



# Pharmaceutical And Analytical Study Of Abhrasindoora

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**ABSTRACT:** *Rasashastra*, an integral part of Ayurveda, encompasses various Herbo-mineral preparations, including *Kharaliya*, *Parpati*, *Kupipakwa* and *Pottali Rasayana*. *Abhrasindoora* indicated in *Kasa*, *Shwasa* is one of the important *Kupipakwa Rasayana* containing equal ratio of *Dhanyabhraka*, *Shu Parada* & *Shu Gandhaka* by which *kajjali* is prepared and levigated with *Vatankura swarasa* and *Arka dugdha*, later is processed by *Kupipakwa* method subjecting it to *Kramagni* pattern. The total yield obtained was 5%. In the present era safety and efficacy of each and every Herb-Mineral preparation becomes mandatory. These preparations should be well understood in the light of modern chemistry. These Herbo –Mineral preparations are subjected to physical, chemical, instrumental, macro and micro analysis before being used. This confirms the quality and safety of the formulations. In the present study it aims for the Standard manufacturing process of *Abhrasindoora* and with its quality control standards that include Organoleptic, Physio-chemical parameters and other advanced instruments parameters which shows that all test ranges are within normal limits.

**Keywords:** *Abhrasindoora*, *Chaturvidha Rasayana*, Pharmaceutical study and Analytical study.

**INTRODUCTION:** The literal meaning of *Rasashastra* is it's "Science of Mercury." It is a subspecialty of *Ayurveda* that deals with thorough understanding of metals and minerals as well as different processing techniques and the creation of medicines or *Rasaushadis*, for the treatment of a wide range of illnesses. Because of their quick onset of action, long-lasting effects and minimal dosage<sup>1</sup> so they are regarded as exceptional.

*Rasashastra* book explains four important unique preparations called as *Chaturvidha Rasayana* includes *Kharaliya rasayana*, *Parpati rasayana*, *Pottali rasayana*, and *Kupi pakwa rasayana*. *Kupipakwa Rasayana* also known as *Sindoora Kalpas* in which *Kajjali* is the primary element, is a unique process involves numerous observations and safety measures, here temperature plays a crucial role. So, the finished product to have the intended and advantageous effect. *Abhrasindoora*<sup>2</sup> is one of the important *Kupipakwa Rasayana* that includes *Dhanyabhraka*, *Shuddha Parada* and *Shuddha Gandhaka* which is indicated in *Kasa* and *Shwasa*.

Pharmaceutics is the branch of pharmacy that deals with the scientific and technological aspects of designing, formulating and manufacturing pharmaceutical products, including drugs, medications and other healthcare products. It involves the study of the physical, chemical and biological properties of drugs and their formulations to ensure safety, efficacy and quality. The procedure adapted here are *Shodhanadhi* procedures, *Kupipakwa Rasayana* etc.

**Objectives:**

- 1) Preparation of *Abhrasindoora* as per classical reference
- 2) To do Organoleptic and Physio-chemical analysis of *Abhrasindoora*
- 3) To do analytical study of *Abhrasindoora* by SEM EDX & Particle size analysis.

**Material and Methods:****Materials:**

*Grahya Krishnabhraka*, *Parada* and *Gandhaka* mentioned as per classical reference and modern specification were procured from the local market. *Vatankura* and *Arka Ksheera* were freshly collected from the botanical garden of institute. Also, *Triphala*, *Bringaraja*, *Shudha churna*, *Lashuna*, *Saindhava*, *Chitraka moola*, *Kumari*, *Kakamachi*, *Nimbu*, *Sarshapa*, *Hingu Navasadora* and *Multani mitti* were collected.

Equipments like *Kalva yantra*, *Dola yantra*, *Urdhwa Patana Yantra*, *Valuka yantra*, *Kacha Kupi*, Pyrometer, Gas stove, Iron vessels, spoons etc.

***Parada Samanya shodhana*<sup>3</sup>:**

500gms of *ashuddha Parada* was taken in *kalva yantra* equal quantity of *Shudha churna* was added and triturated for 7 days. Later it was washed with water and obtained the *Parada* from the vessel. Later equal quantity of *nishtusha Lashuna* and half quantity of *Saindhava* was added to *Parada* and triturated to make a paste. Trituration was continued till the paste turned black. Later was washed with water and *Parada* was obtained

**Table no.1: - Table showing Observation of *Parada samanya shodhana***

| Sl no. | <i>Samanya shodhana</i>                         | Quantity taken (gm) | Quantity obtained (gm) | Total loss (gm) |
|--------|-------------------------------------------------|---------------------|------------------------|-----------------|
| 1.     | <i>Shodhana with sudha churna</i>               | 500gm               | 425gm                  | 75gm            |
| 2.     | <i>Shodhana with lasuna kalka and saindhava</i> | 425gm               | 400gm                  | 25gm            |

***Parada Vishesha Shodhana*<sup>4</sup>:**

***Swedana Samskara*:** *Musha* was prepared from paste of *Sarshapa* and *nishtusha Lashuna*, *Samanya shodhi* *Parada* was poured into *musha* and *pottali* was tied and suspended into *dola yantra* containing *Kanji* and subjected for heat on *mandagni* for 3 days, later was washed with water and *Parada* was collected.

***Mardana Samskara*:** *Sweditha Parada* was subsequently triturated with *Kumari swarasa*, *Chitramoola Kwatha*, *Kakamachi Swarasa*, *Triphala Kwatha* & *Nimbu swarasa* till all the *Parada* particles disintegrate. *Parada* was washed after each trituration with *Drava dravya*.

***Urdhwa Patana Samskara*:** *Marditha Parada* was triturated with equal quantity of *Nishtusha lashuna* and *Sarshapa* paste and *shu. Navasadhara* Trituration was continued till the paste turned to grey color. *Chakrikas* of even size was prepared and dried. *Shu. Hingu* paste was applied both the sides of *chakrikas* and kept for drying. After the *chakrikas* were placed side by side with out over lapping in the mud pot and filled with *saindhava lavana* up to neck region. Another mud pot of even size was placed inverted to the first mud pot, *sandhi bhandhana* was done. This *Damaru yantra* was subjected for *Urdhwa patana* for 8 hours. After *swanga sheeta* sublimated *Parada* was collected and washed with hot water

**Table no.2:- Table showing the result of *Parada vishesha shodhana***

| Sl no. | <i>Samskara</i>     | Quantity taken (gm) | Quantity obtained (gm) | Total loss (gm) |
|--------|---------------------|---------------------|------------------------|-----------------|
| 1.     | <i>Swedhana</i>     | 400gm               | 400gm                  | nil             |
| 2.     | <i>Mardana</i>      | 400gm               | 392gm                  | 8gm             |
| 3.     | <i>Urdhwapatana</i> | 392gm               | 245gm                  | 147gm           |

***Gandhaka Shodhana*<sup>5</sup>: *Dalana method***

*Gandhaka* was coarsely powder in *Kalva yantra*. In big iron pan *goghrita* was poured and melted. Coarse powdered *Gandhaka* was added into molten *ghrita* and heat was given till it melted completely. Meanwhile in a vessel containing *Bringaraja kwatha* was covered with cloth by thread. The molten *gandhaka* was poured into the vessel containing *Bringaraja kwatha*. The solidified *Gandhaka* was taken out from the vessel and washed with hot water. This procedure was repeated for another 6 times.

**Table no.3: - Table showing the result of *Gandhaka shodhana* with *bhringraja kwatha* by *Dalana* method**

| Sl no. | Quantity taken (gm) | Quantity obtained (gm) | Total loss (gm) | Color             | Odour                |
|--------|---------------------|------------------------|-----------------|-------------------|----------------------|
| 1.     | 500gm               | 425gm                  | 75gm            | Pale lemon yellow | Characteristic Odour |

***Abhraka Shodhana*<sup>6</sup>: *Nirvapa* method**

*Krishnabhakra* was taken in a big iron vessel and heated till red hot and was immediately quenched into the vessel containing *triphala kwatha*. Later *Abhraka* was obtained from *Triphala Kwatha*, washed with hot water & dried. This procedure was repeated for another 6 times.

**Table no.4: - Table showing result of *Abhraka shodhana***

| SL NO. | Quantity before <i>shodhana</i> (gm) | Quantity obtained after <i>shodhana</i> (gm) | Total weight loss (gm) |
|--------|--------------------------------------|----------------------------------------------|------------------------|
| 1.     | 500gm                                | 456gm                                        | 44gms                  |

***Dhanyabhakra nirmana*<sup>7</sup>:**

*Shuddha Abhraka* was grossly pounded and 1/4<sup>th</sup> quantity of *Dhanya* to that of *Abhraka* was taken in Jute cloth and tied a *Pottali* which was neither too loose nor too tight. This *Pottali* was dipped in *Kanji* and kept for 3 days. After 3 days, *Pottali* was removed, and vigorously *Pottali* was macerated inside *Kanji* so that Powder of *Abhraka* seeps out through pores of *Pottali* and collects in the *Kanji* containing vessel. Later it was washed with hot water; *Dhanyabhakra* was separated and dried in sunlight.

**Table no.5: - Table showing the result of *Dhanyabhakra nirmana***

| SL.No. | Quantity taken (gm) | Quantity obtained(gm) | Total weight loss (gm) |
|--------|---------------------|-----------------------|------------------------|
| □      | 456                 | 400                   | 56                     |

**Preparation of *Kajjali*:**

Measured quantity of *Shuddha Parada* was taken in *Kalva yantra*, to that little-by-little equal quantity of *Dhanyabhakra* was added and triturated. *Parada* started to disintegrate into large globules. The trituration was continued till the *Parada* particles completely disintegrated into the *Dhanyabhakra*. On the 6<sup>th</sup> day, *Shuddha Gandhaka* was added to the above mixture in little-by-little quantity and trituration was carried out for another 5 days. Trituration was continued till it turned to jet black color (*Samyak siddhi Lakshana* of *Kajjali*). After 60 hours of trituration, *Kajjali* attained jet black color (*Kajjalabha*).

***Bhavana* to *Kajjali*:**

Measured quantity of *Kajjali* was taken in a *Kalva yantra*. To this freshly prepared *Sagni siddha Vatankura swarasa* was added little by little to completely soak the *Kajjali* and trituration was done till the evaporation of liquid. This *Samyak Bhavita Kajjali* was thoroughly dried in shade and weighed. Later *Vatankura swarasa Bhavita Kajjali* was taken in *kalva yantra*. To this freshly collected *Arka dugdha* was added little by little to completely soak the *Kajjali* and trituration was done till the evaporation of liquid. Trituration was carried out for 2 days. Next day the mixture was taken out from *kalva yantra* and kept for drying. This *Samyak bhavita Kajjali* was thoroughly dried in shade and weighed.

**Table no.6:- Table showing the result of *Abhrasindoora kajjali nirmana***

| SL. No. | Abhraka taken (gm) | Parada taken(gm) | Gandhaka taken(gm) | Kajjali obtained (gm) | Loss (gm) | Color                       |
|---------|--------------------|------------------|--------------------|-----------------------|-----------|-----------------------------|
| 1.      | 200gm              | 200gm            | 200gm              | 600gm                 | Nil       | Black with shine particles. |

**Table no.7:- Table showing the result of Abhrasindoora kajjali after Bhavana**

| Sl no. | Bhavana dravya    | Quantity of kajjali taken (gm) | Quantity of kajjali obtained (gm) | Weight gain (gm) | Odour          |
|--------|-------------------|--------------------------------|-----------------------------------|------------------|----------------|
| □      | Vatankura swarasa | 600gm                          | 613gm                             | 13gm             | Charactersitic |
| □      | Arka dudgha       | 613gm                          | 643gm                             | 30gm             | Charactersitic |

**Abhrasindoora preparation: as per Rasendra Sambhava****Method:** Bahirdooma kupipakwa rasayana**Procedure:-**

The whole procedure of Abhrasindoora was divided into 3 phases:

**1. Poorva Karma:-**

- Preparation of Kachakupi
- Filling of Kajjali into Kachakupi
- Placing of Kupi in Valukayantra.

**2. Pradhana Karma:-**

- Heating schedule (Kramagni)
- Observation and recording of temperature
- Corking of Kachakupi

**3. Paschat Karma:-**

- Removal of Kachakupi from Valuka
- Breaking of Kupi
- Collection of final product

**Poorva Karma: -****a. Preparation of Cork:** -A conical shaped cork made of wooden piece, with a length of 2 inches and thickness according to the mouth of Kupi was made and layered with Gopichandana smeared cloth and dried.**b. Filling of Kajjali into Kachakupi:- Materials:** - Kajjali-642gms, weighing machine, Kachakupi, funnel and spoon.**Procedure:** - 642gms of Kajjali was divided into two equal parts and slowly filled in to two Kacha kupi with the help of funnel and spoon.**c. Placement of Kupi in Valuka Yantra: - Materials:** - Kupi filled with Kajjali, Abhraka Patra and Sand.**Procedure:-** At first Abhraka patra (8×10cms) was placed over the hole at the bottom of the Valuka Yantra and sand was spread uniformly over it of about 3 Angula. Now over this, Kajjali filled Kupi were kept firmly in center. Remaining portion of the Yantra was filled with sand upto neck of the Kupi.**Pradhana Karma:** -The Pooja was done after placing the Kupi in Valuka Yantra.

Aghora Mantra was chanted and ignited the fire to wood with the help of camphor, spirit and matchbox. Pyrometer was properly placed i.e. 5-6 cm away and 4 cm above from level of base of Kupi in Valuka Yantra, with this temperature was recorded at regular interval. Kramagni was maintained according to the classical reference. For the first 4 ½ hours Deepagni was maintained to condition the whole apparatus of valuka yantra. From 4 ½ hours Mrudhvagni (next 19 hours) was given, and the temperature maintained between 200° to 450°C. From 23 ½ hours (next 19 hours) Agni was gradually raised to Madhyamagni stage, i.e. 450° to 850°C. At 42 ½ hours of heating Sindoor Siddhi Lakshana were observed, corking was done and subjected to Teevragni. Teevragni was given for 5 hours (from 42 ½ hour), and temperature maintained between 850°-1150°C. Later the apparatus was allowed for self-cooling for complete sublimation of product.

**Paschat Karma:** -a. Removal of Kupi from Valuka Yantra, Breaking of Kupi and collection of Tamra Sindoor.**Materials:** -Knife, thread, sprit, matchbox, wet cloth and Kupi containing final product.**Method:** - After complete cooling of the Bhatti, Sand surrounding the Kupi in Valuka Yantra was carefully removed and then Kupi was taken out. The mud smeared cloth layers of Kupi were scrapped out with knife.

A jute thread dipped in spirit was tied to the *Kupi*, 2-3cm below the level of sublimated product, and ignited. When the whole thread got burnt off, wet cloth was wrapped around the ignited thread immediately. The bottle broke into 2 equal halves with a breaking sound. From the neck region *Sindoora* was collected and at the bottom of *kacha kupi* burnt *Dhanyabhraka* was present. By simple tapping *Sindoora* was collected and the sublimated *Sindoora* was in the form of flakes adhered to the surface of *kupi* which was scraped and stored in clean sterile container.

**Table no. 8: -Table showing loss and weight of *Abhrasindoora* :-**

| Total weight of <i>kajjali</i> | Weight of <i>Abhrasindoora</i> obtained | Weight of <i>talastha dhanyabhraka</i> | Total weight loss | Total percentage of <i>Abhrasindoora</i> yield |
|--------------------------------|-----------------------------------------|----------------------------------------|-------------------|------------------------------------------------|
| 642gms                         | 30gms                                   | 260gms                                 | 353gms            | 5%                                             |

#### **Analytical Study of *Abhrasindoora*:**

**Table No.9: Table showing Results of classical parameters of *Abhrasindoora***

| SL. NO | PARAMETERS         | ABHRASINDOORA                                                                                   |
|--------|--------------------|-------------------------------------------------------------------------------------------------|
| 1.     | <i>Varna</i>       | <i>Rakta</i>                                                                                    |
| 2.     | <i>Rasa</i>        | <i>Niswadu</i>                                                                                  |
| 3.     | <i>Sparsha</i>     | <i>Shlakshna</i>                                                                                |
| 4.     | <i>Gandha</i>      | Characteristic                                                                                  |
| 5.     | <i>Rekhaupurna</i> | When the <i>Abhrasindoora</i> was rubbed between two fingers it entered the furrows of fingers. |

#### **Results of Analytical Study:**

**Table no.10: -Table showing the Organoleptic characters of *Abhrasindoora*:-**

| SL.NO. | Tests      | Results                                                   |
|--------|------------|-----------------------------------------------------------|
| 1.     | Form       | Fine powder                                               |
| 2.     | Color      | Reddish                                                   |
| 3.     | Odor       | Characteristic                                            |
| 4.     | Taste      | Tasteless                                                 |
| 5.     | Appearance | Red colored fine powder and presence of shining particles |

**Table no.11 :- Table showing the result of Physiochemical analysis of Abhrasindoora**

| SL.No. | Physio chemical Parameters | Tamra Parpati rasa                                                               |
|--------|----------------------------|----------------------------------------------------------------------------------|
| 1      | pH Analysis                | 6.7                                                                              |
| 2      | Loss on drying             | 0.182%                                                                           |
| 3      | Loss on ignition           | 98.608%                                                                          |
| 4      | Total Ash value            | 1.391%                                                                           |
| 5      | Acid insoluble Ash         | 0.049%                                                                           |
| 6      | Water soluble Ash          | 0.343%                                                                           |
| 7      | Solubility                 | Partially soluble in Conc.HNO <sub>3</sub> , and Conc. Hcl, Soluble in Aquaregia |

**Table no.12: -Table Showing particle size analysis result of Abhrasindoora:-**

| Result                 |         | Size (d.nm): | %Intensity | St Dev (d.n... |
|------------------------|---------|--------------|------------|----------------|
| Z-Averae (d.nm): 934.1 | Peak 1: | 513.3        | 100        | 77.10          |
| PdI:0.652              | Peak 2: | 0.000        | 0.0        | 0.000          |
| Intercept:0.817        | Peak 3: | 0.000        | 0.0        | 0.000          |

**Table no.13: -Table showing the SEM-EDX result of Abhrasindoora (atomic %, Mass % of elements):-**

| Elements     | Shells         | Kev   | Mass % | Sigma | Atomic % |
|--------------|----------------|-------|--------|-------|----------|
| Oxygen       | K <sup>+</sup> | 0.525 | 3.21   | 0.36  | 26.72    |
| Aluminium    | K <sup>+</sup> | 1.486 | 0.82   | 0.12  | 4.07     |
| Silica       | K <sup>+</sup> | -     | ND     | -     | ND       |
| Sulphur      | K <sup>+</sup> | 2.307 | 1.58   | 0.26  | 6.54     |
| Iron         | K <sup>+</sup> | -     | ND     | -     | ND       |
| Mercury      | M <sup>+</sup> | 2.195 | 94.39  | 1.55  | 62.66    |
| <b>Total</b> |                |       | 100    |       | 100      |

**Discussion: -****Pharmaceutical study**

*Parada samanya shodhana* by trituration with *Sudha churna*, as there is a presence of *Kshariya* property (highly alkaline in nature) of *Sudha churna* it might have absorbed alkaline soluble impurities along with trace elements present in *Parada*, which was observed in *Sudha churna*, and turning it into grey color gradually. Then further again the *Parada* was triturated with *Lashuna Kalka* and *Saindhava Lavana*, color of *Kalka* has turned to black after the continuous *Mardana*. *Lashuna* contains organic sulfur hence the color of *kalka* was black, and also *lasuna* serving as a chelator for mercury poisoning and reduces the poisonous effects. *Lasuna* having *tikshna*, *usna*, *lekhana* properties, dissociates the *Parada* molecules and absorbs impurities and thereby purifies *Parada*.

**Parada vishesha shodhana**

*Swedana samskara*: *Musha* prepared from *Kalka Dravya* of *Lashuna* and *Sarshapa* has *Ushna*, *tikshna guna* which helps in loosening *mala*. *Kanji* helps in loosening *Dosha* present in it. Obtained *Parada* after *Swedana samskara* attained with its increased free flowing nature and more shining appearance.

**Mardhana samskara:** The Trituration of Swedana Samskarita Parada along with the Kalka Dravya is called Mardana Samskara. Does Bahirmala Vinashana that means the impurities holding onto Parada at the outer surface will be eliminated, along with Naga Vanga dosha Vivarjana. 400gms of Swedana Samskarita Parada was taken in Khalwa yantra and Mardana was initiated By Kumari swarasa, Chitraka moola Kwatha, Kakamachi Swarasa, Triphala Kwatha, Nimbu Swarasa consecutively. There is a quote mentioned as “Mardana Guna Vardhanam” that means the more Mardana is done the more Guna (property) will imbibe within the drug. The Nirendriya Parada turns into Sendriya by the addition of organic properties to Parada is done in the process of Mardana. Mardana of Parada with above mentioned Bhavana dravya helps to remove Mala, visha, vanga, Agni and naga dosha respectively.

**Urdhwa patana samskara:** By Urdhwa Patana Samskara, Parada gets rid of Naga and Vanga doshas. The Tikshna, Ushna Guna of Sarshapa, Lasuna and Hingu might have loosened the Doshas, Sh Navasagara expedited the sublimation by intensifying the boiling point of Parada. Impurities might get dissolved in Saindhava Lavana while sublimation. It was very difficult to obtain Parada by this method. The sublimated residue containing Parada turned out to be sticky which got adhered to hands and vessel even after washing with hot water and Kanji. It was found to be difficult to differentiate Parada particles from the sublimated residue as it was shinier and adhesive, this might be due to evaporation of oil present in Sarshapa and Lashuna along with Parada which was seen as a viscous coating on the inner surface of the mud pot.

**Gandhaka shodhana** was done by Dhalana and Galana method, using Bhringraj swarasa as a liquid media. Role of media used for Dhalana, Go-ghrita: Sulfides are fat soluble compounds; this step of melting helps to reduce the toxicity of native element and removes the fat-soluble impurities of Gandhaka and hringaraja Swarasa: Water soluble impurities of Gandhaka will be removed. Hydrocarbons, alkaloids and steroids of this floral component may nullify the chemical impurities like lead, arsenic etc. Role of Vastra galana, The physical impurities like mud, sand etc. Got separated over the cloth as these impurities do not melt or change their state at this temperature. Shodhita Gandhaka was brittle, dull and odorless, maybe due to the change in crystalline structure while passing through the stage of melting. In this process rhombic form of a Sulphur might have converted to monoclinic Sulphur, because monoclinic Sulphur is formed when rhombic Sulphur solidifies at the melting point.

**Abhraka shodhana** by Nirvapa method here repeated heating and quenching into media (Triphala kwatha) sudden change in the temperature causes breaking of strong bonds which results in reduction of hardness and particle size by increasing in its brittleness. Also impose the properties of media & cause the color change. Dhanyabhraka is one among the Pancha samskara of Abhraka. Abhraka is one of the important minerals widely used in lohavada and dehavada. Due to its high therapeutic utility, it is used in many Rasoushadhis, Abhraka Bhasma alone is used as medicine or used as an ingredient in so many formulations. In the process of preparation of bhasma an intermediate process has been followed between shodhana and marana called as Dhanyabhraka. As Abhraka is very hard drug and requires a greater number of putas to get converted into nano particle form. Hence Dhanyabhraka preparation is an intermediate procedure carried out before marana and after shodhana so as to reduce the number of putas. Here Kanji is Amla rasa Pradhana which helps to soften the hard particles of Abhraka. By vigorous maceration the sharp edges of dhanya pierce the Abhraka particles and helps in size reduction. Jute bag is used so that fine Abhraka particles sweep out through the pores and also helps to maintain the friction while vigorous maceration. The aim of Dhanyabhrakikarana is to convert Abhraka into fine, homogenous particle. This process also removes the physical impurities as well as sand particles from the Abhraka.

**Kajjali nirmana:** initially Dhanyabhraka and Parada was triturated, Kajjali turned to greyish color but there was shiny appearance may be due to the presence of Dhanyabhraka. Because during the formation of Biotite (Abhraka), common rock forming silicate that is usually found in far smaller crystal matrices formed during metamorphism. Makes Abhraka shinier. After adding Gandhaka, it started to combine within the mixture, this is due to the strong affinity of the mercury towards Sulphydryl's or thiols. The mercury atom or molecule will tend to bind with any molecules present that has Sulphur or Sulphur-hydrogen combination in its structure. Trituration for the Kajjali continued till it attained jet black color and devoid of shining particles. After it became jet black in color, this might be due to the formation of black Sulphide of mercury.

**Bhavana** for Kajjali with Vatankura Swarasa, Vatankura is one of the marana gana dravyas, which may help in the proper sublimation of compounds. Hydrocarbons present in Vatankura swarasa along with Sulphur is having a capacity to hold Mercury forming a complex compound which prevents the escape of Mercury before compound formation is complete resulting in more yield. Bhavana with Arka dugdha, Arka is one among the Upavisha. It is mentioned in classical texts that Arka is best used for shodhana and Marana procedure, which

helps to convert the metals and minerals into nano particles. *Arka dugha* is known as the best *Maraka Dravya* of *Abhraka*.

In the present study, *Kajjali* subjected to *bhavana* with *Vatankura Swarasa* and *Arka dugdha* there was significant weight gain in the *Kajjali*. This may be due to the presence of the phytochemicals of *Vatankura Swarasa* and due to the presence of amino acids, lipids, resins, proteins, calotoxin, calotropenin and proceragenin enzymes in latex might have attributed for the weight gain of *Kajjali*. *Arka dugdha* has thermogenic property which helps in accelerating the melting point of Metals and Minerals that were inculcated during trituration.

In *Kupi pakwa rasayana* heating pattern plays a very important role in product formation. Here during the *nirmana* of *Abhrasindoora krama agni* was maintained for 47 ½, *Deepagni* was maintained for 4 ½ hours. *Mruda agni* was for 19 hours (200° to 450°C) which shows the melting of *Kajjali*, *Madhyamagni* for 19 hours (450° to 850°C), and *Teekshnagni* for 5 hours (850°- 1150°C). This is the unique specialty of this preparation in which gradual rise of *Agni*, maintenance of the same for specific period, further increases in temperature for sublimation and then self-cooling and might help in breaking of the bonds formed in *Kajjali* and chemical reaction in specific temperature along with agglomeration. 30gm product was obtained out of 642gms of *Kajjali* and yield was 5%. The yield is dependent on proportion of *Parada* in the *Kajjali*. In the present formulation, Sh. *Parada* was first triturated with *Dhanyabhraka* then *Kajjali* was prepared by adding Sh. *Gandhaka* to it and was subjected for sublimation hence sublimated product is rich in Mercuric Sulphide. The quantity of *Parada* bound with *Gandhaka* would contribute in quantifying the yield. In present study 200gm of Sh. *Parada* and 200gms of *Gandhaka* was taken, which after sublimation, yield obtained was 30gms of *Abhrasindoora*. Since *Parada* was initially triturated with *Dhanyabhraka*, there was less amount of free mercury to combine with *Gandhaka*, hence yield was proportionally very least compared to other *Sindoora kalpa*.

### Analytical study

Analytical study brings the standard parameters for the good quality drug. Physico chemical data of the drug help to know how the drug acts in the body. The organoleptic characters of *Abhrasindoora* was reddish in color, tasteless & odorless it may be because of Pharmacological property of the drug. The **pH value** of *Abhrasindoora* is 6.7 suggest as weak acidic in nature. *Abhrasindoora* possessed 0.182% **loss on drying** at 110°C, this shows *Abhrasindoora* has the least amount of moisture content which was minimum. The drug has least hygroscopic activity with less chances of contamination of the drug. **Loss on ignition** is a physical test which reports an elemental or oxide analysis of a mineral. It is calculated by comparing the weight of sample before and after it has been subjected to high temperature. Loss on ignition of *Abhrasindoora* is 98.608%. **Total Ash value** of *Abhrasindoora* is 1.391%, which determines authenticity and purity of sample. **The Acid-Insoluble Ash Limit Test** is designed to measure the amount of ash soluble to diluted hydrochloric acid. Insoluble ash value is nil. It suggests that the presence of Sand, Dust, Dirt, Stone, etc are not found. & the quality and hygiene standard in the production process is good. Here Acid insoluble ash value of *Abhrasindoora* is 0.049%. **Water soluble ash** is the part of the total ash content which is soluble in water. It is a good indicator of either previous extraction of water – soluble salts in the drug or incorrect preparation. Water soluble ash value of *Abhrasindoora* is 0.343%. In **Solubility test** *Abhrasindoora* was partially soluble in Conc. HNO<sub>3</sub> and Conc. HCL. And soluble is Aquaregia. **Particle size** is one of the factors which affect dissolution and absorption of drug, solubility increases with decreasing particle size, since dissolution and absorption are inversely proportional to each other. The particle size of *Abhrasindoora* is 513.3nm, as the particle size is less so the dissolution is fast. That indicates the quality of the *Abhrasindoora* is good. **SEM-EDX** study reveals the accurate elemental analysis of the sample. This study of elements enables us to explore major, minor and trace elements present in the sample. Spectrums of different wavelength were studied, and it was noted that Oxygen, Aluminum, Sulphur were seen in K shell, whereas Mercury was seen in M shell. The peak of Mercury (Hg) is higher in concentration and various small peaks of Sulphur(S), Aluminum (Al), Oxygen (O) is seen in minimal concentrations. Mercury is found to be closely associated with Sulphur and oxygen resulting in the amount to approximately 99.18 % of mass, remaining 0.82% has shown the trace elements of Aluminum. The concentration of mercury and Sulphur is rich in the peaks amounting to 96% inferring in a compounding of Mercuric sulfide.

Report shows atomic % of Mercury is of 62.66%, Sulphur is 6.54%, Oxygen has 26.72% and Aluminum has 4.07%. overall contributing to 100% of atomic percentage of *Abhrasindoora*. There is nowhere mentioning of Aluminum in classics, whereas *Abhraka* (Biotite) compound structure has presence of many trace elements like Aluminum, Silicate, Iron, Potassium etc.

## Conclusion

*Abhrasindoora* is one of the novel drug which requires 48 hours for the formation of product by *kupipakwa rasayana* method. Its Organoleptic, Physio chemical and Particle size ranges were within normal limits as per AFI standards. SEM EDX showed atomic % of mercury, oxygen and sodium is more. The presence of trace element of Aluminum suggests that *Dhanyabhraka* has played a major role in the compound formation of *Abhrasindoora*.

## ABHRASINDOORA PREPARATION

Kupi along with ingredients



Valuka yantra with kupi



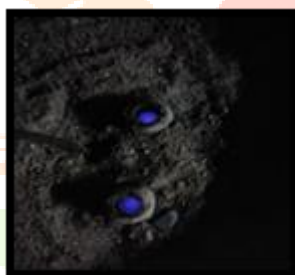
Yellow flumes



Tapta & Sheeta Shalaka



Blue flames



Copper coin test



Corking



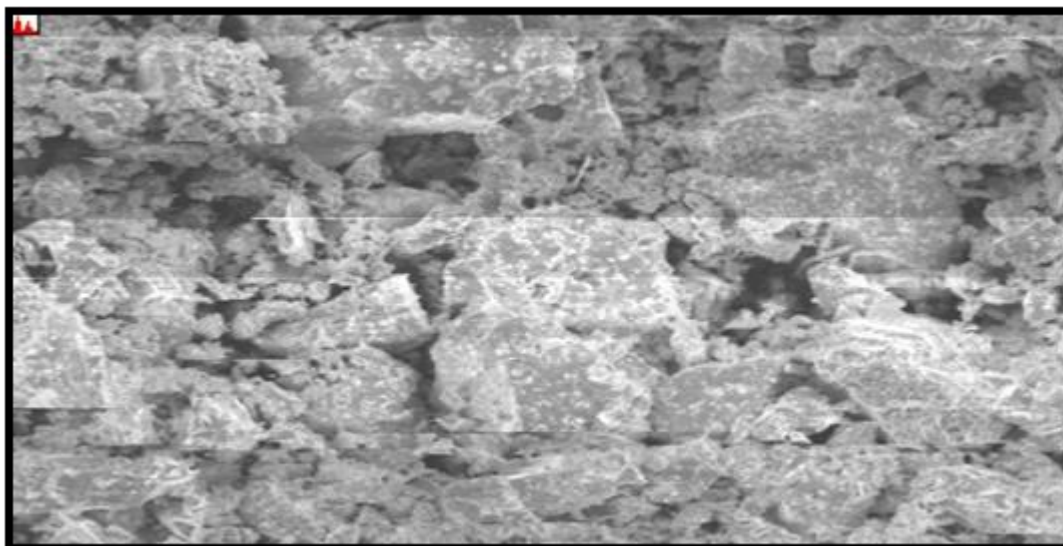
Breaking of Kupi



Abhrasindoora

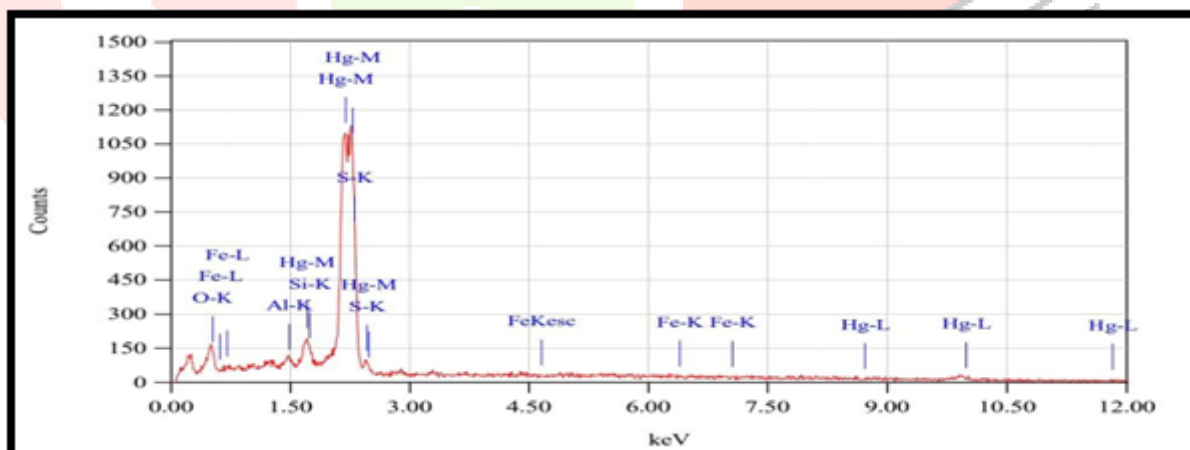


## SEM- EDX



ZAF Method Standardless Quantitative Analysis  
Fitting Coefficient : 0.5472

| Element | (keV) | Mass%  | Sigma | Atom%  | Compound | Mass% | Cation | K       |
|---------|-------|--------|-------|--------|----------|-------|--------|---------|
| O K*    | 0.525 | 3.21   | 0.36  | 26.72  |          |       |        | 3.8186  |
| Al K*   | 1.486 | 0.82   | 0.12  | 4.07   |          |       |        | 0.7915  |
| Si K*   |       | ND     |       | ND     |          |       |        |         |
| S K*    | 2.307 | 1.58   | 0.26  | 6.54   |          |       |        | 1.2758  |
| Fe K*   |       | ND     |       | ND     |          |       |        |         |
| Hg M*   | 2.195 | 94.39  | 1.55  | 62.66  |          |       |        | 94.1142 |
| Total   |       | 100.00 |       | 100.00 |          |       |        |         |



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