



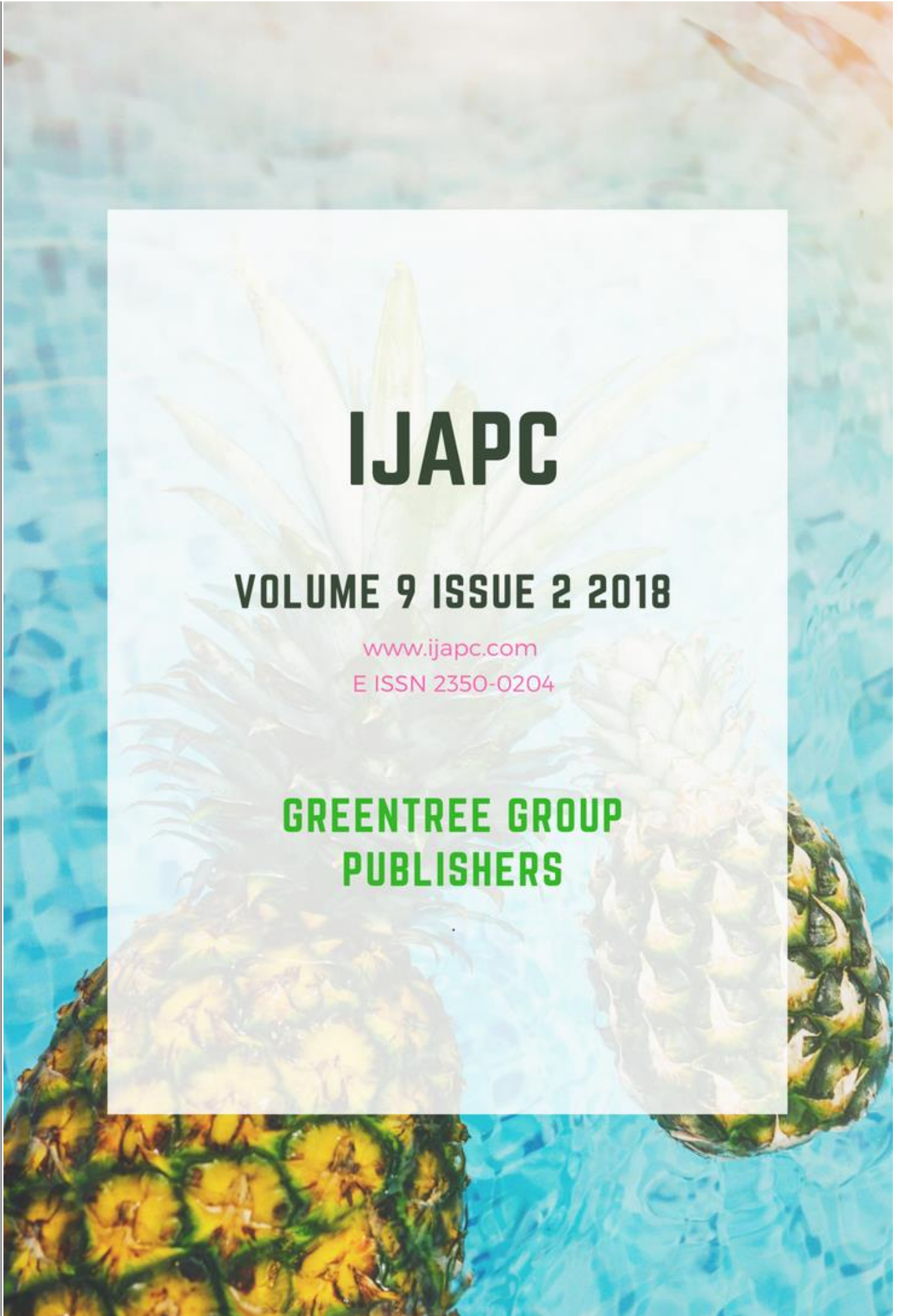
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## *Parada Shodhana* (Purification of Mercury) by Classical Method

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### ABSTRACT

In ancient literature Rasashastra, *Rasa* or *Parada* (Mercury) has been described to be of divine origin. The importance of *Parada* (mercury) in *Rasa* texts is mentioned for *Rasa Chikitsa*. In Rasashastra the process of *Shodhana* is having a greater importance hence wide range of purification methods are described for each metal & minerals including *Parada* (mercury). The literary meaning of '*Shodhana*' is purification but in Rasashastra *Shodhana* is a *Samskara* (process or procedure) which essentially brings out modifications or alteration in properties along with removal of impurities from the metal or mineral. Present study deals with the purification of *Parada* (mercury) mentioned in the classics making it therapeutically potential.

**Aims and objectives-** Purification of *Parada* (mercury) was carried out classically as per the *Rasa Tarangini* reference and its organoleptic characters were observed. **Materials and**

**Methods-** in Ayurveda different references by different authors are available for *Shodhana* of *Parada*. For the present study mercury was triturated with equal quantity of *Sudha Churna* (limestone) in a stone mortar for 36 hours. Further it was triturated again with *Lashuna Kalka* (garlic paste) and *Saindhava* (salt) continuously for 8 hours together. Detailed observations and organoleptic characters were noted during the procedure. **Result and conclusion-** This method was chosen; as the ingredients are easily available. Total quantity of mercury taken was- 500g and obtained quantity of *Parada* from *Sudha Churna* was- 439g, further from *Lashuna Kalka* obtained quantity of mercury was 365g. Following this method of *Shodhana* (purification) mercury can be purified and used for various pharmaceutical procedures also as an ingredient in various formulations making it potent therapeutically.

### KEYWORDS

*Parada, Shodhana, Purification of Mercury, Sudha Churna, Lashuna*



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## INTRODUCTION

In ancient literature Rasashastra, *Rasa* or *Parada* (Mercury) has been described to be of divine origin and claimed to be related to Lord “Shiva or Hara”. Many quotations provide the importance of *Parada* (mercury) in *Rasa* texts as *Rasa Chikitsa*. Mercury has atomic no. 80, boiling point-356.6<sup>0</sup>C, and melting point 38.9<sup>0</sup>C. In Rasashastra the process of *Shodhana* is having a great importance and hence a wide range of purification methods are described for each metal & mineral as well as for *Visha* and *Upavisha* (toxic substances). Even though the literary meaning of ‘*Shodhana*’ is purification but in Rasashastra *Shodhana* is a *Samskara* (process or procedure) which essentially brings out modifications or alteration in properties along with purification. The process which eliminates the blemishes is called *Shodhana*; it is by implementing

prescribed methods like trituration etc., with prescribed drugs.<sup>1</sup> It reduces the toxic effect, eradicate physical and chemical impurities. It enhances therapeutic value of the drug, converting the material for further processing like *Marana* (incineration). Mercury is considered as a heavy metal containing various impurities and causes toxic and adverse effect to the body hence purification of such metal is must. The varieties of mercury based on colour are listed in table 1.

Most of the raw materials (metal and minerals) are extracted from earth. So there is every chance of mixing of impurities, toxicity, heterogeneous and unwanted substances to a large extent. *Shodhana* is indicated to induce certain qualities, which are essential for the safe and easy assimilation of the material in the living body.

**Table 1** Varieties of *Parada* based on Colour<sup>2</sup>

| Variety         | Colour                        | Impurities                                 | Uses                        |
|-----------------|-------------------------------|--|-----------------------------|
| <i>Rasa</i>     | <i>Rakta</i>                  | Which is free from all types of impurities | <i>Rasayana</i>             |
| <i>Rasendra</i> | <i>Shyava</i>                 | Free from impurities                       | <i>Rasayana</i>             |
| <i>Soota</i>    | <i>Ishat Peeta</i>            | With impurities                            | <i>Dehasidhi, Lohasidhi</i> |
| <i>Parada</i>   | <i>Shweta</i>                 | With impurities                            | <i>Sarva Rogahara</i>       |
| <i>Mishraka</i> | <i>Mayura Chandrika Varna</i> | With impurities                            | <i>Sarva siddhidayaka</i>   |

*Dosha* (impurities) of *Parada*<sup>3,4</sup> are classified as follows:

1. *Naisargika Doshas* (natural impurities),
2. *Yougika Doshas* (physical impurities),
3. *Aoupadika Doshas* (chemical impurities in the form of coating).

Types of *Shodhana* (purification) explained are

1. *Samanya Shodhana* (general purification method),
2. *Vishesha Shodhana* (specific method of purification).<sup>5</sup>



Different methods adopted for *Samanya Shodhana* of *Parada* are-

*Parada* added with below specified drugs in the quantity of 1/16<sup>th</sup> part. The mixture is added with required quantity of *Ghritakumari swarasa* and triturated thoroughly for a day (8 hours). Later the mixture is carefully washed with *Kanji* (fermented liquid) to obtain mercury free from all *naisargika* and *Sapta Kanchuka dosha*.<sup>6</sup> The table 2 shows different drugs used for the purification of mercury.

**Table 2** Different drugs for Purification of Mercury

| Drugs added <sup>6</sup>   | To purify              |
|--|------------------------|
| 1. <i>Grahadhuma, Ishtika churna</i> (brick powder), <i>Haridra churna</i> (turmeric powder) and finely cut wool of sheep. | <i>Naga dosha</i>      |
| 2. <i>Indrayana, Ankola and Haridra churna</i>   | <i>Vanga dosha</i>     |
| 3. <i>Citraka Mula churna</i>  | <i>Agni dosha</i>      |
| 4. <i>Aragwadha Twak churna</i>  | <i>Mala dosha</i>      |
| 5. <i>Krsna Dhatura Panchanga or Bija churna</i>   | <i>Capala dosha</i>    |
| 6. <i>Triphala churna</i>  | <i>Visa dosha</i>      |
| 7. <i>Trikatu churna</i>   | <i>Giri dosha</i>      |
| 8. <i>Gokshura churna</i>  | <i>Asahyagni dosha</i> |

Along with the above said references *Rasa Tarangini* text has explained the most essential six general method of purification of mercury to make it fit and potent for therapeutic and pharmaceutical use<sup>6</sup>. According to other authors *Vishesha Shodhana* is considered as *Samskara* of *Parada*. *Parada* should be triturated with *Lasuna* and *Saindhava Lavana* on a *Tapta Khalva yantra* for 7 days<sup>7</sup>. *Parada* should be triturated with *Nagavalli Swarasa, Ardraka Swarasa, Ksharatraya* for 3 days and washed with water. *Parada* will be shining like *Mukta* (pearl) and devoid of *Sapta doshas*<sup>8</sup>. The *Parada* which is extracted by *Urdhwa Patana Vidhi* from *Hingula* is devoid of *Sapta*

*Kanchuka Dosha* is subjected to *Shodhana*. *Parada*'s 1/16<sup>th</sup> part of *Haridra Churna* and *Nimbu Swarasa-Q.S* is taken in a porcelain dish and triturated for 2 days. After drying, it is filtered through four folded cloth and *Parada* is procured.<sup>9</sup>

#### Drugs mentioned for *Samanya Shodhana* of *Parada*<sup>10</sup>:

*Parada Shodhana* has to be carried out for 3 to 7 days, in any of the following drugs to get rid of *Parada doshas*. *Sudha* (lime powder), *Lashoona, Saindhava, Gritakumari Swarasa, Chitraka kwatha, Rakta Sarshapa, Bhrahati kwatha, Triphala kwatha, Nagavalli Swarasa, Ardraka Swarasa, Yavakshara, Tankana, Sarjikshara, Haridra, Ishtika churna* etc. **Vishesha Shodhana**<sup>11, 12</sup> specific *Shodhana* to *Parada* removes the *Visha, Vahni, Mala, Naga, Vanga, Chapalya, Giri,* and *Asahyagni* etc; *Dosha* (impurities). This procedure was intended for strengthening and potentiation of *Parada* and is achieved by *Astadasa Samskaras*. The loss of Mercury is explained in *Rasashastra* text as *Jala gati* (loss by water while washing), *Mala gati* (loss of mercury with impurities), *Hamsa gati* (loss while shifting mercury from one vessel to other), *Dhuma gati* (loss through vapours) and *Jiva gati* (loss of mercury like a soul). To get the pharmacological and therapeutic properties of *Parada*<sup>85</sup> **Rasa** - *Shadrassa*, **Guna** - *Snigdha, Sara and Guru,* **Virya** – *Ushna, Vipaka* - *Madhura*, **Karma**



-Yogavahi, Rasayana, Vrishya, Balya, Vayastambhana, Pushtikaraka, Deepana, Agnivardhaka, Deha Loha Siddhikara, Ropana, Krimighna and Tridoshaghna, **Vyadhi Prabhava** - Vata Roga, Vali, Palithya, Jara Roga, Krimi, Sarva Roga.

In the present study the reference of Rasa Tarangini was followed for the purification of mercury. The purified mercury can be used as an ingredient in various *Rasayogas* (mercurial formulations) like *Kajjali*, *Arogyavardini Rasa*, *Angnitundi Vati*, *Shwasa Kuthara rasa*, *Bruhat Vata Chintamani Rasa*, *Suta Shekhara Rasa*, *Rasa Parpati*, *Loha parpati* etc .

## MATERIAL AND METHODS

### 2.1.PARADA SHODHANA (Purification of mercury)<sup>8</sup> (Figure 1-15)

*Parada* (mercury) was obtained from the Department of Rasashastra and Bhaishajya Kalpana, S D M Ayurveda College and Hospital, Hassan. The study was conducted in the teaching pharmacy of SDM college of Ayurveda and Hospital, Hassan, Karnataka. As per the reference of Rasa Tarangini 5/27-30. Type of procedure adopted was *Mardana* (trituration). Equipments required were stone mortar and pestle, vessel, cloth & spatula.

The ingredients are mentioned below in table 3.

**Table 3** Ingredients for *Parada Shodhana* (purification of Mercury)

| Started on date | Materials                         | Quantity | Completed on date | Duration (in hours)                     |  |
|-----------------|-----------------------------------|----------|-------------------|---|--|
| 9/11/16         | <i>Ashodhita Parada</i> (mercury) | 500 g    | 1/12/16           | <i>Mardana</i> with <i>Sudha Churna</i> | <i>Mardana</i> with <i>Lashuna Kalka</i> |
|                 | <i>Sudha Churna</i> (lime stone)  | 500 g    |                   | 36 hours                                | 8 hours                                  |
|                 | <i>Lasuna</i> (peeled garlic)     | 439 g    |                   |   |  |
|                 | <i>Saindhava lavana</i> (salt)    | 219.5 g  |                   |   |  |

## METHODS

### Method for purification of mercury;

Equal quantity of mercury (500g) and *Sudha Churna* (lime stone- 500g) was taken in mortar and was triturated for 36 hours (3 hrs. for 12 days). Mercury was collected from lime stone filtered through a cloth; the remaining mercury was obtained by washing it with warm water. The wet

powder of lime stone was allowed to dry into 3-4 trays. After drying of these carefully mercury was collected from these trays. The quantity of mercury obtained was 439g.

Equal quantity of *Lashuna Kalka* (439 g) was added to the obtained mercury and half the quantity of *Saindhava Lavana* (219.5 g) was added and is triturated for 8 hours,



observations were noted. Washing of garlic paste was done with lukewarm water. The salt present in it dissolves in water leaving behind the garlic paste from which again mercury can be collected. Once again drying of the remaining garlic paste into trays was done for 6 days and then it was triturated into fine powder and was filtered through cloth to obtain the remaining mercury from the garlic paste to avoid the loss of mercury. The collected mercury is the purified mercury which was weighed and stored in a glass/plastic bottle. The observations were recorded during the whole procedure and noted below in the table. **Precautions;** Spilling of lime stone was avoided in order to minimize the loss of mercury. Careful washing of garlic paste is to be done to avoid loss of mercury. Triturating with garlic paste and salt was done till it turns black in colour.

## RESULTS AND OBSERVATIONS

The observations and results are listed below in tables 4, 5 and 6.

**Table 4** Observations for *Parada Shodhana* (Purification of Mercury)

| Triturating time           | Observed changes during <i>Parada Shodhana</i>  |
|----------------------------|---|
| Initial ½ hour             | Mercury did not mix with garlic paste.  |
| After 1 <sup>st</sup> hour | Mercury started to disintegrate and mix with the garlic paste forming small globules. |
| After 6 <sup>th</sup> hour | Mercury got mixed completely with the garlic  |

|                             |   |
|-----------------------------|---|
|                             | paste and colour of paste was greyish.                    |
| After 9 <sup>th</sup> hour  | Colour of paste was dark grey.                            |
| After 17 <sup>th</sup> hour | Garlic paste turned to black colour.                      |
| After 30 <sup>th</sup> hour | Colour of garlic paste was jet black.                     |
| After 36 <sup>th</sup> hour | Garlic paste got dried and was difficult for trituration. |
| After 44 <sup>th</sup> hour | Garlic paste turned to jet black colour.                  |

**Table 5** Results of Quantity Obtained after *Parada Shodhana* (Purification of Mercury)

| Mercury obtained                         | Quantity obtained | Final quantity | Colour              |
|--|-------------------|----------------|---------------------|
| From <i>Sudha Churna</i> (lime stone)    | 439/500 g         | 365 g          | Shinny bright white |
| From <i>Lashuna Kalka</i> (garlic paste) | 365/ 439 g        |                |                     |

**Table 6** Results of Purification of Mercury

| Parameters of Results                             | Results           |
|---|-------------------|
| Total quantity taken <i>Ashuddha Parada</i>       | 500g              |
| Total obtained quantity of <i>Ashuddha Parada</i> | 365g              |
| Weight loss                                       | 135g              |
| Weight loss in %                                  | 27%               |
| Total no. of hours taken                          | 44 hrs            |
| Total no. of days                                 | 11 days           |
| <b>Organoleptic Characters</b>                    |                   |
| Colour  | Shinny white      |
| Appearance  | Bright and shinny |
| Consistency                                       | Liquid            |
| Odour   | Not specific      |

## DISCUSSION

In order to get rid of the *Dosha* (impurities) present in the mercury, various *Shodhana* procedures with various herbal ingredients have been explained in the classics. As limestone, garlic and salt are easily available this method was chosen for the purification of mercury. To make mercury



fit for consumption and devoid of any impurities the *Shodhana* method was followed.






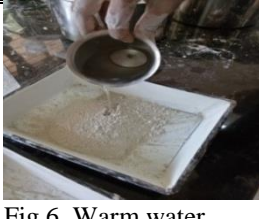









Purification of mercury is a vital procedure to be carried out, before using it as an ingredient in any of the *Rasayoga* (formulations) indicated for internal administration. Total quantity of mercury taken was 500g and obtained was 365g; loss observed was 135g (27% loss). The loss could be due to the spillage of Hg during trituration, evaporation of Hg from the limestone powder and during washing procedure of the garlic paste (loss due to *jala gati*). As Mercury is very unstable liquid metal the loss is obvious. The heat produced due to continuous friction of mortar and pestle along with uniform rising temperature would seize the impurities. Obtained mercury was bright and shiny white in colour as it has undergone purification procedures the impurities might have got dissolved or absorbed in the lime stone powder, garlic paste and salt, with the trituration for complete 44 hours (4 hrs/day) making it more brighter in colour. Researches have proved the effect of garlic in heavy metal poisoning in vitro.<sup>13</sup> also garlic contains sulphur which acts as a chelator for mercury poisoning hence the use of garlic in the process of purification of mercury helps to remove the toxic effect of the heavy metal mercury.<sup>13</sup>

## CONCLUSION

Purification is intended to get rid of impurities of Mercury. *Parada* is obtained from the earth's crust naturally; it is mixed with some unwanted physical & chemical impurities. So it is essential to carry out some procedures before making use of mercury. Purification of mercury is must before its usage for any purpose. Following classical reference as per *Rasa Tarangini* text it took 44 hrs. for the complete trituration in 11 days for purification of mercury. It yielded 365/500g of purified mercury. Loss of 27 % was observed during the procedure. Obtained mercury was bright and shiny white in colour. As per classics this purified mercury can be used further in various formulations as ingredients. As garlic act as chelator for mercury it was used for the purification process.



### Photographs Purification of Parada (Mercury)

|  |   |  |  |
|--|---|--|--|
|  <p>Fig.1. Parada (mercury)</p>                           |  <p>Fig.2. Sudha Churna (lime stone)</p>     |  <p>Fig.3. Mercury + limestone trituration after 8 hours</p> |  <p>Fig.4. Mercury trituration after 4 hours</p>    |
|  <p>Fig.5. Washing of mercury</p>                         |  <p>Fig.6. Warm water added to limestone</p> |  <p>Fig.7. Mercury collected</p>                             |  <p>Fig.8. Shodhita Parada (mercury)</p>            |
| Purification of Mercury with Garlic paste and Salt   |   |  |  |
|  <p>Fig.9. Lashuna (garlic)</p>                         |  <p>Fig.10. Saindhava (salt)</p>           |  <p>Fig.11. Trituration on 1<sup>st</sup> day</p>          |  <p>Fig.12. Trituration on 4<sup>th</sup> day</p> |
|  <p>Fig.13. Washing of Garlic paste with warm water</p> |  <p>Fig.14. Purified mercury</p>           |  <p>Fig.15. Purified mercury</p>                           |  |





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