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ANALYTICAL STUDY OF MRIGANKARASA

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ABSTRACT

*Rasasastra*is a branch that deals with the medicinal properties of minerals and metals. According to the different processes involved and shapes of the product, *Acharyas* have classified *Rasaushadhis* as *Khalveeya rasa, Parpati, Pottali*and *Kupipakwa rasa*. By preparing the Rasaushadhis mentioned above, Acharyas mainly aimed to reduce the toxicity and the dosage. To judge the quality of the product purchased from the market and to meet the new thrust of curiosity, we need some standard for each product, and for these standards, we reckon on analytical study. With an analytical study, the research of a drug is complete. The analytical study aims to know the particular chemical configuration and the Physicochemical changes that occurred after the entire process. In this study, a Kupipakvarasa preparation named Mrigankarasa was subjected to Analytical research to bring out all the analytical parameters that can prove the quality of this medicine. *Mrigankarasa* (1) is a *Kupipakvarasa* preparation containing *Navasara* (Ammonium Chloride)(2), *Saindhava* (Rock salt)(3), *Gandhaka* (Sulphur)(4) and *Vanga* (Tin)(5) and has a wide range of indications from *Prameha* to *Dhatukshaya*. This study not only gives the standards of the product but indirectly gives suggestions for further advancement if required. The drugs were analysed with the help of different analytical methods like organoleptic tests and chemical and instrumental methods like XRD, SEM and EDAX, and the result obtained was that Mrigankarasa is a compound with particle size in nanometre having tin and sulphur as the significant elements with carbon, chloride, calcium and potassium as minor elements.

Keywords: *Kupipakvarasa*, *Mrigankarasa*, Total ash, X-ray diffraction, *Bhasma pariksha*, Nanometre

INTRODUCTION

The demand for Ayurvedic medicines is increasing, and as a result, manufacturers are tempted to prepare by compromising the quality of the product in the urge to fulfil all the demands. It has to accept the new challenges and also be ready to answer the queries of the modern man, who has all the right to know about the drug he is consuming. *Mrigankarasa* is a mineral preparation with a wide range of indications from *Prameha* to *Dhatukshaya*. This medicine is prepared using the Kupipakva method in Valuka Yantra (6). In *Mrigankarasa*, *satva* is taken from the mixture of *Navasara* and *Saindhava* using *Damaruyantra*(7). This data is mixed with Vanga churn and Shudha Gandhaka churn and subjected to heating for 36 hours. After *Swangasheeta*(8)(self-cooling), the product, collected from the bottom of the bottle, is subjected to various analytical methods to prove its quality. The analytical study aims to know the particular chemical configuration and the Physicochemical changes that occurred after the complete processes. It helps us conduct the comparative study among various samples and gives an objective parameter to judge their best quality. It sets the standards for the product and indirectly offers suggestions for further advancement if required. The drugs should be analysed with the help of different analytical methods like organoleptic tests and chemical and instrumental techniques.

Aim and Objective 477

1. To analyse the samples of Mriganka rasa through organoleptic, physicochemical and instrumental methods.

Materials and Methods

The samples to be analysed are *Shudha Gandhaka, Navasara Saindhava Satva, Vanga Churna* and *Mrigankarasa*. The Analytical methods done are –

1. Organoleptic characters
2. Pysico chemical parameters:

a) Total Ash (9)
b) Acid insoluble Ash (10)
c) Water soluble Ash (11)
d) pH (12)

3. XRD
4. SEM
5. EDAX

Organoleptic features were obtained by testing the *rasa, gandha, varna, rupa* and *sparsha*. Total ash value was conducted to evaluate the ash content of the sample. About 2 to 3 gm of the drug was accurately weighed, incinerated, and then ground in a tared platinum or silica dish. The crucible was then kept in a muffle furnace at a temperature not exceeding 600 until free from carbon. Weight was checked after cooling. Then, the charred mass was exhausted with hot water, and the residue was collected on an ashless filter paper. Then, the residue and filter paper were incinerated, and the filtrate was evaporated to dryness and ignited at a temperature not exceeding 60. The percentage of ash concerning the air-dried drug was calculated. The procedure was repeated till there was no difference in the weight of ash. The acid insoluble ash test was conducted to assess the percentage of inorganic content of the sample, which is insoluble in dilute acid. The ash obtained above was transferred in a 250ml beaker without ash loss, and 100ml of dilute HCl was added. Heat the beaker till the liquid boils. After filtering the solution, the insoluble matter was collected on ashless filter paper (Whatman no 41). It is then washed with hot water until the filtrate becomes neutral. The filter paper containing the insoluble matter was transferred to the original crucible. It is then dried on a hot plate and ignited at 600 in a muffle furnace until it becomes white ash. It was weighed after cooling the residue in a desiccator for 30 minutes. The process was repeated until a constant weight was obtained. Then, the acid-insoluble ash concerning the air-dried drug. Similarly, water-soluble ash was also calculated in 25 ml water. Ph was calculated by dissolving 1 g of the sample in 10 ml of distilled water.

An X-ray diffraction pattern was carried out to identify the components of the Mrigankarasa. XRD studies

were done to determine the different crystalline phases in the samples. X-ray diffraction (XRD) patterns were obtained using a Shimadzu XRD-6000 diffract meter with Cu-Kα as a target with 40 KV voltages and 30 MA currents—the X-ray diffraction of the sample matched against the standard reference spectra library of software for phase identification. The mean crystallite size of Mrigankarasa was calculated from the XRD graph using the Debye-Scherrer formula. The Scanning electron microscope (SEM) is an electron microscope that images the sample surface by scanning it with a high-energy beam of electrons in a raster scan pattern. Composition, Crystallography Topography and morphology are the characteristic information obtained from SEM. Energy Dispersive X-ray Spectroscopy is used to determine the elemental composition of a sample. It works by analysing the spectrum of emitted X-rays from a sample as a beam of high-energy electrons is incident upon its surface. The ZAF Method Standard less Quantitative Analysis was done in the present study. The instrument used was 6380 (LA) at a voltage of 20.0kv, prob current of 1.00000 nA and PHA, MODE :T3.

Qualitative Analysis of Mriganka Asa

All three samples of Mrigankarasa were chemically analysed for NaCl, Sulphur, Ammonia and Tin presence.

Test for the presence of NaCl!

Dissolve about 2-3g of accurately weighed drug in 25 ml of purified water, leave it for 30 min, and filter. Wash the filter paper entirely with purified water, and the filtrate is made 100ml in a volumetric flask; make the solution homogenous and titrate 25 ml of this solution with 0.1N Silver nitrate solution using potassium chromate as an indicator. The endpoint shows a light brick-red colour.

Test for the presence of Sulphur:

Add dil HCl and a few drops of barium chloride solution to the sample. A white precipitate of barium sulphate will form.

Procedure for the presence of Sulphur:-

Heat 1 g of sample in a silica crucible at 600^0C until it becomes white ash. Add 25 ml of dil. HCl to this and boil it for 5 min. If 1g of barium chloride is added, this solution will give a white-coloured precipitate.

Test for the presence of Ammonia: Heat a few mg of the sample with sodium hydroxide solution. Ammonia is evolved, recognized by its odour and action on moist red litmus paper, which turns blue.

Result

Organoleptic characters revealed that Mrigankarasa is a golden yellow soft product with a characteristic odour and taste of the ingredients used and has given most of the *Bhasma pariksha* positive.

Table 1 Showing Results of Physico Chemical Parameters

	Sample 1	Sample 2	Sample 3
Total Ash	85.4914%	80.3277%	74.2584%
Water Insoluble ash	64.5110%	67.2437%	59.5176%
Acid Insoluble Ash	58.5033%	64.4127%	61.6380%
Ph	2.12	2.12	1.44

Table 2 shows the results of XRD RESULTS 478

SAMPLES	COMPOUNDS
Mrigankarasa	Bemdtite-SnS2- Hexagonal Berndtite –SnS2-Hexagonal Halite –NaCl-Cubic
Jaritha Vanga	Tin –Sn –Tetragonal Sylvite –KCl-Cubic Halite –NaCl-Cubic

	Carbon –C-Hexagonal Potassium carbide-K2C2-Tetragonal
Shodhita Gandhaka	Sulphur –alpha-S8-Orthorhombic
Satva	Sal-ammoniac –alpha-NH4Cl-Cubic

Table 3 illustrates the results of the XRD.

SAMPLES	INTENSITY (%)	D VALUE	ANGLE THETA
Mrigankarasa	100 5.2 7.9	5.91587 2.95023 1.96561	14.963 30.27 46.144
Jaritha Vanga	100 8.8 62.4	3.14159 3.02962 2.91027	28.387 29.459 30.696
ShodhitaGandaka	100 19.8 39.6	3.85221 3.33413 3.21475	23.07 26.716 27.728
Satva	100 34.7 16.9	2.73828 1.9371 1.94303	32.677 46.864 46.712

Table 4 Showing Results of SEM

Sample	**Magnifications**	**Size**
Mrigankarasa	10000x	500nm to 1.68um

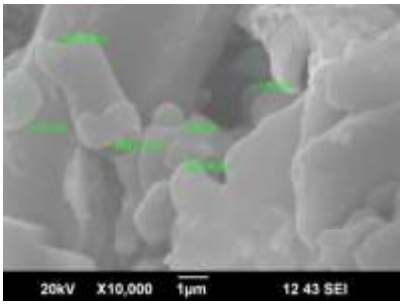

Table 5 Showing EDAX Results of *Mrigankarasa*479

Element	Wt %	Atomic %
Sn	52.15	17.36
S	26.49	32.64
C	12.44	40.92
Cl	4.4	4.9
K	2.68	2.7
Cu	0.97	0.61
Ca	0.88	0.87
	100	100

DISCUSSION

Analysis of the product was essential. The safety and efficacy of the product greatly depend on the composition. Here is an attempt to follow a maximum number of analytical parameters to figure out the exact nature of the drug within the study's limitations. The analysis includes organoleptic characters, physico-

chemical parameters like Ash value, Acid insoluble ash, Water soluble ash, Ph, SEM EDAX, XRD, and qualitative analysis.

The product was golden in colour. Characteristic smell and taste were felt. In physics chemical parameters, the Total Ash for three samples was 83.3773 %w/w, 81.4696%w/w, and 77.2199%w/w. It indicates the presence of inorganic material in the given sample, and the pH shows the acidic nature of the product. Acid insoluble ash values of the three samples were 58.5033%w/w, 64.4127%w/w and 61.6380%w/w. These values indicate the percentage of inorganic content of the sample, which is insoluble in dilute acid.

The loss on drying values of three samples was 0.7951%w/w,5.5509%w/w and 2.1005%w/w, which indicates the moisture content of the samples. Water-soluble ash was done using the following procedure. After obtaining the total ash, boil it for 5 minutes with 25 ml of water. Then, collect the insoluble matter in a crucible or on an ashless filter paper. Then wash with hot water and ignite for 15 minutes at a temperature not exceeding 600^0C. Subtract the weight of the insoluble matter from the weight of the ash; the difference in weight represents the water-soluble ash. Instrumental analysis was carried out mainly for two purposes. To identify the components and know the percentage and size of each element present in the sample.

Analytical procedures carried out were EDAX, XRD and SEM. The analytical procedure started with XRD using Bruker AXS D_8 ADVANCE. XRD is the most potent and established technique for material structural analysis. In the XRD graph, since the highest peak shows the presence of SnS2, the central element in Mrigankarasa is Tin Sulphide, and all others are minor elements. EDAX revealed the components present in the three samples of Mrigankarasa. Calcium, potassium, and copper might have come through plant sources used during the pharmaceutical procedure. SEM is an instrumental analysis to identify a sample's topography and particle size. The magnification used in this present study was 10000 x. Images were evident in the particular resolution and were selected and spotted to determine the particle size. The maximum size recorded in 10000 x was 1.68um, and the minimum size recorded was 500.00nm.

Instrumental analysis was followed by qualitative analysis for sodium chloride, sulphur, ammonia, and tin presence. All the tests were positive, proving these components' presence in the three samples. It is understood from the above studies that. 480

Mrigankarasa is a compound with particle size in nanometres, having tin and sulphur as the significant elements and carbon, chloride, calcium, and potassium as minor elements. Since mrigankarasa has a wide range of indications from prameha to dhatukshaya, the elements present in this compound may have a significant role in curing diseases, and here lies the scope for further study in Mrigankarasa.

CONCLUSION

In the analytical study, the products were tested for basic organoleptic parameters and physicochemical parameters like total ash, acid insoluble ash, pH, etc. This study also included bhasma pareeksha. Further, extensive research was undertaken using instrumental analysis methods like SEM, EDAX, and XRD. The DLS technique and SEM determined the particle size of the samples. EDAX was used for semi-quantitative analysis. Finally, it was concluded that Mrigankarasa is a compound with particle size in nanometres. It has tin and sulphur as the significant elements and carbon, chloride, calcium, and potassium as minor elements.

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