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Miraculous Properties of Lohabhasma Proven by Modern Techniques

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ABSTRACT

Ayurvedic system of medicine includes an important class of drugs of mineral origin under which there is as subclass known as ayurvedicbhasmas. These are derived from metals like gold, silver, copper, iron, lead, supreme medicines due to their extraordinary medicinal properties. However, according to the modern science, heavy metals referred above are difficult to absorb at cellular levels and therefore are toxic and harmful to human bodies. As against this according toayurved, all these elements, after ayurvedic processes of bhasmikarananot only lose their toxicity but miraculous medicinal properties are induced when they are transformed into what is called as bhasma state. In an attempt to elucidate the exact nature of this bhasma state, we found that a genuine ayuvidicbhasma possesses two characteristics (i) extremelytiny particle size, tending to nano level of the order of 20-90 nm and (ii) attachment of an organic components to these nanosizedbhasma particles. These findings are expected to be useful to throw light on the medicinal potential of ayurvedicbhasma.

Keywords : Ayurvedic System , Bhasma, E-DAX, XRD

I. INTRODUCTION

Ayurved firstly introduced the concept of "Bhasma" in its medicinal system. Originally, ayurvedic system of medicine was mostly restricted to medicinal plants (vanaushadhi) and to, some extent to animal products such as cowurine, cowdung, cowmilk, honey etc. Later on metal-based bhasmas were introduced and subsequently they constituted the most important class of drugs of mineral origin.

The art and sciene of ayurvedicbhasmas in general and metal-based bhasmas in particular is the subject of "ayurved rasashastra" ,which is an extremely important and interesting branch of ayurved. The origin, history, developments in ayurvedrasashastra is itself an attractive and promising area for research especially for chemists. Research in this subject will be also relevant and encouraging in coming years because ayurved and ayurvedic medicines will receive more and more appreciation and importance all over the world. Metal-based ayurvidic drugs being the superior drugs as compared to all other classes of drugs, there is an excellent opportunity to rejuvenate this original art with the help of modern scientific developments. The present work is an attempt from this point of view.

II. SYNTHESIS AND CHARACTERIZATION OF METALLICBHASMAS

Synthesis of Metallic Bhasmas.

Preparation of bhasma is an elaborate process involving shodhana, marana and bhasmikarana. The classical texts of Ayurveda prescribe in detail these processes. Metals are first purified through a process called shodhana, during which the metal is repeatedly heated and then cooled in herbal extracts. This is fillowed by bhasmikarana where, the shodhit metal is repeatedly triturated with herbs (bhavana) and calcinated in closed earthen crucibles in a pit, by buringcowdung cakes (a Process called puta), to obtain bhasma. The size of pit, the number of cowdung cakes to be used to obtain a specific temperature and duration of heating are specified in detail in standard ayurvedic texts. This process is repeated as many times as prescribed in classical texts for each preparation. Thus we have dashaputa (10 cycles), shataputa (100 cycles), Sahastraputa (1000 cycles) etc. to ensure that the bhasma is properly prepared. To confirm the formation of a genuine bhasma a set of tests are also specified (Ayurvedic Formulary of India, 2003).

Though bhasma preparations are widely used in ayurved, practically noting is known as to what happens to the metal when it is subjected to bhavana with herbs and subsequent calcinations processes. The traditional texts also don't throw any light on the changes undergone by a metal during the obove processes.

The synthesis of an ayurvedicbhasma generally involves three major steps given below and illustrated in following flow sheet Ayurvedic purification of the metal (shuddhi).

a. Destruction of metallic state (marana).
b. Conversion of crude product into bhasma state (bhasmikarana).

Synthesis of Lohabhasma as a representative example

There are numerous methods reported in literature for the synthesis of lohabhasma which is an ancient and famous iron based ayurvedic preparation. Out of these following three methods are selected for the present work.

1.1 Method Using Plant (Kanchnar) Material

In this method the general purification was first done by the standard method. For special purification trifala extract was prepared in cowurine and the above processed iron powder was heated to red heat and then dipped in this extract successively seven times. The process of marana was done in the juice of kanchnar (bauhinia variegate). For this purpose the purified iron powder was mixed with this plant juice in a mortar and the mixture was triturated till a homogenous paste is formed. This paste was transformed to closed crucible system and then subjected to gaja-puta.

The process of bhasmikarana was also done in the same way as that for marana but here the trituration for plant juice followed by gaja-puta was repeated seven times.

1.2 Method Using cow-urine

In this method the first operation was identical with that described for general purification.For special purification, the above processed iron powder (500g) was heated and dipped in freshly collected cow-urine. This operation of heating and dipping the hot iron powder in cow urine was repeated seven times.

After special purification, the iron powder was taken in a mortar and mixed with cowurine and the mixture was triturated for six hours keeping it in viscous state. This mixture was kept overnight for interaction to complete the destruction of metallic state (marana).
Finally for bhasmikarana, the above iron powder is mixed with cow-urine in a mortar and triturated till a homogenous paste is obtained. The paste is transferred to closed crucible system and subjected to gaja-puta. Total seven gaja-puta are given

Finally for bhasmikarana, the above iron powder is mixed with lemon juice in a mortar and triturated till a homogenous paste is obtained. The paste is transferred to closed crucible system and subjected to gaja-puta. Total six gaja-puta are given.

III. Characterization and particle size Determination

Chemical Composition by E-DAX

The quantitative determination of the elemental constituents of the two lohabhasma samples to establish their chemical composition was done through EDAX model Inc

Mahwah NJ USA. The E-DAX patterns are shown in figure 1.1 and the result of analysis is shown in table 1.1

Table 1.1. Chemical Composition by E-DAX

Method	C	O	Fe	Al	Si	Cr	K	S	Ca
Method I	30.40	28.07	35.60	0.40	1.02	—	0.15	0.58	1.91
Method II	36.93	28.30	29.14	—	0.77	3.43	1.17	0.26	—

1.3 Phase analysis by XRD and partile size determination

The investigations were done to examine the crystalline modifications of iron oxides. The XRD patterns were recorded on Phillips X-pert Pro Powder diffratometer in the diffraction range (10.90)2. Debye Scherrer equation was used to calculate mean crystallite size.

The XRD patterns with relevant details are shown in Fig. 2.2 while the results of phase analysis and particle size determination are shown in Table 2

Table 2.2. components identified through XRD

Sr. No.	Method	Major Constituent	Solid State Nature	Crystallite Size
1.	Method I	Hamatite	Microcrystalline	39.7 nm
2.	Method II	Fe2O3	Mostly Amorhous	23.5 nm

Evidence for organic component [14]

The significant percentage of carbon identified by E-DAX and the nature of the IR spectra of lohabhasma (as well as for metallic bhasmas obtained from other metals) give some indications in favour of the presence of organic components associated with lohabhasma particles. However, since EDAX is unable to detect the presence of hydrogen and solid state IR spectra show poor resolution, some confirmatory evidence to support the presence of such organic component is necessary. For this purpose samples of lohabhasma(method II) were refluxedon pure toluene for 12 hour for three successive times and the soluble part was isolated. The IR spectra as well as electronic spectra (200-700 nm) in spectroscopic chloroform are then recorded)Tjese spectra gave confirmatory evidence for the presence of organic components. The exact nature of this component is under investigation at present.

IV. Conclusions

According to the ayurvedic principals, metals as well as non-metals alone, cannot exhibit extraordinary medicinal properties in their inorganic from. Therefore, pure metal oxides; sulfides; silicates; carbonates or phosphates are not known to possess significant medicinal properties and also they are not assimiable to human bodies. But when they are transformed info their bhasma state miraculous medicinal properties are claimed to be induced in them. Two major factors seem to be responsible for induction of tremendous medicinal potential in the bhasma state. These may be (a) extremely tiny size tending to nanolevel (10-90 nm) of the bhasma particles and (b) organic component imparted to these tiny bhasma particles.

In the present work, encouraging experimental evidence is obtained in favour of both these factors. Similar results and evidence is obtained in metallic

bhasmas derived from copper, gold, tin and zinc. These result and evidences are expected to be useful to throw some light on the nature of ayurvedicbhasmas and their claimed extraordinary medicinal properties.

V. Acknowledgement:

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VI. REFERENCES

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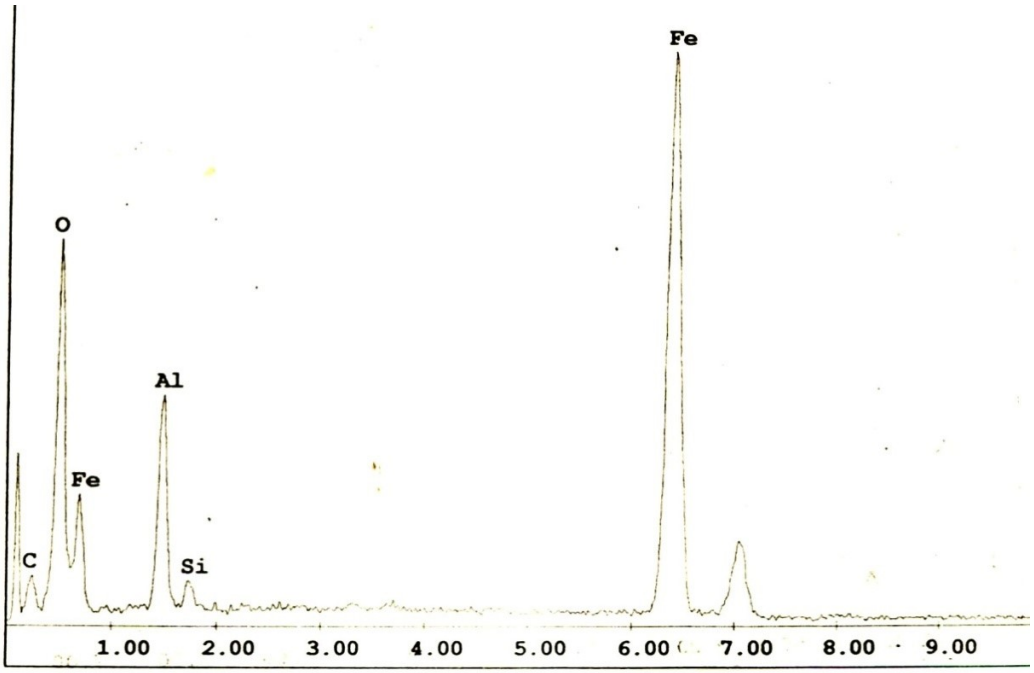
E-DAX ANALYSIS

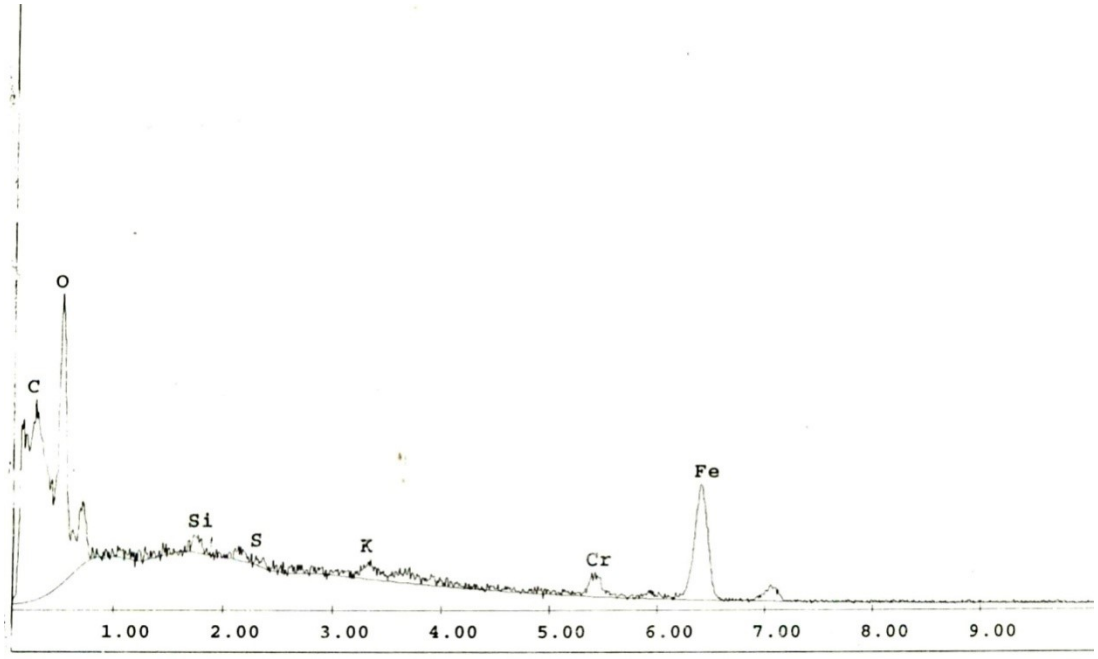
Figure No. : 3.6.1 Loha – 01



Element	Wt %
CK	12.95
OK	24.66
AlK	9.86
SiK	1.01
FeK	51.52

Loha - 02

Figure No. : 3.6.2



Element	Wt%
C K	36.93
O K	28.30
Si K	0.77
S K	0.26
KK	1.17
Cr K	3.43
Fe K	29.14
Total	100.00

XRD PATTERNS OF SYNTHESIZED *LOHABHASMA*

Figure No.: 3.7.1

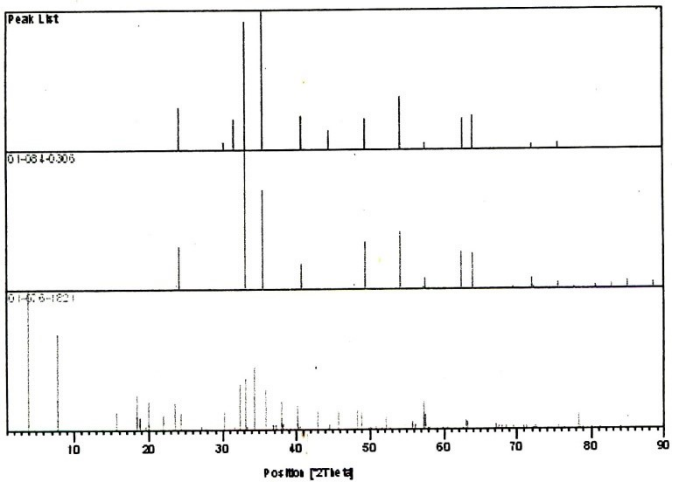
XRD patterns of

Loha-01

Anchor Scan Parameters :

Sample Identification	:	694
Comment	:	Fe203 RGS R1 100108
Measurement Date / Time	:	1/10/2008 1:52:08 PM
Raw Data Origin	:	XRD measurement (*.XRDML)
Scan Axis	:	Gonio
Start Position [^{0}2Th]	:	10.0100
End Position [^{0}2Th]	:	79.9900
Step Size [^{0}2Th]	:	0.0200
Scan Step Time [s]	:	1.0000
Scan Type	:	Continuous
Offset [^{0}2Th]	:	0.0000
Divergence Slit Type	:	Fixed
Divergence Slit Size [^{0}]	:	0.8709
Specimen Length [mm]	:	10.00
Receiving Slit Size [mm]	:	0.1000
Measurement Temperature [^{0}C]	:	25.00
Anode Material	:	Cu
Generator Settings	:	40kV. 30mA
Goniometer Radius [mm]	:	240.00
Dist. Focus-Diverg. Slit [mm]	:	100.00
Incident Beam Monochromator	:	No
Spinning	:	No

Graphics :



Name and Formula		
Reference Code	:	01-076-1821
ICSD Name	:	Iron Oxide
Empirical Formula	:	Fe_2O_3
Chemical Formula	:	Fe_2O_3
Crystallographic Parameters		
Crystal System	:	Hexagonal
Space Group	:	P3
Space Group Number	:	143
a (Å)	:	5.5600
b (Å)	:	5.5600
c (Å)	:	22.5500
Alpha (º)	:	90.0000
Beta (º)	:	90.0000
Gamma (º)	:	120.0000
Calculated density	:	2.63
Volume of cell	:	603.71
Z	:	6.00
RIR	:	2.08

Name and Formula		
Reference Code	:	01-084-0306
ICSD Name	:	Iron Oxide
Empirical Formula	:	Fe_2O_3
Chemical Formula	:	Fe_2O_3
Crystallographic Parameters		
Crystal System	:	Rhombohedral
Space Group	:	R-3c
Space Group Number	:	167
a (Å)	:	5.0347
b (Å)	:	5.0347
c (Å)	:	13.7473
Alpha (º)	:	90.0000
Beta (º)	:	90.0000
Gamma (º)	:	120.0000
Calculated density	:	5.27
Volume of cell	:	301.78
Z	:	6.00
RIR	:	3.27

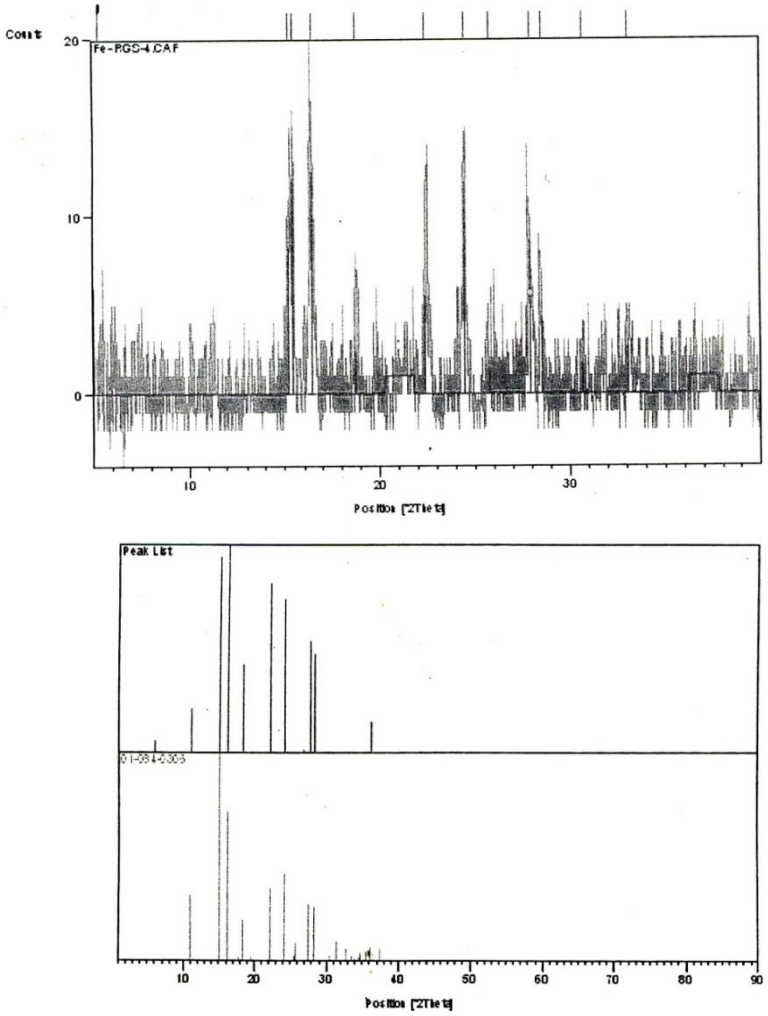
Figure No. : 3.7.2
XRD patterns of
Loha-02

Anchor Scan Parameters :

Sample Identification	:	654
Comment	:	Fe-RGS-4, Pyro 18/06/07
Comment	:	CuCeO2, 75,2%, 160C
Measurement Date / Time	:	6/18/2007 3:42:12 PM
Raw Data Origin	:	XRD measurement (*.XRDML)
Scan Axis	:	Gonio
Start Position [02Th]	:	5.0100
End Position [02Th]	:	39.9900
Step Size [02Th]	:	0.0200
Scan Step Time [s]	:	1.0000
Scan Type	:	Continuous
Offset [02Th]	:	0.0000
Divergence Slit Type	:	Fixed
Divergence Slit Size [0]	:	0.8709
Specimen Length [mm]	:	10.00
Receiving Slit Size [mm]	:	0.1000
Measurement Temperature [0C]	:	25.00

Anode Material	:	Mo
Generator Settings	:	40kV. 30mA
Goniometer Radius [mm]	:	240.00
Dist. Focus-Diverg. Slit [mm]	:	100.00
Incident Beam Monochromator	:	No
Spinning	:	No

Graphics :



Name and Formula		
Reference Code	:	01-084-0311
ICSD Name	:	Iron Oxide
Empirical Formula	:	Fe_2O_3
Chemical Formula	:	Fe_2O_3
Crystallographic Parameters		
Crystal System	:	Rhombohedral
Space Group	:	R-3c
Space Group Number	:	167
a (Å)	:	5.0016
b (Å)	:	5.0016
c (Å)	:	13.6202
Alpha (º)	:	90.0000
Beta (º)	:	90.0000
Gamma (º)	:	120.0000
Calculated density	:	5.39
Volume of cell	:	295.07
Z	:	6.00
RIR	:	3.28