat, then another saravwas covered over it and kapadmitti procedure was done.

**Puta(Stage of incineration)**

- Properly sealed and dried samputa was subjected to heat treatment in electric muffle furnace.
- Maximum temperature and duration of heat was decided on the basis of temperature required for maran of material taken on the previous research work done[7]
- Temperature was allowed to rise up to $900^0$C and then maintained at peak for 45 minutes. After self cooling saravsamputa was taken out and weighed.
- Process was repeated 27 times.

**OBSERVATIONS**

- Chandrika gradually starts decreasing after $4^{th}$puta but the desired colour was not develop.
- Weight loss was observed during initial 5 putas, may be because of burnt erandapatra and guda remnants.
- The colour of pellets after $1^{st}$puta was black and begins to change from black to blackish brown($3^{rd}$puta), brownish red ($4^{th}$ and $5^{th}$puta) and finally brick red ($6^{th}$ to $27^{th}$puta)
- Fineness of bhasma gradually increased after each puta.
- Colour of bhasma was reddish ( Ishtikachurna)

**Ancient quality control parameters followed for BhasmaPariksha( Evaluation)**[8]

After preparation of Abhrakbhasma, it is subjected to bhasmapariksha. Following test has been performed.

- **Rekhapurnatva –** After preparation, Bhasma was rubbed in between thumb and index finger, as a result it was filled in between lines of fingers and thumb.

- **Varitaratva –**Small amount of the prepared Bhasma was taken and sprinkled over the silent water taken in a beaker. It was found that 70 % of the Bhasma particles float over the surface of water.
- **Nischandratva –** Luster / shining has not been observed in prepared Bhasma.
- **Nisvadutvam -** The prepared Bhasma was found tasteless when a small amount was kept over the tongue
- **Dantagrenakachkachaiti -** When a small amount of Bhasma was placed between the teeth, no any sandy feeling was appreciated.

**Table 1: showing the complete maran process of Abhrakbhasma**

| Duration of levigation | Total number of putas | Temperature | Number of days During one puta |
|---|---|---|---|
| 7 hrs/ puta | 27 | $900^0$C maintained for 45 minutes | 3 days/ puta |

**Table 2:Bhasmapariksha of Abhrakbhasma**

| Number of putas | Chandrika | Varitaratva | Rekhapurnatva |
|---|---|---|---|
| 1 to 4 | + + + | Absent | Absent |
| 5 to 10 | + + + | + | + |
| 10 to 15 | + + | + | + + |
| 15 to 20 | + + | + + | + + |
| 21 to 24 | + | + + | + + + |
| 25 to 27 | Absent | + + + | + + + |

## DISCUSSION

Classical texts are enriched with various pharmaceutical techniques for shodhan and maran of metals and minerals. Various processes for abhrakshodhan are described in the literatures, among them nirvapa is considered the most efficient[9].

Similarly for Maran total 27 puta and temperature of $900^0$C, maintained at peak for 45 min is found to be most suitable to achieve the desired quality of bhasma. In each time after giving puta pellets became soft and easily breakable which indicates the quantum of heat provided was suitable. Change of colour from black to blackish brown followed by brownish red and finally brick red may be due to formation of oxides of iron ($Fe_2O_3$). Considering bhasmapariksha (table 2) we found that there is presence of many particles showing metallic luster, in predominance from $1^{st}$ to $10^{th}$puta and it started decreasing from $10^{th}$ to $24^{th}$puta, finally at $27^{th}$puta there was not any shining metallic luster which was indicative of absence of free metal in the bhasma. This disappearance of metallic particle may be due to complete conversion of metals of raw material in to compound form due to the process of bhavana and puta. Similarly varitaratva and rekhapurnatvaindicates the fineness of bhasma and is also indicative of particle size of bhasma.

## CONCLUSION

- Shodhan of Abhrak was done successfully with triphalakwath as a media and is found to be the most suitable.
- Puta system of heating in electric muffle furnace at a temperature of $900^0$C, maintained at peak for 45 minutes and total of 27 puta is essential for preparation of Abhrakbhasma.
- Ancient quality control parameters were based on naked eye observation but covers all aspects for internal administration as far as safety and efficacy is concerned.

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