

ANALYTICAL STUDY OF KASISABHASMA AND ANNABHEDI CHENDURAM WITH REFERENCE TO PH, INDUCTIVELY COUPLED PLASMA WITH OPTICAL EMISSION SPECTROSCOPY (I.C.P.O.E.S), SCANNING ELECTRON MICROSCOPY(SEM), ENERGY DISPERSIVE X-RAY ANALYSIS(EDAX)

Ashwin Ashok Shete¹, Avinash Ashok Shete², PVNR Prasad³

¹MD (Rasashastra and Bhaishajyakalpana), MBA (HRM), Assistant Professor, Dr. D Y Patil College Of Ayurveda and Research Centre, Pimpri, Pune 411018, Maharashtra, India

²MS (Streeroga evam Prasutitantra), Consultant, Vatsalya Nursing Home, Pune 411014, Maharashtra, India

³MD (Rasashastra and Bhaishajyakalpana), Associate Professor, PG Dept of Rasashastra, Dr. NRS Govt. Ayurvedic College, Vijayawada 520002, Andhra Pradesh, India

Email: ashwin3485@gmail.com

ABSTRACT

Anemia (*Pandu*) is one of the major diseases in developing countries like India. Iron deficiency is mostly cause and iron therapy is treatment for it. To find solution for iron deficient anemia, Ayurveda and Siddha shows ray of light. '*Kasisa*' is iron rich compound which is presented in this article in two forms i.e. *Kasisa bhasma* and *Annabhedi chenduram*. *Annabhedi chenduram* is *siddha* medicine. (*Siddha* is also a traditional medical system of India which is of *Dravidian* origin and has its entire literature in Tamil language). Many research programs were conducted on *Kasisa Bhasma* of Ayurveda and *Annabhedi Chendooram* of *Siddha medicine* for the management of *Anaemia*. The both compound preparation should be understood well and interpreted vividly in the light of modern technology. Analytical study is needed to understand similarity and differences in between two.

Therefore, it is highly desirable that these drugs should be analyzed with objective characteristics, such as Inductively Coupled Plasma with Optical Emission Spectroscopy (I.C.P.O.E.S), Scanning Electron Microscopy (SEM), Energy Dispersive X-Ray Analysis (EDAX) based on which the specifications of such drugs can be well understood on a scientific basis. To understand their acidity or alkalinity pH test done. Results are discussed in this article. Standard methods of tests are used. Result found as *Kasisa bhasma* is more alkaline than *Annabhedi chenduram*. Both drugs are iron rich.

Keywords: *Annabhedi Chendooram*, '*Kasisa*', I.C.P.O.E.S, SEM, EDAX

INTRODUCTION

'*Kasisa*' is described under *Uparasa* group by Rasacharyas¹. It is one among the Iron containing

minerals. '*Kasisa*' which is an *iron* compound is presented in this article in two forms i.e. *Kasisa*

bhasma and *Annabhedi chenduram*². The both compound preparation should be understood well and interpreted vividly in the light of modern technology.

Therefore, it is highly desirable that these drugs should be analyzed with objective characteristic, such as I.C.P.O.E.S, SEM, EDAX based on which the specifications of such drugs can be well understood on a scientific basis. To understand their acidity or alkalinity pH test done. *Kasisa Bhasma* and *Annabhedi Chendooram* contain number of similari-

ties both in terms of composition and preparation with minimum variations.

ANALYTICAL STUDY

Determination of pH

For the determination of the pH³ of the sample, a buffer of PH 4 would suffice. The pH Meter is standardized using this buffer and check the pH of the sample. About 2 gm of the sample is thoroughly dissolved in 100 ml of the distilled water, then the pH meter is inserted and the display reading is noted.

Table 1: Study of pH.

SI No	Name of Sample	pH value
1	pH of <i>shuddha Kasisa</i>	2.32
2	pH of <i>Kasisa bhasma</i>	7.17
3	pH of <i>Annabhedi chenduram</i>	6.9

Inductively Coupled Plasma with Optical Emission Spectroscopy (ICPOES)

Place of study: DMRL, Hyderabad

Description of method:

ICP-OES makes use of the fact that the atoms of elements can take up energy from inductively coupled plasma, are thereby excited, and fall back into their ground state again emitting a characteristic radiation. The identification of this radiation permits the qualitative analysis of a sample. A quantitative determination takes place on the basis of the proportionality of radiation intensity and element concentration in calibration and analysis samples.

In ICP-OES⁴ analysis, the liquid sample is introduced into the inductively generated argon plasma through a nebulizer system and excited. The spectrum emitted is transferred into a spectrometer where it is decomposed into the individual wavelengths and evaluated. The intensities of the spectral lines are measured by CID semiconductor detectors. Calibra-

tion is effected with multi-element solutions mixed from standard solutions.

Features of ICP-OES

- ❖ The method is suited for multi-element determination in solutions or after appropriate sample preparation of solid samples brought into solution.
- ❖ Detectable elements: approx. 70, determinable concentration ranges from a few µg/l up to 2 % in solution or 1 µg/g up to 100 % in solids.
- ❖ Precision: 1 - 3 % for major elements, ± 10-30 % for traces.
- ❖ Particularly suited for stoichiometry determinations, material controls, and material determinations.
- ❖ Test quantities at least 1-0 mg for major elements, 100-500 mg for traces.
- ❖ Measurement times of generally a few minutes per sample; for solid samples, a possibly time-consuming sample preparation must be taken into account

Table 2: Elemental analysis of samples of *Kaseesa bhasma* and *Annabhedi chenduram*

Elements	Concentration %	
	Sample A (<i>Kasisa bhasma</i>)	Sample B (<i>Annabhedi chenduram</i>)
Hg	Nil	Nil
Fe	40.0 (1.0)	38.5 (1.0)
Sn	Nil	Nil

Remarks: Elemental Concentration given in % and standard deviation given in brackets Scanning Electron Microscopy

The Scanning Electron Microscope (SEM)⁵ is a microscope that uses electrons rather than light to form an image. The SEM has a large depth of field, which allows a large amount of the sample to be in focus at one time. The SEM also produces images of high resolution, which means that closely spaced features can be examined at a high magnification. Preparation of the samples is relatively easy since most SEMs only require the sample to be conductive.

Scanning electron microscopy is used for inspecting topographies of specimens at very high magnifications using a piece of equipment called the scanning electron microscope.

During SEM inspection, a beam of electrons is focused on a spot volume of the specimen, resulting in the transfer of energy to the spot. These bombarding electrons, also referred to as primary electrons, dislodge electrons from the specimen itself. The dislodged electrons, also known as secondary electrons,

are attached and collected by a positively biased grid or detector, and then translated into a signal.

To produce the SEM image, the electron beam is swept across the area being inspected, producing many such signals. These signals are then amplified, analyzed, and translated into images of the topography being inspected. Finally, the image is shown on a CRT (Cathode Rays Tube)

Place of study – SEM Dept. D.M.R.L. Hyderabad

Methods:

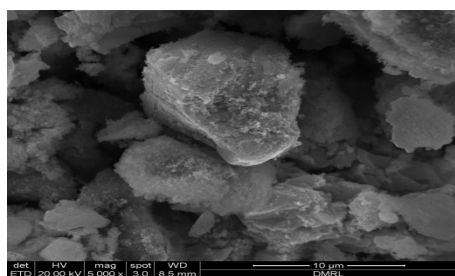
Samples of *Kaseesa bhasma* and *Annabhedi chenduram* were given for SEM.

The SEM pictures with magnification 5.00 Kx, 2.00 Kx, resolutions are taken for samples of *Kaseesa bhasma* and *Annabhedi chenduram*.

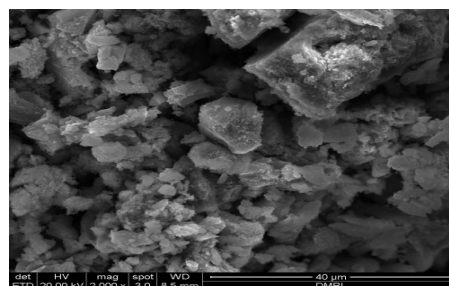
Observation:

Spongy, relatively compact microcrystalline aggregates with loss of grain boundaries were observed in all samples.

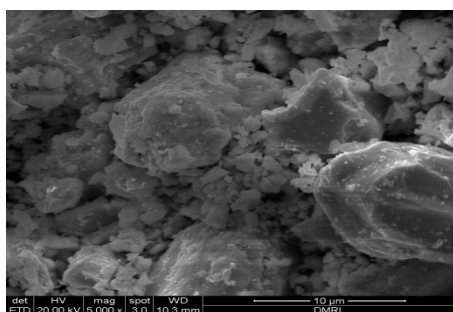
SEM PICTURES OF KASISA BHASMA AND ANNABHEDI CHENDURAM



SEM image of *Kasisa Bhasma* 5.00 KX



SEM image of *Kasisa Bhasma* 2.00KX



SEM image of *Annabhedi Chenduram*
5.00KX

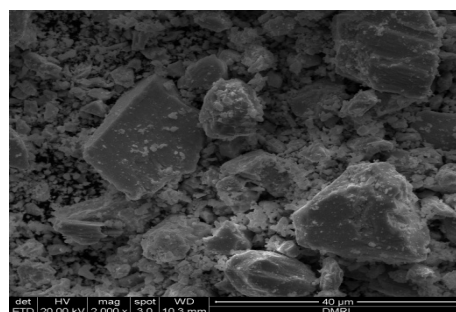
ENERGY DISPERSIVE X-RAY ANALYSIS

A SEM may be equipped with an EDX⁶ analysis system to enable it to perform compositional analysis on specimens. EDX analysis is useful in identifying materials and contaminants, as well as estimating their relative concentrations on the surface of the specimen.

This technique is used in conjunction with SEM and is not a surface science technique. An electron beam strikes the surface of a conducting sample. The energy of the beam is typically in the range 10-20keV. This causes x-rays to be emitted from the point the material. The energy of the x-rays emitted depends on the material under examination. The x-rays are generated in a region about 2 microns in depth, and thus EDX is not a surface science technique. By moving the electron beam across the material an image of each element in the sample can be acquired in a manner similar to SAM. Due to the low x-ray intensity, images usually take a number of hours to acquire. Elements of low atomic number are difficult to detect by EDX. The SiLi detector (see below) is often protected by a Beryllium window. The absorption of the soft x-rays by the Be precludes the detection of elements below an atomic number of 11(Na). In windowless systems, elements with as low atomic number as 4(Be) have been detected, but the problems involved get progressively worse as the atomic number is reduced.

The Lithium drifted Silicon (SiLi) detector:

The detector used in EDX is the Lithium drifted Silicon detector. This detector must be operated at liq-



SEM image of *Annabhedi Chenduram*
2.00Kx

uid nitrogen temperatures. When an x-ray strikes the detector, it will generate a photoelectron within the body of the Si. As this photoelectron travels through the Si, it generates electron-hole pairs. The electrons and holes are attached to opposite ends of the detector with the aid of a strong electric field. The size of the current pulse thus generated depends on the number of electron-hole pairs created, which in turn depends on the energy of the incoming x-ray. Thus, an x-ray spectrum can be acquired giving information on the elemental composition of the material under examination.

Methods:

Annabhedi chenduram and *Kasisa bhasma* samples were given for EDX analysis.

EDAX Analysis of *annabhedi chenduram* and *Kasisa bhasma*

SEM Quant results. Listed at 1:10:38 PM On 7 /4 / 13.

Operator: **D.M.R.L.** Hyderabad.

Client: All ISIS Users.

Job: Demonstration data SiLi detector.

Spectrum label:

System resolution = 124 eV.

Quantitative method: ZAF (3 iterations).

Analyzed all elements and normalized results.

2 peaks possibly omitted: 0.00, 8.04 keV

DISCUSSION & RESULTS

In analytical study, chemical analysis results are, *shuddha kasisa* is highly acidic in nature (pH 2.32), pH of *Kasisa bhasma* 7.17 and pH of *Annabhedi*

chenduram 6.9. So *Kasisa bhasma* is more basic and *annabhedi chenduram* is slightly acidic. As Yadavaji Trikamji Acharya described *Niramlatva* is Test for *Kasisa bhasma* is proven here.

ICPOES shows more conc. Of Iron in *Kasisa Bhasma* (40.0) than *Annabhedi Chenduram* (38.5)

In Scanning Electron Microscopy, Spongy, relatively compact microcrystalline aggregates with loss of grain boundaries were observed in all samples.

In analytical study, results are showing percentage of Iron in raw material, *shodhit kasisa* and finished products. So it reveals that, both the compounds are iron rich compound

CONCLUSION

The pH of *Kasisa bhasma* is more towards basic while that of *Annabhedi chenduram* is towards acidic. The amount of iron present in *Kasisa bhasma* is more comparative to *Annabhedi chenduram*.

REFERENCES

1. Rasashastra – Dr PHC Murthy
2. Tamilo ka Siddha Chikitsa Sampradaya – Ramnivas Sharma, page62-63
3. Ph:Quality control & standardization Ayurvedic Medicines, Dr Devendra Joshi, Dr Geeta Joshi, page 170

4. ICPOES; Protocol For Testing Ayurvedic, Siddha & Unani Medicines by Dr. D.R. Lohar. Published by Pharmacopoeial Laboratory for Indian Medicines, Ghaziabad, Department of Ayush, Ministry of Health & Family Welfare, Government of India
5. SEM; Protocol For Testing Ayurvedic, Siddha & Unani Medicines by Dr. D.R. Lohar. Published by Pharmacopoeial Laboratory for Indian Medicines, Ghaziabad, Department of Ayush, Ministry of Health & Family Welfare, Government of India
6. E-DAX: Wikipedia: Energy-dispersive X-ray spectroscopy: 2016 Aug 19. Available from: https://en.wikipedia.org/wiki/Energy-dispersive_X-ray_spectroscopy

Source of Support: Nil

Conflict Of Interest: None Declared

How to cite this URL: Ashwin Ashok Shete et al: Analytical Study Of Kasisabhasma And Annabhedi Chenduram With Reference To Ph, Inductively Coupled Plasma With Optical Emission Spectroscopy (I.C.P.O.E.S), Scanning Electron Microscopy(SEM), Energy Dispersive X-Ray Analysis(EDAX). International Ayurvedic Medical Journal {online} 2018 {cited August, 2018} Available from: http://www.iamj.in/posts/images/upload/1658_1662.pdf