ABSTRACT

Introduction: Minerals are basically impure in their native ore form. Shodhana is the process to purify the metals or minerals by adopting different techniques. Sphatika (Potash alum) is one among the uparasa mentioned in Rasashastra (Indian alchemy). The purified or shodhita Sphatika is said to be useful in kushta roga, netra roga and also as vrana ropaka. There are different methods mentioned for shodhana of Sphatika. Materials and Methods: Ashuddha Sphatika was taken and subjected to shodhana in two different methods and an attempt was made to compare the physico-chemical properties of shodhita Sphatika done by puta method and open method of heat. Observations and Results: The samples of shodita Sphatika by two different methods were subjected to organoleptic characters like appearance, odour, taste and physico-chemical parameters like pH, total ash and acid insoluble ash. The obtained results were discussed in the present paper.

KEYWORDS: Sphatika, mineral, shodhana, Potash alum.

INTRODUCTION

Sphatika (Potash alum) is one among the uparasa composed of aluminium and potassium sulphate with chemical formula \( K_2 \text{Al}_2 (\text{SO}_4)_{3}\cdot24\text{H}_2\text{O} \). Hardness of sphatika is 3.5-4 and specific gravity is 2.6.\(^{1}\)
Sphatika is a sort of soil, first found in Saurashtra region of Gujarat state. This is now available in the name of Bauxite in Punjab, Bihar, Uttar Pradesh apart from Saurashtra. Alunite resembles sphatika.\textsuperscript{[2]}

Phataki and Phullika are the two varieties of Sphatika. Phataki is light yellow in colour. It is heavy, soft and is good for nullifying the influence of poisons over body. It is useful in healing the wounds. It is indicated in all types of kushta roga. Phullika is light weighted, bright white coloured, smooth and little sour tasting. Application of its paste over the copper foils helps in incineration of copper.\textsuperscript{[3]}

Minerals basically are impure that means not fit for internal administration in crude form. They contain many impurities, toxins which may cause many untoward side effects in the body. In order to neutralize these toxins, the minerals are subjected to purification measures in which physical and chemical impurities are removed and the drug is made safe for further processing to make it therapeutically fit.

Many references of sphatika shodhana are mentioned in rasashastra treatise. In the present study, two different methods of sphatika shodhana were carried out and the samples were subjected to analysis, the difference in organoleptic characters, physico-chemical parameters are recorded and discussed.

\textbf{Table 1: Properties of sphatika.\textsuperscript{[6]}}

<table>
<thead>
<tr>
<th>Sl. no</th>
<th>Properties</th>
<th>Sphatika properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rasa</td>
<td>Kashaya, katu, amla</td>
</tr>
<tr>
<td>2</td>
<td>Guna</td>
<td>Laghu, ruksha</td>
</tr>
<tr>
<td>3</td>
<td>Veerya</td>
<td>Ushna</td>
</tr>
<tr>
<td>4</td>
<td>Vipaka</td>
<td>Katu</td>
</tr>
<tr>
<td>5</td>
<td>Doshaghnata</td>
<td>Tridosha shantiprada</td>
</tr>
<tr>
<td>6</td>
<td>Karma</td>
<td>Keshya, netrahita , raktasthambhaka</td>
</tr>
<tr>
<td>7</td>
<td>Rogaghnata</td>
<td>Vrana, visha, shwitra</td>
</tr>
</tbody>
</table>

\textbf{MATERIALS AND METHODS}

\textbf{Ingredients:} Ashuddha Sphatika – 50g

\textbf{Method I- Puta method of sphatika shodhana}:\textsuperscript{[4]} Ashuddha sphatika was taken and kept in a sharava and sandhibandhana (sealed securely with mud smeared cloth) was done. Then it was dried and subjected to one gajaputa. The temperature of the heat was 960\degree C. After swaangasheeta (self- cooling), sharava was taken out from the pit; it was opened and shuddha
sphatika (purified alum) was collected. The content was in the form of a soft white mass. It was transferred to khalva yantra, mardana (powdered) was done and weighed, the obtained quantity was 7g.

Fig. 1: Sphatika (Potash Alum).
Fig. 2: Sharava (Earthen saucers).
Fig. 3: Sharava with Sphatika.
Fig. 4: Enclosed with Sharava.
Fig. 5: Sharava after sandhibhandana.
Fig. 6: Pit with cowdung cakes.
Fig. 7: Pit with sharava.

Fig. 8: Gaja puta.

Fig. 9: Giving heat.

Fig. 10: After swaangasheeta.

Fig. 11: Sharava taken out from pit after giving puta.

Fig. 12: Obtained sphatika after shodhana.
Method II- Open method of heat: Ashuddha Sphatika was taken in an iron pan and subjected to heat. It starts melting at the temperature of 110°C. The heat was continued till all the water from Sphatika evaporates and it turns free of water content. At the end of the process, a dull white coloured sphatika was formed. Later it was taken out from the fire and kept for cooling. After sometime, the Shuddha Sphatika was collected by scraping the iron pan and weighed, the obtained quantity was 25g.
Dose: 2 to 4 ratti (250-500mg).

Indications: Visarpa (erysipelas), kandu (pruritis), shwitra (vitiligo), mukharoga (diseases of mouth)

Analytical study
The organoleptic characters like appearance, odour, taste and physico-chemical parameters like pH, total ash and acid insoluble ash of both the samples are carried out.

pH determination
pH value of an aqueous liquid may be defined as the common logarithm of the reciprocal of the hydrogen ion concentration expressed in grams per liter. The pH value of a solution can be measured with an apparatus called pH meter, consists of a voltmeter connected with two electrodes. pH meter was calibrated to 4, 7 and 9 by using buffer solution. Sample of
Shodhita Sphatika by puta method was taken in a glass beaker. The electrode of the pH meter was dipped to the solution and reading was noted. The same exercise was repeated for another sample that is Shoditha Sphatika by open method of heat and the reading was noted.

**Total ash**[^8]

Incinerated accurately weighed 2-3 grams of both the samples were taken in a tared silica dish. The crucible was kept in a Muffle furnace at a temperature not exceeding 600°C until free from carbon. After cooling it was weighed and the percentage of ash with reference to air dried drug was calculated.

**Acid insoluble ash**[^9]

The ash of method I sample was transferred in a 250 ml beaker and 100 ml of dilute Hydrochloric acid was added. The beaker was heated till the liquid boiled. The solution was filtered and the insoluble matter was collected on an ashless filter paper (Whatmann no 41). It was washed with hot water until the filtrate was neutral. The filter paper containing the insoluble matter was transferred to the crucible. It was dried on a hot plate and ignited at 600°C in a muffle furnace. The residue was allowed to cool in a desiccator for 30 minutes and weighed without delay. The process was repeated for method II sample. The acid insoluble ash was calculated with reference to the air dried drug for both the samples.

**OBSERVATIONS AND RESULTS**

Table 2: Pharmaceutical observations and results.

<table>
<thead>
<tr>
<th>Sl. no</th>
<th>Parameters</th>
<th>Sphatika shodhana by puta method (I)</th>
<th>Sphatika shodhana by open method of heat (II)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Initial weight</td>
<td>50 gram</td>
<td>50 gram</td>
</tr>
<tr>
<td>2</td>
<td>Final weight</td>
<td>07 gram</td>
<td>25 gram</td>
</tr>
<tr>
<td>3</td>
<td>Colour</td>
<td>White colour</td>
<td>Dull white colour</td>
</tr>
<tr>
<td>4</td>
<td>Appearance</td>
<td>Amorphous powder form</td>
<td>Amorphous powder form</td>
</tr>
<tr>
<td>5</td>
<td>Odour</td>
<td>No specific odour</td>
<td>No specific odour</td>
</tr>
<tr>
<td>6</td>
<td>Taste</td>
<td>No taste</td>
<td>No taste</td>
</tr>
</tbody>
</table>

Table 3: Analytical study observations and results.

<table>
<thead>
<tr>
<th>Sl. no</th>
<th>Parameters</th>
<th>Sphatika Shodhana by Puta method (I)</th>
<th>Sphatika Shodhana by direct heat method (II)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>pH</td>
<td>5.18</td>
<td>3.14</td>
</tr>
<tr>
<td>2</td>
<td>Total ash</td>
<td>187%</td>
<td>70.5%</td>
</tr>
<tr>
<td>3</td>
<td>Acid insoluble ash</td>
<td>729%</td>
<td>4%</td>
</tr>
</tbody>
</table>
DISCUSSION

Sphatika is a mineral drug and to use it for therapeutics the process of shodhana has to be carried out. Two different methods of shodhana of sphatika are found, one is closed method of heating by means of a puta and the other open method of heating in an iron pan. In this study shodhana of Sphatika was done by two different methods.

Obtained quantity of shodhita Sphatika by puta method is 7gm and quantity of shodhita Sphatika by direct heat is 25gm. The quantity of Shodhita Sphatika by puta method is less when compared to open method of heat; this may be due to the high intense heat used in puta method.

The colour of the shodhita Sphatika by puta method is white and the colour of the shodhita Sphatika by open method is dull white. This could be due to the oxidation that takes place and the colour imparted during the process. No specific odour and taste for both the samples were observed. The change in colour is because of the amount of heat given and the oxidation that occurs in closed and open method of heating.

The pH of shodhita Sphatika by puta method is 5.18 and shodhita Sphatika by open method of heat is 3.14. The variation in the value of pH may be due to the oxidation that has occurred, impacted the change.

Total ash of shodhita Sphatika by puta method is 187% and the shodhita Sphatika by open method of heat is 70.5%. Acid insoluble ash of shodhita Sphatika by puta method is 329% and the shodhita Sphatika by open method of heat is 4%. Because of more heat in puta method, the ash value is more; the ash of elements could have been added. These are the single trial values. The trial should be repeated to obtain more reliable values of analytical parameters.

CONCLUSION

Shodhana is considered as the important process in removing the impurities from the minerals. It helps to convert the inorganic material into organic material, helps in reducing the particle size and helps in further process of bhasmikarana. Sphatika shodhana was done by two different methods and its analytical study was carried out. Based on the obtained results, the shodhana of Sphatika done by puta method can be considered as better method for
shodhana process due to its organoleptic characters and physico-chemical analysis results and these parameters can be taken as preliminary standards for Sphatika shodhana.

REFERENCES