

RESEARCH ARTICLE

**Preparation and Characterization of Iron based Indian traditional drug –
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ABSTRACT

The Iron based Indian traditional drug 'Abhrak bhasma' is administered for various ailments since long. Its processing involves shodhan which is intermediate pharmaceutical processing and maran. For shodhan different media are described i.e. cow-milk, cow-urine, decoction of triphala and badari separately, followed by maran i.e treating Abhrak with Eranda patra swaras & guda following repeated calcination at 900⁰ C in electric muffle furnace, in presence of air so that the metallic state is transformed into the corresponding oxide form traditionally known as 'bhasma'. To assure the quality of bhasma, rasa shastra quality control tests like *nischandratva*, *varitara*, *rekhapurnatva*, etc., were used then the bhasma was analyzed using modern parameters. In this work, we present a systematic preparation and characterization of this traditional drug using various techniques Field emission scanning electron microscopy (FESEM), Energy dispersive X ray analysis (EDAX).

Key words: Shodhan, Maran, Bhasma, Abhrak bhasma, FESEM, EDAX.

INTRODUCTION

Medicinal preparations called bhasma are unique to the ayurveda system of medicine. According to this medicinal system, bhasma involves the conversion of a zero valent metal into its mixed oxide of higher oxidation state. These are generally prepared by repeated incineration & calcination of metals and minerals with medicinal herbs decoctions or juices so as to eliminate their harmful effects and are taken along with honey, milk, butter, or ghee (a preparation from milk). Abhrak bhasma has been used for several chronic diseases like tuberculosis, breathing problems like dyspnoea, asthma, piles, and skin diseases. Arthritis etc ^[1].

Important steps involved in the formation of Abhrak bhasma are (a) shodhan (purification) with different media like cow-milk, decoction of triphala pieces of dry fruits Haritaki (*Emblica officinalis*), Vibhitaki (*Terminalia bellirica*) & Amalaki (*Terminalia chebula*), cow- urine and decoction of badari (*Zizyphus jujuba*) are frequently used as medium ^[2].

Among them nirvapa process (heating to red hot stage and immediately quenched in liquid

medium) for seven times is most acceptable for shodhan of abhrak ^[3]. (b) Marana i.e trituration of metal or mineral with Eranda patra swaras & guda for several hours & then repeated incineration and calcination at high temperature in a puta system of heating ^[4].

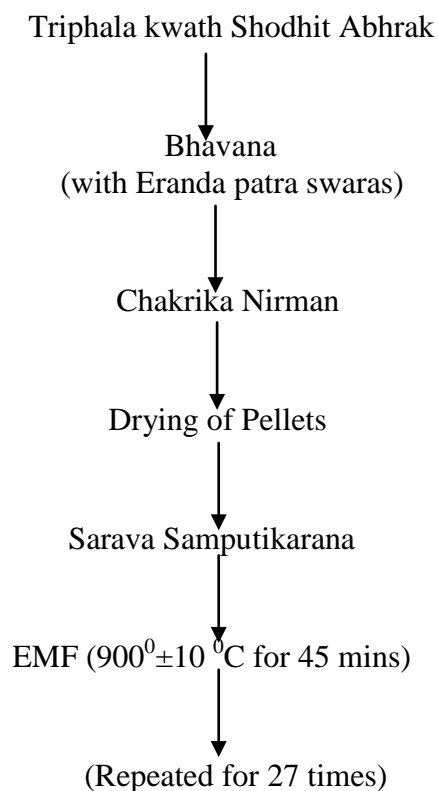
MATERIALS AND METHODS**Pharmaceutical processing of Abhrak**

Raw abhrak (Biotite) was procured from Ayurvedic Pharmacy of Banaras Hindu University, Varanasi and subjected to shodhan process according to traditional ayurvedic procedures ^[5].

Raw Abhrak was purified through nirvapa process i.e heating to red hot stage & then quenching in liquid media (Triphala kwath) for 7 times ^[6,7]. Then weighed shodhit Abhrak i.e 500 gms was levigated with measured amount of liquid extract of Eranda patra swaras & Guda (jaggery) in equal quantity by weight i.e 500 gms. Process of levigation was conducted in an electric mortar pestle for at least 7 hrs till a homogeneous paste was formed, After 7 hrs thick, sticky black colored mixture, having peculiar odour was

obtained which was made into pellet form of uniform size & shape. This pellet was then transferred to an earthen crucible covered with a lid and sealed with sealing clay, then it was subjected to calcination in electric muffle furnace, temperature was allowed to rise up to 900°C maintained at peak for 45 minutes. After each puta, material was allowed to cool. Each puta step was followed by bhavana step and this combination was repeated 27 times before completion of Abhrak bhasma preparation. Final Abhrak bhasma was collected in fine powder form after grinding the material from the previous step.

FLOW CHART SHOWING MARANA OF ABHRAK



OBSERVATIONS

- Chandrika gradually starts decreasing after 4th puta but the desired colour was not develop.
- Weight loss was observed during initial 5 putas, may be because of burnt Eranda patra and guda remnants.
- The colour begins to change after 4th puta, it was gradually increased and after 6th puta it was brick red in colour.
- Fineness of bhasma gradually increased after each puta.
- Colour of bhasma was reddish (Ishtika churna)

Analytical techniques

All the intermediary samples were analyzed using FESEM coupled with EDAX (model: Quanta – 200ESEM). Before analysis, the samples were converted into fine powder form by means of a glass mortar and then covered with thin layer of gold using puttering method. After coating, a small amount of the sample was mounted to the stub with silver glue, prepared with silver powder and isopropyl alcohol.

RESULTS AND DISCUSSION

Results of FESEM studies of raw Abhrak shows the presence of layered structure along with granular particles within the layered structure. FESEM of triphala kwath shodhit abhrak shows the presence of layered like structure but the granular particles have been decreased as compare raw material).

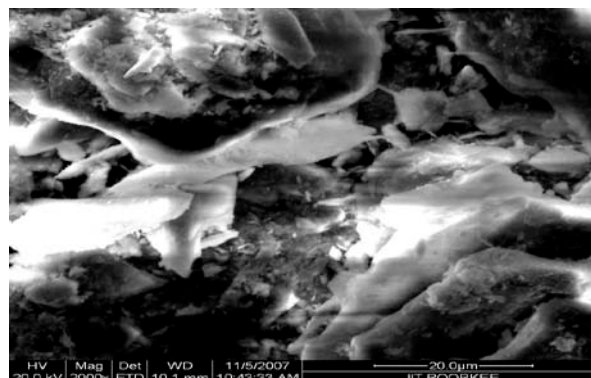


Fig 1: Raw abhrak

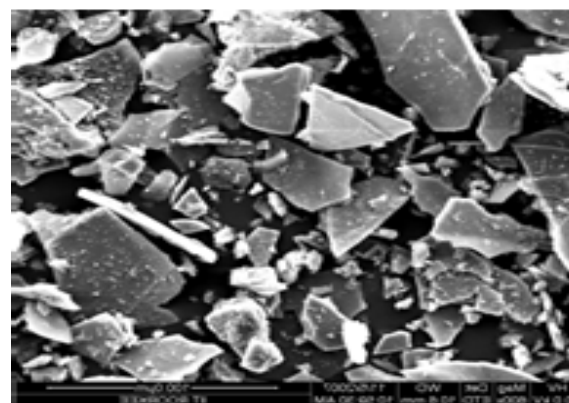


Fig 2: Triphala kwath shodhit abhrak

FESEM studies of prepared abhrak bhasma shows gradual reduction in particle size as well as much higher density in the abhrak bhasma after 27th puta, size of the prepared bhasma after 27th puta ranges from 70-100 nm. FESEM results revealed that the plate like structure of abhrak remains intact even after shodhan process. However they became more granular and appeared to be microcrystalline. Particle size in the shodhit samples were decreased as compare to the raw

material. Maximum reduction in the particle size upto 70 nm was seen after 27th puta.

Another parameter used is Energy dispersive X-ray analysis (EDAX) to analyze elemental composition of samples. The results are tabulated in Table 1 and 2. These tables show the weight (%) of major and minor element present in different samples.

Table 1: Weight (%) of major elements in different samples

Sample	C	O	Fe	Si	Al	Mg	K
A1	8.16	38.17	16.26	18.25	9.16	5.60	3.8
A2	37.40	29.82	12.21	8.32	4.00	2.90	4.06
A3	22.03	28.99	16.16	11.23	5.17	3.05	6.68
A4	3.40	29.33	23.90	14.86	6.55	4.03	8.01
A5	3.82	28.08	14.76	25.35	6.27	4.28	8.76
A6	5.71	27.91	25.28	13.72	6.47	4.00	8.10
A7	6.30	29.88	23.58	14.17	6.33	4.97	6.55

A1 – Raw Abhrak, A2 – triphala kwath shodhit abhrak, A3 – 4th puta abhrak bhasma, A4 – 10th puta abhrak bhasma, A5 – 15th puta abhrak bhasma, A6 – 20th puta abhrak bhasma, A7 – 27th puta abhrak bhasma

Table 2: Weight (%) of minor elements in different samples

Element	A1	A2	A3	A4	A5	A6	A7
F	00.92	ND	1.91	2.08	2.27	1.64	2.45
Cl	00.35	ND	ND	ND	ND	ND	ND
Pd	00.98	ND	ND	ND	ND	ND	ND
Ti	02.15	00.84	ND	ND	ND	ND	ND
Sn	ND	ND	2.37	3.01	2.96	1.52	2.05
Ba	ND	ND	2.41	4.82	3.84	4.96	3.32

ND- Not detected

A1 – Raw Abhrak, A2 – triphala kwath shodhit abhrak, A3 – 4th puta abhrak bhasma

A4 – 10th puta abhrak bhasma, A5 – 15th puta abhrak bhasma, A6 – 20th puta abhrak bhasma, A7 – 27th puta abhrak bhasma

(Table 1 & 2) shows that the raw material (Sample – 1) contain Fe, Si, K, Mg, Al, K, C and O in the major quantity (major element) where as F, Cl, Pd and Ti were also found in the sample. It appears that raw material (biotite) contains Mg, K, Fe, Al and Silicate with carbon present in it from the natural organic matter. Triphala kwath shodhit sample shows variation of Fe, Mg, Al, Si with appearance of enough amount of K. The weight (%) of several elements taken together indicates the presence of the predominant silicate group. Interestingly % of Fe after 20th puta was 25.35 but after 27th puta it decreases to 23.58, this shows that as the number of puta increases, % of Fe decreases as more and more metal gets converted in to oxide form due to oxidation and reduction reaction.

Significant variation in the major and minor elements composition was observed after shodhan process using different media. In major elements, % weight of Fe and Si was decreased Some additional minor elements were found added and some were eliminated after shodhan. Pd, Cl and Ti were detected only in raw sample. Sn, Ba and F is found in almost all the samples with more or less

variation. Therefore it can be concluded that new elements incorporated either in the form of major or minor may be due to addition of Source of new elements presents in the media.

CONCLUSION

The present studies illustrate the significance of shodhan process and maran process in the preparation of abhrak bhasma. Results also revealed that there is much difference in the physico chemical properties of raw material, shodhit abhrak and abhrak bhasma, which may be ultimately credited to beneficial result of pharmaceutical processes of Rasa Shastra. Besides this, analytical tools also reveals that the chemical constituent of abhrak bhasma is combination of iron, aluminium, silica, magnesium, potassium and zinc.

REFERENCE

1. Sharma Sadanand rasa Tarangini, Motilal Banarasi Das, Varanasi, 22, 2002.
2. Sharma Sadanand rasa Tarangini, Motilal Banarasi Das, Varanasi, 22, 2002.
3. Kulkarni D.A: Rasa Vagbhata Rasa Ratna Sannucchaya, Meharchand Lacchman Das, New Delhi 21, 1992.
4. Korde Deepali R: A Pharmaceutical standardization of Abhraka bhasma (Evaluation of effect of different number of putas in its single preparatory method), Department of Rasa Shastra and Bhaishajya kalpana, IPGT&RA, Jamnagar.2003.
5. Kulkarni D.A: Rasa Vagbhata Rasa Ratna Sannucchaya, Meharchand Lacchman Das, New Delhi 21, 1992.
6. Joshi, damodar, Pharmaceutical and Pharmacotherapeutics studies on Abhraka bhasma with special reference to Amlapitta, Department of Rasa Shastra, Institute of Medical Sciences, Banaras Hindu University.
7. Jha C. B, Standardization of Abhraka Satvapata, Department of Rasa Shastra, Institute of Medical Sciences, Banaras Hindu University, 1991.