

**PHARMACEUTICAL STANDARDIZATION OF RASASINDOORA PREPARED BY
KUPIPAKWA RASAYANA METHOD**

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ABSTRACT

Rasashastra is a specialized branch of Ayurveda that focuses on the pharmaceutical processing and therapeutic application of metals, minerals, and mercury-based formulations through systematic procedures such as Sodhana (purification) and Marana (incineration). Kupipakwa Rasayana is an important pharmaceutical technique under Rasashastra, wherein drugs are prepared by controlled heating of ingredients in a sealed glass bottle (kupi) using graded temperature (krama agni). Rasasindura, a classical Kupipakwa Rasayana, is a Sagandha, Sagni and Bahirdhuma preparation indicated for various chronic and complex disorders due to its high potency, rapid action, and minimal dose requirement. In the present study, Rasasindura was prepared following classical textual references with standard pharmaceutical procedures. Parada (mercury) was purified using Lasuna (garlic) and Saindhava Lavaṇa, while Gandhaka (sulphur) was purified by the Dhalana method using cow ghee and cow milk. Equal quantities of purified Parada and Gandhaka were triturated to obtain Kajjali, which was further subjected to seven Bhavana with Vaṭankura Swarasa. The Bhavita Kajjali was filled into a clay-smeared glass bottle and heated in a vertical electric muffle furnace through well-defined stages of Paka, including Gandhaka Jaraṇa and Sindoora formation. Classical observations such as colour change, fume emission, flame characteristics, and copper coin test were carefully noted to confirm the completion of each stage. After self-cooling, the bottle was broken, and bright red Rasasindoora deposited at the neck of the kupi was collected. The study highlights the importance of precise temperature regulation, careful observation of classical laksanas, and adherence to traditional methods to ensure the quality, safety, and efficacy of Rasasindoora. This work reinforces the scientific relevance of traditional Rasashastra procedures in the preparation of potent herbo-mineral formulations.

KEYWORDS: Parada, Gandhaka, Kupipakwa, Rasa sindoor, Vatankura Swarasa etc.

INTRODUCTION

Rasashastra is a specialized branch of Ayurveda that deals with the processing and therapeutic use of minerals, metals, and mercury-based formulations. It emphasizes purification (sodhana) and incineration (Marana) techniques to convert substances into safe, bio assimilable forms. Also, it aims to enhance the potency,

rapid action, and shelf life of medicines. Hence plays a significant role in treating chronic and complex diseases with minimal dosage.

kupipakwa rasayana is one among four types of rasanarayana, pharmaceutical technique of in which medicines are prepared by heating ingredients in a sealed

glass bottle (kupi). The process involves controlled heating (krama agni) using a sand bath (valuka yantra). It facilitates complex chemical transformations, producing highly potent and stable formulations.

Rasasindoora is one of the Sagandha, Sagni and Bahirdhooma kupipakwa rasayana which is prepared by triturating purified mercury (suddha Parada) and purified sulphur (suddha Gandhaka) in equal ratio to form Kajjali. The prepared Kajjali is filled into a sealed glass bottle (kupi) coated with seven layers of clay-smear cloth. The bottle is placed in an electric muffle furnace and subjected to gradual, controlled heating. During heating, sulphur fumes are released and mercury gets converted into a red sulphide compound. After self-cooling, the bottle is broken and bright red Rasasindoora is collected from the neck of the kupi.

MATERIALS AND METHOD

Steps for rasasindoora nirmana

1. Parada sodhana
2. Gandhaka sodhana
3. Kajjali nirmana
4. Rasasindoora nirman

PARADA SODHANA

Materials Required

- Asodhita parada- 75gm
- Dehusk garlic- 75gm
- Saindhava lavana-75gm

Equipment: - khalva yantra (mortar and pestle), stainless steel container, glass jar, cotton cloth, weighing machine

Procedure

- Asodhita parada was taken in a khalva yantra.
- Same amount of de-husked Lasuna (garlic) was added to it and triturated continuously.
- Saindhava lavana was added with Mercury and the mixture was pounded in Khalva Yantra (mortar and pestle) until a black paste was formed.
- The trituration was carried out for 7 days (3 hrs each day).
- After that, it was washed with warm water and garlic got washed out. Water was decanted from the vessel to found shiny mercury.
- Mercury was then collected & stored carefully for further pharmaceutical use.

RESULT

Asodhita parada taken was-75 gm

Sodhita parada obtained-70 gm

OBSERVATION

- When garlic was added and triturated with parada, parada gets mixed with it and gradually the colour of mixture turned black (due to presence of allyl propyl disulphide in garlic).
- Gradually the parada disappears into garlic paste inside the khalva yantra.

- Pungent smell of garlic was observed during trituration.
- A smooth paste formed which indicated completion of trituration.
- While washing colour of water changed to ash grey.
- After decantation of water, parada was seen on base of vessel.
- Parada varna was silvery white with lusture.

PRECAUTION

- Dehusk garlic was used
- When pouring mercury, care taken not to spill mercury outside khalva.
- Trituration and washing were done carefully to avoid loss of Parada.

GANDHAKA SODHANA

Materials Required

- Asuddha gandhaka-100gm
- Cow milk- quantity required
- Cow ghee- quantity required

Equipment: - iron ladle, wide mouth steel container, cotton cloth, cooking gas/ gas stove,

Procedure

- In an iron ladle a spoon full of cow ghee was taken and heated over gas stove.
- When the ghee melted, Asodhita gandhaka was added and heated in mild fire.
- Meanwhile milk was poured in a stainless-steel vessel, and a cotton cloth was wrapped over the mouth of vessel.
- Then a small amount of cow ghee was smeared on the cloth, and the cloth was tightly secured with a thread.
- After some time gandhaka liquified and appeared reddish brown in colour. Then the melted gandhaka was poured over the vessel.
- When the vessel gets cool down the gandhaka was collected from the milk.
- This procedure was repeated for three times, each time the cow milk was replaced with fresh milk.
- Then the gandhaka finally obtained was washed with warm water to remove adhered milk and dried in shade to remove water.

RESULT asodhita gandhaka taken- 100 gm

Sodhita gandhaka obtained-80 gm

OBSERVATION

- On heating with cow ghee, crude Gandhaka gradually melted and changed from its original yellow colour to a reddish-brown molten state.
- Mild sulphurous odour was observed during melting, which increased slightly with rise in temperature.
- The molten Gandhaka passed smoothly through the ghee-smear cloth into the milk, leaving behind visible physical impurities on the cloth.

- On contact with milk, Gandhaka immediately solidified into thin flakes or granules and settled at the bottom of the vessel.
- The milk turned turbid and slightly yellowish, indicating absorption of impurities and toxic principles.
- After cooling, Gandhaka became soft, brittle, and brighter in appearance compared to the raw sample.
- With each successive Dhalana, the colour of Gandhaka became more uniform and lustrous, and the intensity of sulphur smell reduced.
- After three Dhalana cycles, the purified Gandhaka appeared clean, smooth, and free from visible impurities.
- Washing with warm water removed residual milk and ghee, and shade drying resulted in completely moisture-free Gandhaka.

PRECAUTION

- Heating of Gandhaka should always be carried out on mild fire to prevent burning or ignition.
- Iron ladle must be clean and completely dry before use.
- Cow ghee should be added before Gandhaka to avoid direct contact of Gandhaka with high heat.
- The cotton cloth should be properly smeared with ghee and tightly secured to prevent spillage of molten Gandhaka.
- Fresh cow milk should be used for each Dhalana cycle to ensure effective purification.
- Care should be taken while pouring molten Gandhaka to avoid splashing and burns.
- Adequate ventilation should be maintained to avoid inhalation of sulphur fumes.
- Gandhaka should be washed thoroughly with warm water after completion to remove adhered milk and ghee.

KAJJALI NIRMANA

Materials Required

- Suddha parada-60 gm
 - Suddha gandhaka-60 gm
- Equipment: khalva yantra, steel spoon, collecting vessel

Procedure

purified mercury and purified sulphur were taken in a khalva yantra and triturated continuously till the criteria for proper Kajjali was found. Then it was collected.

Result:- kajjali obtained was 115gm

OBSERVATION

- Parada and gandhaka when triturated gradually became uniform black color. colour that looked like collyrium
- Luster of parada was not seen in final kajjali.
- Kajjali obtained was fine to touch.

PRECAUTION

- Parada and Gandhaka should be taken in equal quantity (1:1).
- Grinding should be continuous, steady, and uniform to ensure proper bonding of Parada and Gandhaka.
- Trituration should be continued until classical Siddhi Lakṣaṇas appear: Nischandra (lusterless), Rekhapurṇatva, Slakṣṇatva
- Direct hand contact should be avoided; use wooden spatula if required.

RASASINDOORA NIRMANA

Material: - kajjali-100 gm, vatankura swarasa- quantity required

Equipments

- Kacha Kupa (glass bottle)
- Cork (to seal mouth)
- Vastra (cloth)
- Mitti (clay)
- Electric muffle furnace(vertical)
- Khalva yantra
- Collecting tray
- Cloth wick
- Lauha-salaka (thin iron rod)
- Burning oil(petrol/kerosine)
- knife

It was done by following procedure

1. Kajjali Bhavana
2. Kupa nirmana
3. Kupa bhavana
4. Kupa sthavana
5. Paka vidhi initial
6. Pakavidhi second
7. Kupa mukha mudrana
8. Pakavidhi final
9. Kupa bhanga vidhi

1. Kajjali Bhavana

- In a khalva yantra Kajjali was taken and vatankura swarasa was added to it.
- Trituration done till kajjali comes back to dry-powder stage.
- This bhavana procedure was carried out 7 times.
- The bhavita kajjali was then collected for further procedure.

2. Kupa nirmana

- Kacha kupa (capacity750 ml) was prepared by enwrapping clay smeared cloth over its outer surface, leaving the mouth of bottle.
- Each second lepa was put only after the first one had dried.
- This mrit-vastra lepana was repeated 7 times and was left to dry completely.

3. Kupi bharana

- The bhavita Kajjali was then filled into the Kupi (glass bottle) with help of a paper made cone.
- Care was taken not to allow any foreign material into the bottle and not to waste Kajjali.

4. Kupi sthapana

- The mouth of the kupi was closed temporarily with a cork which was removed later when heating started.
- The kupi containing kajjali was then placed inside the vertical electric muffle furnace.
- It was adjusted in such a manner that the mouth of the kupi remained above the level of furnace opening.
- Also, the kupi was kept untouched with the inner walls of Electric Muffle Furnace.

5. Paka vidhi, initial (TEMP. 0-360°C)

In this first stage of heating, EMF was switched on and the temperature gradually raised over time.

Events occurred During this period were.

- The Kajjali inside the kupi started melting.
- Fumes started coming out from the bottle. Then the fumes colour changed to yellowish and the yellowish fumes gradually became dense.
- Later yellow colour Gandhaka layer seen around the rim of mouth of the bottle.
- Smell of Gandhaka was observed, initially it was mild but went strong on increasing of temperature.
- The mild type of heat continued till the fumes stopped coming out of the bottle and blue flames started coming. The time taken for the fumes to start coming out depends upon the amount of Sulphur added in Kajjali.
- Hot iron rod was used to clear the mouth of bottle to clear the opening for Gandhaka fumes to come out.

6. Pakavidhi, second (TEMP. 360°C-460°C)

- At this juncture, the heat increased from mild to medium.
- Blue flames started coming out of the bottle, which indicated Gandhaka jāraṇa (burning out of extra Sulphur) has started. This type of heat continued, till the blue flames stopped coming from the bottle.
- During this stage Sulphur got stuck at the neck of the bottle, which was gently pushed down with the help of a thin Iron-rod. When the blue flames stopped coming out, it was understood that Gandhaka jāraṇā process has completed and formation of Sindura has taken place.
- At this stage, the inside of the bottle appeared red hot in color.
- A copper-coin test was done at this time. When coin was placed on mouth of the bottle, it lost its color as it came in contact with molecules of mercury in form of vapor.

7. Kupi mukha mudrana (Closing and sealing the bottle)

On confirmation of completion of Jarana, that is digestion of Sulphur in mercury, cork of the bottle was refitted and sealed correctly with clay smeared cloth.

Observation seen before kupi mukha mudrana

- The fumes and the flame arising from the bottle completely stopped indicating the complete evaporation of Sulphur.
- The iron rod inserted into the bottle did not emit any fumes when removed out, indicating that no minor amount of Sulphur had adhered to it.
- The base of the bottle appeared red when seen in torch light
- The mercury molecules were seen rising in circular motion inside the bottle.
- A copper coin was placed on the mouth of the bottle lost its color at the base as it came in contact with mercury molecules

8. Pakavidhi, final (TEMP. 460°C-600°C)

- Temperature was maintained high for sudden heat supply.
- It facilitated the complete evaporation of mercury compound to neck of the bottle.
- It was kept undisturbed for 3 hours, until switched off. After switching off, the Electric Muffle Furnace apparatus was left to cool down without taking out the bottle from the EMF.

9. Kupi bhanga vidhi (Breaking the bottle)

- Then the next day, bottle was taken out from EMF, the cloth enwrapped was scraped with the help of a knife and the bottle was wiped to clean it.
- A wick was made of cloth, and it was drenched in petrol. It was rolled on the bottle at a place where it had to be broken and was lit.
- After about 30 seconds to 1 minute, the burning wick was removed and immediately the bottle was held amidst wet cloth, by which it broke up on the burnt area perfectly, due to sudden change in temperature.
- Tapping the bottle gently, the Sindoor stuck at the neck was collected, avoiding the glass-pieces and was preserved.

Following Table Showing Temperature recorded along with observation

TIME	TEMPERATURE (°C)	SPECIFIC OBSERVATION
08:10 am	Emf started	----
09:00 am	100	Smell of Gandhaka started coming out
09:17 am	120	Slowly fumes of Gandhaka appeared due to breaking of bond of Kajjali.
09:23 am	125	Slightly yellowish fumes visible to naked eye
09:40 am	180	Yellowish fumes appeared in bottle
10:05 am	180	Dense yellowish fumes appear in bottle & strong smell of Gandhaka was observed
10:25 am	200	Dense yellowish fumes from inside of bottle was observed & strong smell of Gandhaka was present
11:00 am	220	Dense yellowish fumes from inside of bottle was observed, yellow colour Gandhaka layer seen around the rim of mouth of bottle, boiling of Gandhaka observed
11:26 am	300	Same as above
12:05 pm	360	Same observation as above When Louha salaka was inserted to clear the mouth of bottle, fire started to ignite at the neck of the bottle and on the Louha salaka
12:10 PM	360	Strong smell of Gandhaka was observed Blue color flame started
12:30 PM	400	Flames started to reduce due to complete evaporation of free Sulphur Inside wall of bottle looked red in color due to bond formation of Rasasindura
02:05 PM	440	Very mild flame appeared
02:45 PM	460	Flame stopped completely due to complete evaporation of gandhaka Copper coin test positive due to starting of evaporation of mercury Base of bottle appear red hot due to bond formation of Rasasindura Final corking done with proper sandhibandhana
03:20 PM	550	-----
03:45 PM	590	-----
05:50 PM	600	-----
05:55 PM	600	The EMF was switched off

RESULT

Weight of Kajjali taken-----100 gm

Weight of Rasasindura obtained-----50 gm

Loss occurred-----50 gm

Reason of loss----- due to evaporation of Sulphur



Parada sodhana



Sodhita parada



Gandhaka sodhana



Kajjali bhavana



Kacha kupi (mrut vastra lepita)



Kupi bhavana



Blue flame



Formation of RS at bottom of kupi



Kupi mukha mudrana



Kanthastha collection of RS



Final product rasasindoor

DISCUSSION

Rasasindoora is a classical Kupipakwa Rasayana preparation described in Rasashastra, renowned for its high potency, rapid therapeutic action, and requirement of very small doses. The present pharmaceutical study was undertaken to understand and document the sequential processing steps, observations, and transformations occurring during the preparation of Rasasindoora, following classical principles with the aid of modern equipment like the electric muffle furnace.

Sodhana of Parada and Gandhaka forms the foundation of Rasasindoora Nirmana. In Parada sodhana, trituration with Lasuna and Saindhava Lavaṇa facilitated the removal of physical and chemical impurities. Garlic, rich in sulphur-containing compounds such as allyl propyl disulphide, plays an important role in detoxification by forming temporary complexes with mercury, thereby aiding in the elimination of impurities. The black coloration during trituration and the subsequent recovery of lustrous, silvery white mercury after washing indicated effective purification. Minor loss in weight of Parada can be attributed to removal of impurities and handling loss during washing and decantation.

Gandhaka sodhana by Dhalana method using cow ghee and cow milk is a classical and widely accepted procedure. Melting of Gandhaka in ghee ensured uniform heat distribution and prevented direct burning. Filtration through ghee-smear cloth allowed retention of gross impurities, while quenching in milk helped in removing toxic principles and reducing irritant properties of sulphur. Repetition of the process for three times enhanced the purity, softness, and homogeneity of Gandhaka. The observed weight loss after Sodhana may be due to removal of impurities and sublimation of volatile components.

Kajjali Nirmana is a crucial step where purified Parada and Gandhaka are triturated together to form a stable black sulphide compound. Continuous and uniform trituration resulted in the disappearance of mercury luster (Nischandratva), fine texture (slaksnatva), and Rekhpurnatva, confirming the attainment of classical Siddhi Lakṣaṇas. The formation of Kajjali indicates intimate bonding between mercury and sulphur, which is essential for the safety and efficacy of the final product.

During Rasasindoora Nirmana, Bhavana of Kajjali with Vaṭankura Svarasa was performed to enhance homogeneity, possibly impart organic attributes aiding the sublimation process. The application of seven layers of clay-smear cloth over the glass bottle provided mechanical strength and thermal insulation, preventing breakage during heating.

Controlled heating in the electric muffle furnace played a pivotal role in the transformation of Kajjali into Rasasindoora. In the initial stage, melting of Kajjali and emission of yellow sulphur fumes indicated sublimation

of excess sulphur. The appearance of blue flames during the second stage confirmed Gandhaka Jarana, signifying burning off of unbound sulphur. Classical tests such as copper coin discoloration and observation of internal red-hot appearance of the bottle served as reliable indicators of the ongoing chemical changes. These observations correlate well with classical descriptions, validating the use of modern heating equipment without deviating from traditional principles.

Sealing of the bottle at the appropriate stage ensured a closed environment necessary for the sublimation and condensation of mercury sulphide at the neck of the kupi. The final high-temperature phase facilitated upward movement and deposition of Rasasindoora. Self-cooling prevented thermal shock and maintained the integrity of the compound.

Breaking of the bottle by controlled thermal stress allowed safe collection of the bright red Rasasindoora from the neck region, which is considered the purest and most potent fraction. The characteristic color, location of deposition, and absence of free mercury or sulphur indicate successful completion of the process.

Overall, the study demonstrates that strict adherence to classical pharmaceutical procedures, careful observation of lakṣaṇas, and precise temperature regulation are essential for obtaining good quality Rasasindoora. The integration of traditional Ayurvedic concepts with controlled modern instrumentation enhances reproducibility, safety, and standardization of Kupipakwa Rasayana preparations.

CONCLUSION

Rasasindoora was successfully prepared by following classical Kupipakwa Rasayana principles. Proper sodhana of Parada and Gandhaka ensured removal of impurities and safety of the formulation. Kajjali Nirmana with attainment of classical Siddhi Lakṣaṇas confirmed complete amalgamation of mercury and sulphur. Controlled heating in an electric muffle furnace facilitated systematic Gandhaka Jarana and Sindoora formation, as evidenced by classical observations and tests. The final product obtained was bright red Rasasindoora, free from free mercury and excess sulphur, indicating a successful and standardized pharmaceutical process.

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