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IMPORTANCE OF MEDIA IN THE PHARMACEUTICAL PROCESSING'S OF ABHRAKA "A X RAY DIFFRACTION STUDY"

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ABSTRACT

Abhraka is an important mineral used as medicine in the form of *bhasma* in ayuverda since long back. *Shodhana* (purification) is an important intermediately pharmaceutical process during conversion of metals and minerals into *bhasma* (ash). Different text of *ayurvedic* pharmaceutics mentioned a lot of media (liquids) for the *shodhana* process of *abhraka* (Biotite). It is important to learn regarding the uses of these media in the pharmaceutical processing's. In this paper an attempt is made to find out the significance of these media through X Ray diffraction study.

Keywords: *Abhraka*, *bhasma*, *shodhana*, *ayurveda* , X Ray diffraction

INTRODUCTION

Abhraka (biotite) is an important mineral that contains several compounds having mainly several elements such as Si, Fe, Al, Mg and K as main ingredient and frequently used as raw material for preparation of many *ayurvedic* formulations specially *bhasma* (ash). *Shodhana* (purification) is an essential intermediately pharmaceutical process used for purification of metals and minerals during their conversion into *bhasma* (ash). It is a process of detoxification by which physical and chemical blemishes and toxic materials are eliminated thus make the material suitable for further processing i.e. conversion into *bhasma*[1]. Various techniques along with different media are referred in *ayurvedic* texts [2,3,4] for the *shodhana* process of *abhraka*. Among them *nirvapa*[5] process (heating to red hot stage and immediately quenched in liquid medium) for seven times is most acceptable. Cow-milk, decoction of *triphala* {pieces of dry fruits *Haritaki* (Emblicaofficinalis), *Vibhitaki* (Terminaliabellirica) &*Amalaki* (Terminaliachebula)}, *Kanjii* (sour liquid)cow- urine and decoction of *badari* (zizyphusjujuba) are frequently used as medium [6,7,8]. Recent advances in analytical techniques such as spectroscopy, electron microscopy, crystallography etc. can provide useful information about structural as well as compositional change in the raw material during the different steps of *ayurvedic* drug formulation. These changes eventually correlated with medicinal value added in the raw material during various formulation steps. The objective of the present study is to evaluate and confirm the changes in the properties of *abhraka* (biotite) during *shodhana* process using X-ray diffraction analysis.

MATERIALS AND METHOD

Pharmaceutical processing of *Abhraka*

Raw *abhraka* (Biotite) was procured from *Ayurvedic* Pharmacy of Banaras Hindu University, Varanasi and subjected to *shodhana* process according to traditional *ayurvedic* procedures [9]. Raw *abhraka* and liquid media were taken in a clean iron pan and steel vessel respectively. Iron pan was kept on charcoal burner and peak temperature of charcoal burner was maintained with the help of electric blower. *Abhraka* flakes were turned up and down with metal tongs to provide uniform heating. When the *abhraka* (biotite) flakes reached at the stage of red hot condition (approx. 850^0C), it was quickly quenched into the liquid media and then *abhraka* pieces were separated by filtering through iron sieve and collected in an iron pan. *Triphala kwath*, cow'smilk, *Kanjii* (sour liquid), cow's urine (g*omutra*) and *badarikwath* were used as media for *shodhana* and the process is repeated for seven times in each media separately. Samples were obtained after the complete process of *shodhana* and code was given as in table 1.

Analytical technique:

X-ray Diffraction (XRD) [10]is a powerful non-destructive technique for investigation of structural properties of crystalline materials. Diffraction pattern is produced when a crystalline material is irradiated with a collimated beam of x-ray. The diffraction pattern and the intensity of each diffracted x-ray as a function of the diffraction angle can provide information such as crystal structures, phase purity, grain size etc.

Small quantities of samples were crushed to very fine size powder in an agate mortar. These powders were then mounted on the sample holder of a commercial high resolution X-ray power diffractometer fitted with a curved monochromator. This diffractometer operates on "Bragg-Bretano geometry". An eighteen KW rotating anode generator was used as a source of X-ray. This machine was of Rigaku make with model No. Rint 2000/PC series. The XRD data were collected in the fully automatic mode and stored in the personal computer.

RESULTS AND DISCUSSIONS

Results of XRD studies are shown from Fig.1 to 6 and table 2 to 7. On comparing the XRD data available for all the six samples reveals that strongest three peak of all the samples are nearby same. These are shown in table 8.

JCPDS data available shows after comparing with findings that the raw material Krishna *VajraAbhraka* (Biotite) used is Potassium Iron Magnesium Aluminum Silicate Hydroxide having following formula

$K (Mg, Fe^{+2}) 3 (Al, Fe^{+3}) Si_3O_{10} (OH, F)_2$

It also shows that there is no much structural change in the above complex mixture of compound occurs. But there is some addition and deletion of peaks is occurring. This is due to the addition and deletion of some compounds in very minor amount which could not be found after comparing with JCPDS data. In the sample six which is *Badari Kwath Shodhit* 3rd strongest peak is different from others.

CONCLUSION

The present studies exemplify the significance of *shodhana* process (purification) in the preparationof *abhraka* (biotite) based *ayurvedic* formulations. Results also revealed the importance of media in the *shodhana*. Various physico-chemical changes were occurred depending upon the selection of the media during the *shodhana* such as reduction in particle size as shown by

FWHM pattern of XRD study, differences in peaks are due to variation in elemental composition of major elements and addition as well as deletion of minor elements from the raw material.

REFERENCES

1. Shastri, K.N.: Sadanand Sharma's *Rasa Tarangani*, MotilalBanarasi Das, Varanasi, 22, 2002.
2. Mishra, S.N.: Somdeva'sR*asendraChudamani*, ChaukambhaOrientalia, Varanasi, 135, 2004.
3. Sharma, Gulraj. : Madhava's *AyurvedaPrakash*, ChaukambhaBharati Academy, Varanasi, 284, 1999.
4. Tripathi, I.D.: GopalkrishnaBhata's*RasaedraSarSangraha*, ChaukambhaOrientalia, Varanasi, 4, 2003.
5. Kulkarani, D.A.: Rasa Vagbhata's *Rasa RatnaSammucchaya*, MeharchandLacchman Das, New Delhi, 21, 1992.
6. Joshi. Damodar., Pharmaceutical and Pharmacotherapeutics Studies on Abhrak*Bhasma* with special reference to *Amlapitta*, Department of *Rasa Shastra*, Institute of Medical Sciences, Banaras Hindu University, 98, 1973.
7. Jha. C.B., Standardization of *Abhraka Satvapatana*, Department of *Rasa Shastra*, Institute of Medical Sciences, Banaras HinduUniversity, 142, 1991.
8. Kadam. Ajit., A Comparative Study of *Abhraka*Satva*Bhasma* and Loha*Bhasma*, Department of Rasa Shastra, Institute of Medical Sciences, Banaras Hindu University,128, 1997.
9. Kulkarani, D.A.: Rasa Vagbhata's *Rasa RatnaSammucchaya*, MeharchandLacchman Das, New Delhi, 21, 1992.
10. Westgren A (1932). "ZurChemie der Legierungen". AngewandteChemie 45 (2): 33.

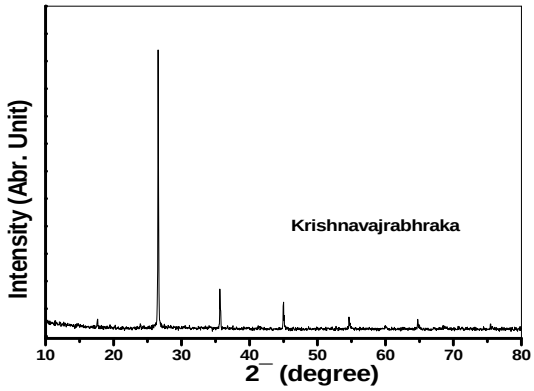

Fig 1.

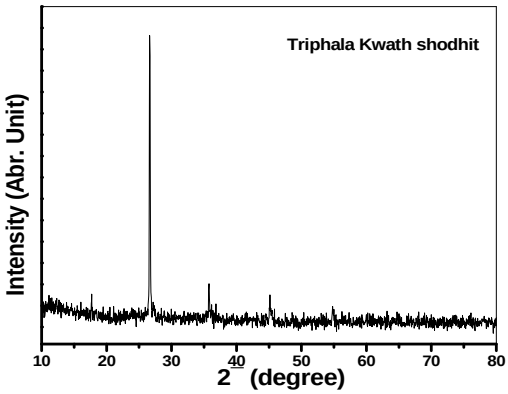

Fig 2.

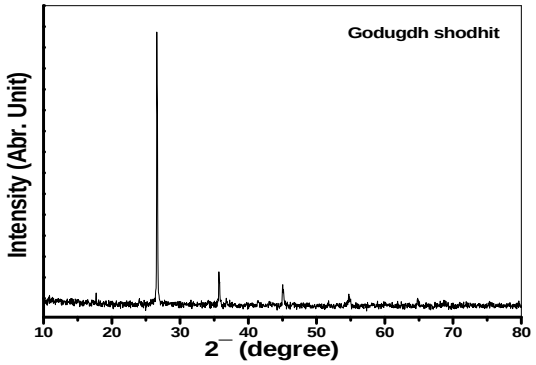

Fig 3

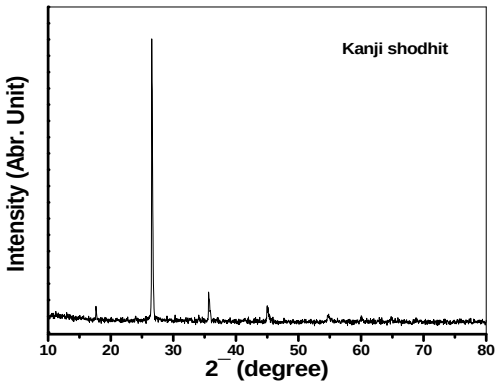

Fig 4

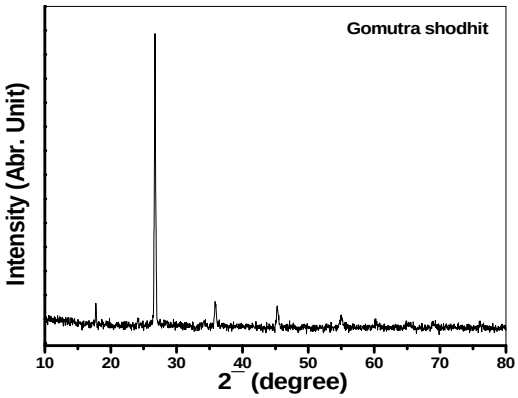

Fig.5

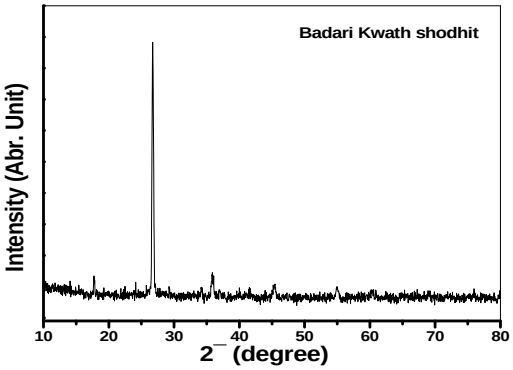

Fig 6

Table 1 showing the sample coding of different product after *shodhana* process

S.No.	Name of the Sample	Code
1.	Krishna Vaj*rabhraka*.	**1**
2.	TriphalaKwathShodhit*Abhraka*	**2**
3.	GodugdhaShodhit*Abhraka*	**3**
4.	Kanji Shodhit*Abhraka*	**4**
5.	GomutraShodhit*Abhraka*	**5**
6.	**BadariKwathShodhit*Abhraka***	**6**

Table 2: Showing the details of peak of Krishna Vaj*rabhraka* (Raw material)

S.No.	Angle(2 cos¯)	D-spacing	Rel. Intensity	FWHM(in degree)
1.	17.642	5.0233	32	**.1393**
2.	23.958	3.7113	16	**.1458**
3.	26.569	3.3522	1000	**.1476**
4.	31.175	2.8667	9	**.1669**

5.	35.662	2.5156	125	**.1656**
6.	44.988	2.0134	87	**.1853**
7.	54.653	1.6780	36	**1.6792**
8.	60.010	1.5404	10	**.3328**
9.	**64.757**	**1.4384**	**34**	**.1349**

Table 3: Showing the details of peak of TriphalaKwath (purified) *Abhraka*

S.No.	Angle(2 cos¯)	D-spacing	Rel. Intensity	FWHM(in degree)
1.	17.702	5.0064	61	**.1582**
2.	26.650	3.3422	1000	**.1681**
3.	27.169	3.2796	49	**.2905**
4.	35.767	2.5085	108	**.1632**
5.	45.156	2.0063	68	**.2303**
6.	**54.802**	**1.6738**	**47**	**.1991**

Table 4: Showing the details of peak of Godugdha (cow'smilk) (purified) *Abhraka*

S.No.	Angle(2 cos¯)	D-spacing	Rel. Intensity	FWHM(in degree)
1.	17.707	5.0050	33	**.4512**
2.	26.628	3.3450	1000	**.1588**
3.	35.719	2.5117	132	**.1768**
4.	36.776	2.4419	23	**.9751**
5.	45.038	2.0113	81	**.2533**
6.	54.713	1.6763	42	**.4187**
7.	**64.806**	**1.4375**	**29**	**.1806**

Table 5 showing the details of peak of Kanjiishodhit (purified) *Abhraka*

S.No.	Angle(2 cos¯)	D-spacing	Rel. Intensity	FWHM(in degree)
1.	17.666	5.0164	41	**.1609**
2.	23.994	3.7058	13	**.1269**
3.	26.594	3.3491	1000	**.1932**
4.	34.077	2.6289	17	**.1754**
5.	35.684	2.5141	101	**.2299**
6.	45.009	2.0125	53	**.2926**
7.	54.809	1.6736	27	**.4075**
8.	**68.770**	**1.3640**	**15**	**.1640**

Table 6 showing the details of peak of Gomutra (cow's urine) shodhit (purified) *Abhraka*

S.No.	Angle(2 cos¯)	D-spacing	Rel. Intensity	FWHM(in degree)
1.	17.759	4.9905	59	**.1487**
2.	24.106	3.6890	19	**.2364**
3.	26.725	3.3330	1000	**.2222**
4.	33.840	2.6467	17	**.3211**
5.	34.185	2.6208	26	**.4025**
6.	35.858	2.5023	86	**.3036**
7.	45.267	2.0016	76	**.2990**
8.	53.446	1.7130	17	**.4793**
9.	**54.992**	**1.6684**	**41**	**.3553**

Table 7 showing the details of peak of BadariKwathshodhit (purified) *Abhraka*

S.No.	Angle(2 cos¯)	D-spacing	Rel. Intensity	FWHM(in degree)
1.	17.743	4.9950	64	**.1985**
2.	24.126	3.6858	29	**.4641**
3.	26.734	3.3319	1000	**.2757**
4.	34.179	2.6212	27	**.2120**
5.	35.843	2.5033	82	**.4215**
6.	45.444	1.9942	50	**.4202**
7.	**54.965**	**1.6692**	**39**	**.4935**

Table 8 showing the strongest three peak of all the samples

Sr. No.	1st Strongest Peak(2 cos¯)	2nd Strongest Peak(2 cos¯)	3rd Strongest Peak(2 cos¯)
1.	26.656	35.662	**44.988**
2.	26.650	35.765	**45.156**
3.	26.625	35.719	**45.038**
4.	26.594	35.684	**45.009**
5.	26.725	35.858	**45.267**
6.	**26.734**	**35.843**	**17.743**

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