

PHARMACEUTICAL STUDY OF SWARNA VANGA BY THREE DIFFERENT METHODS

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ABSTRACT

Ayurveda has unique Pharmaceutical techniques for preparation of medicine and dispensing which are extremely scientific and practical even in the modern era. *Rasa-Shastra* is the branch of *Ayurveda* which is the pharmaceutico-therapeutic in its approach. It encodes the extremely important unique procedures of *Shodhana*, *Marana* etc. of metal, mineral and other compounds. Besides this it has the uniqueness in its dispensing techniques which are individualistic in their approach with regards to the patients as well as the disease condition. The principles of Pharmaceutics in the text of *Rasa-Shastra* are highly esteemed even today and are still in enigma to the modern pharmaceutical chemistry. Evolution of specific procedures as *Shodhana*, *Marana*, *Bhavana* and *Kupipakva* preparation emphasize the conversion of metals, minerals and other group of drugs into herbomineral preparation which are easy to administer and are easily assimilable, highly effective and non-toxic forms. In the present study *SwarnaVanga* was prepared by three different methods mentioned in the *Ayurvedic* classics in the *Charaka Govt Ayurvedic Pharmacy* and P.G. Deptt. of *Rasa-Shastra & Bhaishjya Kalpana*, R.G.G.P.G. *Ayurvedic College Paprola*. Total nine batches of *SwarnaVanga* were prepared, 3-3 batches of each three methods. According to this reference we tried to see the difference in *SwarnaVanga* prepared with different ratios of ingredients mentioned by different *Ayurvedic* classics.

KEYWORDS: *Kupipakwa*, *Swarna vanga*, *Rasa-aushadhi*.

INTRODUCTION

RasaShastra is a branch of *Ayurveda* explaining pharmaceutical aspects of conversion of metals and minerals into therapeutically potent drugs. *RasaShastra* deals with different types of *Kalpana* like *Bhasma*, *Pishti*, *Pottali*, *Kupi-pakwa* etc. which are termed as *Rasaausadhis*.

The *Rasaausadhis* are the back bone of *Ayurvedic* therapeutics. These are chiefly based on metals and minerals, small doses, tastelessness, quick action, effectiveness and *Rasayana* like properties make them more popular and superior over the other medicines and due to this these are main focus of patients as well as pharmaceutical manufacturers. Among the *Rasausadhi*, *Kupipakva Rasayanas* are more unique due to their specific method of preparation and long shelf life, less toxic in therapeutic dosages thus these are medicinally more valuable for physicians and patients too.

Formulation prepared in a glass bottle and by subjecting it to a gradually raised temperature in a specific heating device like furnace is known as *Kupipakva Rasayana*. *SwarnaVanga* is one such medicament indicated mainly in diseases such as *Prameha*, *MedoRoga*, *Swasa*, *Kasa* and as a *Rasayana*.

In the present study different methods for preparation of *SwarnaVanga* were adopted and a number of *Kupipakwa* were prepared. According to this reference we tried to see the difference in *Swarna Vanga* prepared with different ratios of ingredients mentioned by different *Ayurvedic* Classics.

MATERIALS AND METHODS

Swarnavanga preparation

- *Parada Shodhana* - *Sudha Churna*, *Lashuna Kalka* and *Saindhava lavana*
- *Gandhaka Shodhana* - *Godugdha* and *Goghritta Navasadar Shodhana*
- *Vanga Samanya Shodhan* in - *Tila Taila Takra Gomutra Kanji Kulattha Kwath*
- *Vanga vishesh shodhana* - *Churnodaka*

It involves following pharmaceutical procedures

1. *Kanji* preparation
2. *Kulattha Kwath* preparation
3. *Churnodaka* preparation

Process 1: Parada Shodhana

- **Reference:** *Rasa Tarangini* (5/27-30)
- **Principle:** *Mardana*

- **Duration:** 46 hours
- **Equipments:** Pestle and mortar, spatula, stainless steel vessels, Cotton cloth and Weighing machine.

Procedure: Stage – I

- **Duration:** 32 hours
- **Material for Shodhana**

Ashudha Parada	1kg
Sudha Churna	1kg

1. Ashudha Parada and Sudha Churna in equal quantity were mixed in a Kharal and its trituration was started.
2. *Mardana* for 32 hours was done. The white color of Sudha was converted into grey color and Parada was completely mixed into the Sudha powder in globular form.
3. After completion of *Mardana* it was filtered through double layer of cotton cloth as mentioned in text.
4. Some amount of Parada which was still present in Sudha Churna after passing through cotton cloth was obtained by dissolving it in water.

Observations

- After *Mardana* for 2 hours, Parada started disintegrating into small globules and mixing up with Sudha Churna.
- After 8 hours, white color of Sudha Churna start converting into light greyish color.
- After *Mardana* for 32 hours, Parada was mixed completely with Sudha Churna. Parada globules were visible in the mixture.
- After filtration of Parada from cotton cloth, obtained Parada had slight greyish layer on its surface but on repeated washing the greyish layer disappeared gradually and its original shine was reappeared.

Amount of Parada obtained -	886g
• Weight loss	- 114 gm
• % of Weight loss	- 11.4%
• Color	- Shiny Silver in color

Stage – II

- **Duration :** 14 hours
 - **Material for Shodhana**
1. Parada (Obtained from Stage I) - 886 gm
 2. Lahsuna Kalka - 886 gm
 3. Saindhava Lavana - 443 gm

Procedure

- Parada obtained from 1st stage i.e. 886 gm was taken in *Khalva Yantra*.
- Then, equal quantity of *Lahsuna Kalka* i.e. 886 gm and half quantity of *Saindhava Lavana* i.e. 443 gm were added to it and process of *Mardana* was started.
- After 14 hours of *Mardana*, the mixture became black in color.

- Then the mixture was washed with warm water and the process of decantation was done many times by adding fresh warm water until Parada mixed in the mixture was obtained completely.
- After the whole process, 849 gm of *Shudha Parada* was obtained.

Amount of Parada obtained: 849 gm

- **Weight loss:** 37 gm
- **% of Weight loss:** 4.18%
- **Color:** Shiny Silver with enhanced brightness

Observations

- After *Mardana* for 1 hour, Parada was completely mixed into the mixture and started disintegrating into small globules.
- After *Mardana* for 2 hours, the color of the mixture changed into grey color.
- On washing the mixture, the globules of the Parada started mixing with each other and regained its original state.

Precautions

- *Mardana* should be done very carefully as Parada may spill out of *Khalva Yantra* due to its *Chanchalatva Guna*.
- Washing of the paste with warm water should also be done very carefully otherwise Parada would be lost.

Process No 2: Gandhakashodhana

- **Reference :** *Rasamritam 2/3*
- **Principle :** *Dhalana*
- **Duration :** 6 hours
- **Equipments:** Pestle and mortar, spatula, ss vessels, Stirrer, cotton cloth, tray, Weighing machine, gas stove and cylinder.

Material for Shodhana

1. Ashudha Gandhaka : 1Kg
2. Go-ghrita : 250 gm
3. Go-dugdha : 6 L
4. Hot water : Q.S.

Procedure

- *Gandhaka* was crushed in pestle and mortared into powder form and then collected.
- In a stainless steel container *Goghritta* was taken and heated till melting. Then *Ashuddha Gandhaka* was added to it and heated in *Mandagni* till melting.
- At the same time *Godugdha* was taken in another vessel and boiled.
- Small piece of cotton cloth was placed over the vessel of boiled *Godugdha*.
- Another stainless steel vessel containing hot water was taken.
- When the *Gandhaka* was melted completely then it was poured into the vessel containing *Godugdha* through cotton cloth.

- Then the *Gandhaka* was allowed to cool in *Godugdha*.
- After cooling it was taken out and washed with hot water and taken in a tray and then allowed to dry.
- After drying it was packed in air tight container.
- The same procedure was repeated two more times after drying and at the end of procedure it was washed properly with warm water, allowed to dry properly and then packed in an air tight container.

Observations

- *Gandhaka* was pale yellow in colour and bright.
- It takes around 6-8 min to melt *Gandhaka* completely.
- When *Gandhaka* was melted completely it forms a homogeneous mixture with *Goghritta*.
- When molten *Gandhaka* was filtered through cotton cloth every time a fine layer of *Gandhaka* was deposited on it, which has to be collected manually.
- It was observed that at around the temp 117-120°C *Gandhaka* was melted completely.
- Physical impurities like dust, stones, threads etc. were seen in cloths when molten *Gandhaka* was poured through it.
- Colour of *Gandhaka* changed to bright yellow after *Shodhana*.
- **Final Weight** - 940gm
- **Weight loss** - 60 gm
- **% of Weight loss** - 6%
- **Color** - Bright yellow
- **Odour** - Characteristic
- **Description** - Granular

Precautions

- Mild heat should be used throughout the process.
- Continuous stirring should be done with ladle.
- When the *Gandhaka* melts completely it should be poured immediately into the vessel containing warm milk very carefully.
- Some of the *Gandhaka* remains unfiltered on cotton cloth it should be melted again and filtered through cloth to avoid excessive loss.
- After completion of process the lumps of *Gandhaka* should be washed properly with warm water so that *Ghee* can be washed off from it.
- At the end the final product should be dried properly.

Process no. 3: *Navasadar Shodhana*

- **Reference** : *RasaTarangini* (14/3-4)
- **Equipments** : Pestle and mortar, spatula, SS vessels, Stirrer, cotton cloth, tray, weighing machine, gas stove and cylinder.

Material for *Shodhana*

1. *Ashudha Navsadar*: 450g
2. Water: 1350 ml(3 times to *Navasadar*)

Procedure

- 450g of *Ashudha Navsadar* was taken and washed with water to remove external impurities.
- *Navasadar* was then crushed and reduced to powder form and collected.
- After that it was dissolved in 1350ml of water in a stainless steel container and then stirred well.
- Then liquid was filtered once through a clean cotton cloth.
- The filtrate was then taken in another clean vessel placed over fire and boiled to evaporate all the liquid part.
- Later the white fine powder left at the base of the container was collected, dried and stored in a suitable airtight container as *Shudha Navasadar*.

Observations

- When *Navasadar* was dissolved in water then the stainless steel vessel became very cold and water also turned very cool.
- Amount of *Shudha Navasadar* obtained : 442 gm
- Weight loss : 8 gm
- % of Weight loss : 2%
- Color : Pure white color

Precautions

- *Navasadar* should be reduced to fine powder so that it can dissolve completely in water.
- It should be filtered properly through cotton cloth so that no physical impurities are left in it.
- It should be dried completely and should also be packed and stored in air tight container to save it from moisture.

Process 4: *Kanji Preparation*

- **Reference** : *Bhaishjya Kalpana Vigyan*
- **Principle** : *Sandhana*
- **Equipments** : SS Container, LPG Stove, Ladle, Porcelain jar, Weighing machine, Cotton cloth, Knife.

Material for *Kanji Preparation*

1. Rice - 1 kg
2. Radish - 500 gm
3. *Raai* - 250 gm
4. *Saindhava Lavana* - 250 gm
5. *Sarshapa Taila* - 120 gm
6. Water - 10 L

Procedure

- Raw rice were cleaned to separate visible foreign substances and then washed with water and crushed into coarse powder.
- Radish was also washed and cut into small pieces.
- Then the rice were cooked in the water and then filtered by using cotton cloth to obtain the *Manda*.
- Then the *Manda* obtained was put into the clean air tight container and all the other ingredients were also added and mixed well in the container.

- The container was then covered with lid and sealed by using cloth smeared by *Multani Mitti* and left for *Sandhana*.
- It was opened after 20 days and general tests of fermentation were carried out and then *Kanji* was filtered.

Test of completion of *Kanji* preparation

- Burning candle keeps on burning when brought above container after removing the lid.
- Sour taste and irritating smell.

Observations

- **Color** : Pale whitish
- **Taste** : Very sour
- **Smell** : Characteristic
- **pH** : 3
- **End product obtained:** *Kanji*
- **Quantity obtained** : 8 L

Process 5: *Kulattha Kwatha* Preparation

- **Reference** : *Sha.Ma.Kha.* 2/1
- **Principle** : *Kwathana*
- **Equipments** : SS vessels, spatula, measuring cylinder, weighing machine, Muslin cloth, gas stove.

Material for *Kwatha* Preparation

1. *Kulattha* seeds - 4 kg
2. Water - 64 L

Procedure

- 4 kg of *Kulattha* seeds were procured, screened, washed, dried and crushed to coarse powder.
- 64 L of water was taken in a ss vessel and coarse powder of *Kulattha* seeds was added to it and kept overnight.
- Next day decoction was prepared by heating on medium flame and reducing the material to 1/8th of its original volume.
- The decoction was then filtered and used for *Samanya Shodhana* of *Vanga*.

Observations

- Crushed *Kulattha* seeds absorbed water and swelled up when kept in water for overnight.
- Color of decoction was rusty brown.
- **End product obtained:** *Kulattha Kwatha*
- **Color** : Rusty brown
- **Odor** : Characteristic
- **Quantity obtained** : 8 L

Precautions

- *Kulattha* seeds should be soaked in water for overnight.
- Continuous heating should be done on medium flame.

Process No. 6: *Churnodaka* Preparation

- **Reference** : *Rasa Tarangini* (11/216-218)
- **Equipments:** Pestle and mortar, SS Container, Filter paper, Stirrer, Measuring Cylinder, cotton cloth

Material Required

1. *Churna* (Lime powder) - 30g
2. Water - 7.5 L

Procedure

- 30 g of Lime was taken from local market and it was crushed into fine powder with help of pestle and mortar.
- Then it was added to 7.5 L water and stirred properly to mix it well.
- After that vessel was covered with lid and kept undisturbed for 12 hrs.
- Next day, this *Churnodaka* was decanted and filtered through a filter paper.
- This filtrate was stored in an air tight container.

Process No. 7: *Vanga Shodhana*

Samanya Shodhana of *Vanga*

- **Reference:** *Rasa RatnaSmucchya* (5/29)
- **Principle:** *Dhalana*
- **Equipments:** SS container, SS tray, *Pithara Yantra*, LPG Stove, Spatula, Long Handled iron Ladle, Measuring cylinder.

Material Required for *Samanaya Shodhana*

1. *Ashudha Vanga* (Tin) - 696gm
2. *Tila Taila* (Sesame oil) - 7L
3. *Takra* (Butter milk) - 7L
4. *Gomutra* (Cow's Urine) - 7L
5. *Kanji* (Sour gruel) - 7L
6. *Kulattha Kwatha* (Decoction of *Dolichos biflours*) - 7L

General Procedure

- *Ashudha Vanga* was taken in a long handled big iron ladle and kept over LPG stove for heating.
- On melting it was immediately quenched in the liquid media kept in a stainless steel container covered with a round stone having a hole in its centre. This setup is called as *Pithara Yantra*.
- This process was repeated 7 times in each media.
- When *Vanga* got solidified in the liquid it was taken out of *Pithara Yantra*, washed with hot water and subjected to next *Dhalana* process.
- Thus, *Vanga* was subjected to *Dhalana* process totally 35 times, 7-7 times in each 5 media mentioned before.

I. *Dhalana* in *Til taila*

- Amount of *Til Taila* used 7 L

Table 3.1: Showing Changes observed before and after *Dhalana* in *Taila*.

Characteristics	Before <i>Dhalana</i>	After <i>Dhalana</i>
Weight	696g	694g
Tin Cry	Present	Absent
Hardness	Not hard	Becomes hard as it forms a mass
Flexibility	Flexible and bends easily	Not flexible
Shape	Long ribbon like	Circular mass
Color	Silvery and shiny	Silvery and less shiny

Observations

Behaviour of *Vanga*

- When *Vanga* was heated on LPG stove in a long handled iron ladle, it melted and converted into silvery white liquid, slight black layer was also formed and a characteristic bad odour was produced during melting.
- When *Vanga* was melting it also produced a typical sound.
- Shape of *Vanga* was also distorted; a circular single mass was obtained.
- Tin cry was not present after *Dhalana*.
- After each *Dhalana*, some pores were observed on the surface of *Vanga*. And some oil was also present in these pores.
- During further heating of *Vanga* it burnt with flames due to oil adherent to it.

Behaviour of *Til taila*

- *Taila* becomes hot and slightly black in color, some fumes were also produced.
- Quantity of *Taila* was reduced after each *Dhalana* process.

Precautions

- *Taila* should be taken fresh every time for *Dhalana*.
- *Pithara Yantra* becomes hot enough during the process, so care must be taken to avoid getting burnt.
- Container should be cleaned off solid material properly.

II. *Dhalana* in *Takra*

- Amount of *Takra* used: 7 L

Table 3.2: Showing Changes observed before and after *Dhalana* in *Takra*.

Characteristics	Before <i>Dhalana</i>	After <i>Dhalana</i>
Weight	694g	648g
Brittleness	Not present	Slightly brittle
Shape	Single irregular, circle with smooth margins	Amorphous shape, highly irregular, spinous processes also appear with some black burnt particles
Color	Silvery white and somewhat shiny	Dull silvery white, less shiny with some black particles
Smell	Like Burnt oil	Like Burnt butter

Observations

Behaviour of *Vanga*

- *Vanga* burnt with a flame during melting for first dip due to presence of some oil adhered to it.
- Now it was taking slightly more time than before to melt.
- *Vanga* got converted to a silvery white liquid when heated and a blackish layer was formed over it.
- A particular loud sound was produced when molten *Vanga* was poured in the *Takra* and some particles got attached to inner part of *Pithara Yantra*.
- *Vanga* became highly amorphous in shape with numerous spinous processes over its surface.
- After 3rd and 4th *Dhalana* in *Takra*, some part of *Vanga* got converted to very small pieces and black colored particles and it continued in successive *Dhalana* process. It means some part of *Vanga* started to get oxidized.

Behaviour of *Takra*

- A lot of steam was produced when molten *Vanga* was poured in the *Takra*. *Takra* actually starts boiling immediately after *Vanga* was poured in it.
- *Takra* became very thin liquid after *Dhalana* and the creamy part of it got separated easily.
- Volume of *Takra* was reduced after each quenching.
- Odour like burnt butter was produced.

Precautions

- Fresh butter milk should be taken for *Dhalana* everytime.
- A bigger stainless steel vessel should be used for *Pithara Yantra*.
- Special care should be taken to avoid getting burnt.

III. *Dhalana* in *Go-Mutra*

Amount of *Go-Mutra* used: 7 L

Table 3.3: Showing Changes observed before and after *Dhalana* in *Go-Mutra*.

Characteristics	Before <i>Dhalana</i>	After <i>Dhalana</i>
Weight	648 g	642 g
Brittleness	Present	Increased
Shape	Amorphous and distorted	Amorphous and distorted, numerous small particles
Color	Silvery white, shiny with some black particles	Silvery white, less shiny with black particles

Observations

Behaviour of *Vanga*

- Some more part of *Vanga* got oxidized after each *Dhalana* and forms black colored particles and *Vanga* became more brittle.
- After each *Dhalana* process *Vanga* was taking more time to melt.
- A lot of fumes were emitted during heating due to burning of *Go-Mutra*.
- *Vanga* got converted to numerous small particles and it became less spiny. These particles get separated easily.
- The oxidized *Vanga* got converted into black powder. Few particles became very fine and were adhering to finger spaces.

- *Gomutra* lost its color, smell and became more transparent after process
- During *Dhalana* process *Gomutra* boiled and spilled over slightly.
- Quantity of *Gomutra* was reduced after each *Dhalana*.

Precautions

- Fresh *Gomutra* should be taken for *Dhalana* every time.
- The iron ladle taken should be big enough to allow stirring and should contain long handle.

IV. *Dhalana* In *Kaanji*

- Amount of *Kaanji* used: 7 L

Behaviour of *Go-Mutra*

Table 3.4: Showing Changes observed before and after *Dhalana* in *Kaanji*.

Characteristics	Before <i>Dhalana</i>	After <i>Dhalana</i>
Weight	642 g	634 g
Brittleness	Present	Increased
Shape	Distorted, amorphous and angulated, with some powder	Distorted and angulated, powdery material increased
Color	Silvery white, shiny with black powder	Silvery white, less shiny with increased black powder

Observations

Behaviour of *Vanga* –

- The *Kaanji* entrapped in the powder of *Vanga* burnt with a typical sound and a particular smell.
- The part of metal in powdered state did not actually melt, it only got red hot.
- After *Dhalana* process the oxidized powder of *Vanga* was increased in quantity.
- Some particles of *Vanga* remain adhered to inner part of the *Pithara Yantra* which was removed using spoon.

- *Pithara Yantra* should be covered properly with lid, otherwise *Vanga* particles spill out with *Kaanji*.

Behaviour of *Kaanji*

- *Kaanji* starts to boil when molten *Vanga* was poured into it.
- *Kaanji* lost its smell to a great extent after process.
- Color of *Kaanji* also got changed to dull white / greyish after process.
- Quantity of *Kaanji* was reduced after every *Dhalana* process.

Precautions

- *Kaanji* for every *Dhalana* should be taken fresh.

V. *Dhalana* In *Kulattha Kwatha*

- Amount of *Kulattha Kwatha* used : 7 L

Table 3.5: Showing Changes observed before and after *Dhalana* in *Kulattha Kwatha*.

Characteristics	Before <i>Dhalana</i>	After <i>Dhalana</i>
Weight	634 g	626 g
Brittleness	Still present	Increased
Shape	Distorted, amorphous and angulated, with some powder	Amorphous, Distorted and angulated, powdery material increased
Color	Silvery white, shiny and black powder	Silvery white, less shiny and black powder

Observations

Behaviour of *Vanga*

- Maximum of *Vanga* got oxidized and converted into black powder form.
- On heating powdered *Vanga* becomes red hot and the metallic *Vanga* changes to silvery white liquid.
- On pouring molten *Vanga* in *Kulattha Kwatha* a particular sound was produced and some particles of *Vanga* got attached to inner surface of *Pithara Yantra*.
- *Vanga* became speculated, irregular and distorted after *Dhalana*.

Behaviour of *Kulattha Kwatha*

- Fumes were produced from *Kwatha* when molten *Vanga* was poured into it.
- *Kulattha Kwatha* lost its color, smell and became more transparent after process.
- Quantity of *Kwatha* was reduced after every *Dhalana* process.

Precautions

- Fresh *Kulattha Kwatha* should be taken for every subsequent quenching.
- Lid of *Pithara Yantra* should be covered properly.

Change In Weight During *Samanya Shodhana*

- Weight before *Samanya Shodhana*: 696 g
- Weight after *Samanya Shodhana*: 626 g
- Loss of weight : 70 g (10.05 %)

Vishesha shodhana of *Vanga*

- Reference : *Rasa Tarangini*(18/8-9)
- Principle : *Dhalana*
- Equipments: SS container, SS tray, *Pithara Yantra*, LPG Stove, Spatula, Long handled Iron Ladle, Measuring cylinder.
- Material required:
 1. *Samanya Shodhita Vanga* : 626 g
 2. *Churnodaka* : 7 L

Procedure

- *Vanga* was taken in a long handled iron ladle and kept over LPG stove.
- On melting, it was immediately poured in *Churnodaka* kept in *Pithara Yantra*.
- This process was repeated 7 times in *Churnodaka*.
- When *Vanga* got solidified in *Churnodaka*, it was taken out of the *Pithara Yantra*, washed with hot water and subjected to next *Dhalana* process.

Table 3.6: Showing Changes observed before and after *Dhalana*.

Characteristics	Before <i>Dhalana</i>	After <i>Dhalana</i>
Weight	626 g	622 g
Brittleness	Present	Maximum brittle
Shape	Amorphous along with powdered mass	Amorphous along with increased powdered mass
Color	Silvery white, shiny black Particles	Silvery white, shiny with more black particles

Observations

Behaviour of *Vanga*

- When molten *Vanga* was quenched in *Churnodaka*, hissing sound was heard.
- On repeated hearing, fumes were observed with a particular smell.
- *Vanga* became more oxidized and most of the metallic form converted into grayish black powder form.
- After quenching *Vanga* was reduced to small particles, coated with blackish powder.

Behaviour of *Churnodaka*

- Colour of *Vanga* was changed to slightly blackish.

- Transparency of the *Churnodaka* was decreased slightly
- Quantity of *Churnodaka* was reduced after every *Dhalana*.

Precautions

- *Vanga* should be poured very carefully in *Churnodaka* and *Pitharayantra* Should be covered with lid properly.
- After process, *Vanga* should be collected carefully because some part of *Vanga* was converted into fine particles.

Change in Weight During *Vishesha Shodhana*

- Weight before *Vishesha Shodhana* : 626 g

- Weight after *Vishesha Shodhana* : 622 g
- Loss of weight : 4 g (0.63%)

Swarna Vanga Preparation

Swarna Vanga was prepared with three different methods mentioned in *Rasa Tarangini* and *Rasamritam*. 3-3 batches of each were prepared.

So, total nine *Kupipakwa* were prepared by three different methods.

Process 8: Swarna Vanga Preparation

- Material required

Table 3.7: Showing Quantity of Ingredients of *Swarna Vanga*.

Ingredients	Quantity of material required		
	<i>SwarnaVanga I</i>	<i>SwarnaVanga II</i>	<i>SwarnaVanga III</i>
<i>Shudha Vanga</i>	240 g	150 g	224 g
<i>Shudha Parada</i>	120 g	150 g	112 g
<i>Shudha Gandhaka</i>	120 g	150 g	158 g
<i>Shudha Navasagara</i>	120 g	150 g	112 g
<i>Nimbu Swarasa</i>	150ml	150ml	150ml
<i>Saindhava Lavana</i>	90g	75g	Not present
Luke warm water	Q.S.	Q.S.	Q.S.

Procedure

Procedure for preparation of *Swarna Vanga* by all three methods was same, so same procedure was followed for every batch of *Swarna Vanga*. There are two main steps involved in whole process of *Swarna Vanga* preparation –

A. *Swarna Vanga Kajjali* preparation

B. *Swarna Vanga Kupipakwa* preparation

A. *Swarna Vanga Kajjali* Preparation

Total four steps were involved in preparation of *Swarna Vanga Kajjali*:

Step I - *Dhatupishti Nirmana*

Step II - Trituration of *Dhatupishti* with *Saindhava lavana* and *Nimbu*

References

Swarna Vanga I: Rmr.(3/95-100)

Swarna Vanga II: R.T.(18/68-76)

Swarna Vanga III: R.T.(18/77-80)

- **Equipments:** *Khalva Yantra*, stainless steel tray, gloves, mask, brushes, butter paper, spoon, big iron ladle, suction syringe, stainless steel container, weighing machines and squeezer.

Swarasa (Saindhava Lavana was not added in *Swarna Vanga– III*)

Step III - Addition of *Shudha Gandhaka*

Step IV - Addition of *Shudha Navasagar*

I. *Dhatupishti Nirmana*

- **Total duration of trituration** : 2 hours

• *Shudha Parada* was taken in a *Khalva* and *Shudha Vanga* was taken in an iron ladle and melted over heat. After that molten *Vanga* was poured immediately in the *Khalva* containing *Shudha Parada*. *Mardana* was done, after 2 hours it was mixed properly and amalgam was formed.

Observations

Table 3.8: Showing observations after *Dhatu Pishti Nirmana*.

Batch	Weight	Color	Appearance
<i>SwarnaVanga-I</i>	360 g	Grey	Globules form
<i>SwarnaVanga-II</i>	300 g	Grey	Globules form
<i>SwarnaVanga-III</i>	336 g	Grey	Globules form

II. Trituration Of *Dhatupishti* With *Saindhava Lavana* And *Nimbu Swarasa*: (*Saindhava Lavana* absent in *Swarna Vanga – III*)

- **Total duration of trituration:** 18 hrs
- *Saindhav Lavana* was added to *Dhtupishati* and it was triturated with *Nimbu Swarasa*. After 10-15 minutes of trituration *Nimbu Swarasa* turned black and it was removed with the help of suction syringe.
- In *Swarna Vanga – III*, *Saindhava Lavana* was not added only *Nimbu Swarasa* was added to it.

Observations

- Above procedure was repeated until the black color was gone.
- After hours of *Mardana* color of mixture was silver grey.
- Obtained material was washed with lukewarm water properly and kept for drying in sunlight for 2 days.

Table 3.9: Showing observations after trituration with *Saindhava* and *Nimbu*.

Batch	Weight	Color	Appearance
SwarnaVanga-I	345 g	Silver Grey	Globules form
SwarnaVanga-II	290 g	Silver Grey	Globules form
SwarnaVanga-III	330 g	Silver Grey	Globules form

III. Addition Of *Shudha Gandhaka*

- **Total duration of trituration:** 30 hrs
- Dried *Dhatupishti* was taken in a *Kharal*, *Shudha Gandhaka* was taken and trituration was started.
- After some time of trituration with *Gandhaka* the color of mixture changes from grey to dark grey.
- Trituration was continued till the mixture became black, very fine and uniform.

Observations**Table 3.10: Showing observations after addition of *Shudha Gandhaka*.**

Batch	Weight	Color	Appearance
SwarnaVanga-I	460 g	Black	Fine uniform Powder with slight luster
SwarnaVanga-II	430 g	Black	Fine uniform Powder with slight luster
SwarnaVanga-III	480 g	Black	Fine uniform Powder with slight luster

IV. Addition of *Shudha Navasadar*

- **Total duration of trituration:** 10 hrs
- *Shudha Navasadar* was added to above mixture and trituration was done properly.
- Trituration was done till the mixture became uniform and *Navasadar* got mixed properly in it.

Observations**Table 3.11: Showing observations after addition of *Shudha Navasadar*.**

Batch	Weight	Color	Appearance
SwarnaVanga-I	578 g	Black	Very fine, uniform and lusterless powder
SwarnaVanga-II	580 g	Black	Very fine, uniform and lusterless powder
SwarnaVanga-III	570 g	Black	Very fine, uniform and lusterless powder

Test for *Kajjali*: If free mercury particles remain present in *Kajjali*, then on rubbing it with gold or copper sheet with lemon juice, white silver like coating can be seen. (*Rasamritam* 1/18)

- This *Swarna Vanga Kajjali* was then divided into three equal parts to prepare 3-3 *Kupipakwa* of each method. Equal quantity of *Swarna Vanga Kajjali* was taken in each of three *Kupi* for further process.
- **SwarnaVanga I:** *SwarnaVangaI* (a), *SwarnaVangaI* (b), *Swarna VangaI* (c)
- **SwarnaVangaII:** *SwarnaVangaII* (a), *Swarna VangaII* (b), *Swarna VangaII* (c)
- **SwarnaVangaIII:** *SwarnaVangaIII* (a), *Swarna VangaIII* (b), *Swarna VangaIII* (c)

B. *Swarna Vanga Kupipakwa* Preparation

- **Equipments:** *Baluka Yantra*, earthen pots, *Kanchkupi* (beer bottle of green color), cotton cloth, copper coins, iron rods, *Abhraka Patra*, *Multani Mitti*, LPG stove, LPG cylinder, Infra Red pyrometer gun, match box, knife, stainless steel tray, torch, cork for the bottle with size same as that of mouth of bottle.
- **Material required:** *Swarna Vanga Kajjali*
- **Procedure**

5 major steps were involved in *Swarna Vanga Kupipakwa* preparation

- Step I** – Filling of *Kajjali* in *Kanchkupi*
- Step II** – Application of heat
- Step III** – Corking of *Kupi*
- Step IV** – Breaking of *Kanch kupi*
- Step V** – Collection of final product

I. Filling of *Kajjali* in *Kanchkupi*

- *Swarna Vanga Kajjali* was taken and filled in seven layer mud smeared *Kanchkupi*.
- *Baluka yantra* was made ready. The hole at the base of *Baluka Yantra* was covered with *Abhraka Patra* from inner side and *Kanch kupi* was placed above *Abhraka Patra*. Sand was filled in *Baluka Yantra* upto neck of the bottle.
- Mouth of the *Kanch kupi* was closed temporarily during filling of *Baluka* in *Baluka Yantra*.
- This setup of *Baluka Yantra* was then placed over LPG stove for *Paka*.

II. Application of Heat

- Heat was applied to the *Baluka Yantra* placed over LPG stove. Heat was given in an increasing order.
- In between hot iron rod was regularly inserted to clean the neck of bottle and avoid blockage by deposition of sublimated *Navasadar* and *Gandhaka*.

- Temperature was recorded and noted down time to time during *Paka*. Infra Red Pyrometer gun was used to record temperature.
- Different tests for the completion of *Paka* as copper coin test, *Sheeta Shalaka* test was done.

III. Corking of *Kupi*

- After completion of *Paka* corking of bottle was done. Heating pattern and observations can be better understood in tabular form.
- After corking it was further cooked for 5-6 hours. Then it was allowed for self cooling.
- Next day after self-cooling *Kanch Kupi* was taken out of *Baluka Yantra* very carefully.

IV. Breaking of *Kanchkupi*

- *Kapadmitti* of the *Kupi* was removed carefully by scrapping slowly with knife and bottle was cleaned with a wet cloth.

- Now the content inside the bottle was visible against light and the level of deposition of drug was marked.
- A thread dipped in kerosene was wrapped around the bottle in the lower middle part and ignited.
- On complete burning the remnants of the thread were immediately removed and bottle was either wrapped in a wet cloth or water was sprinkled on it. By this a sound of cracking was produced and bottle broke into two parts.

V. Collection of Final Product

- The golden material deposited in lower part and at the base of bottle was collected by gentle tapping and with the help of forceps.
- Material collected was very light in weight and of golden color.
- After that it was screened properly for pieces of glass which might have got mixed during breaking of bottle.

Observations During *Swarna Vanga-Ikupipakwa Paka*

Table 3.12: Showing observations during *Paka* of *Swarna Vanga I(a,b&c)*.

Stage of process	Effect/purpose	Duration	SV I(a) Temp.	SV I (b) Temp.	SVI (c) Temp.	Observations
The stage of low temperature	The liquefaction of material	00:00 hrs	Inside-18°C Outside-24°C	Inside-15°C Outside-20°C	Inside-12°C Outside-22°C	<i>Baluka Yantra</i> containing <i>Kanchkupi</i> was placed over the stove and heating was started temperature was maintained.
	Sublimation of <i>Navasadar</i>	1:00 hr	Inside-58°C Outside-270°C	Inside-55°C Outside-222°C	Inside-50°C Outside-250°C	White fumes starts to appear which signifies that <i>Navasadar</i> started to burn with smell of ammonia
	Liquefaction of <i>Kajjali</i>	2:00 hrs	Inside-85°C Outside-330°C	Inside-78°C Outside-260°C	Inside-80°C Outside-320°C	Semi solid state of <i>Kajjali</i> was felt on inserting hot iron rod and white fumes continues to appear
	<i>Gandhaka Jarana</i> was started	3:00 hrs	Inside-90°C Outside-350°C	Inside-83°C Outside-300°C	Inside-85°C Outside-364°C	Yellow mixed white fumes started to appear. Particles of <i>Navasadar</i> started to deposit on the neck and mouth of bottle.
	<i>Gandhaka Jarana</i> under process	4:00 hrs	Inside-98°C Outside-370°C	Inside-92°C Outside-340°C	Inside-95°C Outside-385°C	Yellow fumes appeared. Sulfur crystals started to deposit on inner part of the neck of bottle which was cleared through red hot iron rod to avoid blockage.
		5:00 hrs	Inside-110°C Outside-388°C	Inside-102°C Outside-375°C	Inside-103°C Outside-410°C	When hot iron rod was inserted blue flame appeared
The stage of moderate temperature		6:00 hrs	Inside-120°C Outside-410°C	Inside-116°C Outside-400°C	Inside-118°C Outside-448°C	Heat was increased. Blue fumes appeared with the smell of burning sulfur on insertion of hot iron rod.
		7:00 hrs	Inside-132°C Outside-430°C	Inside-126°C Outside-425°C	Inside-130°C Outside-450°C	<i>Gandhaka</i> fumes were still present but now fumes has become dense.
	<i>Gandhaka Jarana</i> was	8:00 hrs	Inside-140°C	Inside-136°C	Inside-137°C	Copper coin was placed over the mouth of bottle for few

	still under process		Outside-450 ⁰ C	Outside-448 ⁰ C	Outside-460 ⁰ C	minutes and removed. It turned black which indicates that sulfur was still present. Fumes were still coming from bottle.
	<i>Gandhaka Jarana</i> completed	a) 10 hrs b) 11:30 hrs c) 11:00 hrs	Inside-195 ⁰ C Outside-498 ⁰ C	Inside-185 ⁰ C Outside-495 ⁰ C	Inside-205 ⁰ C Outside-500 ⁰ C	Fumes were disappeared completely. Copper coin turned white, few mercury particles were adhered to it. Which indicates that <i>Gandhaka Jarana</i> was completed.
The stage of Corking		a) 10 hrs b) 11:30 hrs c) 11:00 hrs				No fumes and flame were present. <i>Sheeta Shalaka</i> test was done. Corking of the <i>Kupi</i> was done with a brick made cork smeared with mud cloth.
The stage of temperature maintenance		10:00-17:30 hrs	-			Moderate temperature was maintained for 5-6 hours after corking
The stage of self cooling		15:00 – 17:30 hrs				Heat was stopped and it was allowed for self cooling and on next day bottle was taken out, broken and product was collected.

Table 3.13: Showing Result of Final Product.

Batch	Wt. of <i>Kajjali</i>	Wt. of SV	Yield %
SV I (a)	193 g	78 g	40.41%
SV I (b)	193 g	58 g	30.05%
SV I (c)	192 g	69 g	35.93%

Table 3.14: Showing Characters of Final Product.

Batch	Color	Taste	Odour	Texture	Consistency
SV I (a)	Golden yellow	Tasteless	Odourless	Crystal like scattered	Soft
SV I (b)	Golden yellow	Tasteless	Odourless	Crystal like Scattered	Soft
SV I (c)	Golden yellow	Tasteless	Odourless	Crystal like scattered	Soft

Observations During *Swarna Vanga-Ii Kupipakwa Paka*Table 3.15: Showing observations during *Paka of Swarna Vanga II (a, b & c)*.

Stage of process	Effect / purpose	Duration	SV II (a) Temp.	SV II (b) Temp.	SV II (c) Temp.	Observations
The stage of low temperature	The liquefaction of material	00:00 hrs	Inside-9 ⁰ C Outside-11 ⁰ C	Inside-9 ⁰ C Outside-18 ⁰ C	Inside-12 ⁰ C Outside-12 ⁰ C	<i>Baluka Yantra</i> containing <i>Kanchkupi</i> was placed over the stove and heating was started and temperature was maintained.
	Sublimation of <i>Navasadar</i>	1:00 hr	Inside-50 ⁰ C Outside-320 ⁰ C	Inside-50 ⁰ C Outside-312 ⁰ C	Inside-52 ⁰ C Outside-164 ⁰ C	White fumes starts to appear which signifies that <i>Navasadar</i> started to burn with smell of ammonia.
	Liquefaction of <i>Kajjali</i>	2:00 hrs	Inside-101 ⁰ C Outside-350 ⁰ C	Inside-80 ⁰ C Outside-320 ⁰ C	Inside-74 ⁰ C Outside-290 ⁰ C	Semi solid state of <i>Kajjali</i> was felt on inserting hot iron rod and white fumes continues to Appear
	<i>Gandhaka Jarana</i> was started	3:00 hrs	Inside-174 ⁰ C	Inside-108 ⁰ C	Inside-76 ⁰ C	Yellow mixed white fumes started to appear.

			Outside-400°C	Outside-340°C	Outside-300°C	Particles of <i>Navasadar</i> started to deposit on the neck and mouth of bottle.
	<i>Gandhaka Jarana</i> under process	4:00 hrs	Inside-195°C Outside-430°C	Inside-122°C Outside-358°C	Inside-90°C Outside-320°C	Yellow fumes appeared. Sulfur crystals started to deposit on inner part of the neck of bottle which was cleared through red hot iron rod to avoid blockage.
		5:00 hrs	Inside-210°C Outside-460°C	Inside-140°C Outside-370°C	Inside-107°C Outside-350°C	When hot iron rod was inserted blue flame appeared
The stage of moderate temperature		6:00 hrs	Inside-215°C Outside-500°C	Inside-154°C Outside-400°C	Inside-115°C Outside-370°C	Heat was increased. Blue fumes appeared with the smell of burning sulfur on insertion of hot iron rod.
		7:00 hrs	Inside-202°C Outside-495°C	Inside-170°C Outside-430°C	Inside-146°C Outside-395°C	<i>Gandhaka</i> fumes were still present but now fumes has become dense.
	<i>Gandhaka Jarana</i> was still under process	8:00 hrs	Inside-210°C Outside-490°C	Inside-180°C Outside-460°C	Inside-165°C Outside-400°C	Copper coin was placed over the mouth of bottle for few minutes and removed. It turned black which indicates that sulfur was still present and fumes were also coming.
	<i>Gandhaka Jarana</i> completed	a)10:00hrs b)11:30hrs c)12:00hrs	Inside-212°C Outside-495°C	Inside-201°C Outside-500°C	Inside-204°C Outside-498°C	Fumes were disappeared completely. Copper coin does not show any change neither it turned black nor white. Which indicates that <i>Gandhaka Jarana</i> was completed.
The stage of Corking		a)10:00hrs b)11:30hrs c)12:00hrs				No fumes and flame were present. <i>Sheeta Shalaka</i> test was done. Corking of the <i>Kupi</i> was done with a brick made cork smeared with mud cloth.
The stage of temperature maintenance		10:00 hrs – 18:00 hrs				Moderate temperature was maintained for 6 hours after corking
The stage of self cooling		16:00 hrs – 18:00 hrs				Heat was stopped and it was allowed for self cooling and on next day bottle was taken out, broken and product was collected.

Table 3.16: Showing Result of Final Product.

Batch	Wt. of <i>Kajjali</i>	Wt. of SV	Yield %
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SV II (a)	193 g	60 g	31.08%
SV II (b)	193 g	66 g	34.19%
SV II (c)	194 g	70 g	36.08%

Table 3.17: Showing Characters of Final Product.

Batch	Color	Taste	Odour	Texture	Consistency
SV II (a)	Golden yellow	Tasteless	Odourless	Crystal like scattered	Soft
SV II (b)	Golden yellow	Tasteless	Odourless	Crystal like scattered	Soft
SV II (c)	Golden yellow	Tasteless	Odourless	Crystal like scattered	Soft

Observations Duringswarna Vanga-Iii Kupipakwa Paka

Table 3.18: Showing observations during pakaof SwarnaVangaIII(a,b& c).

Stage of process	Effect / purpose	Duration	SV III (a) Temp.	SV III (b) Temp.	SV III (c) Temp.	Observations
The stage of low temperature	The liquefaction of material	00:00 hrs	Inside-15 ⁰ C Outside-15 ⁰ C	Inside-20 ⁰ C Outside-20 ⁰ C	Inside-17 ⁰ C Outside-17 ⁰ C	<i>Baluka Yantra</i> containing <i>Kanchkupi</i> was placed over the stove and heating was started and temperature was maintained.
	Sublimation of <i>Navasadar</i>	1:00 hr	Inside-40 ⁰ C Outside-199 ⁰ C	Inside-53 ⁰ C Outside-250 ⁰ C	Inside-60 ⁰ C Outside-267 ⁰ C	White fumes starts to appear which signifies that <i>Navasadar</i> started to burn with smell of ammonia
	Liquefaction of <i>Kajjali</i>	2:00 hrs	Inside-71 ⁰ C Outside-280 ⁰ C	Inside-84 ⁰ C Outside-300 ⁰ C	Inside-88 ⁰ C Outside-297 ⁰ C	Semi solid state of <i>Kajjali</i> was felt on inserting hot iron rod and white fumes continues to appear
	<i>Gandhaka Jarana</i> was started	3:00 hrs	Inside-96 ⁰ C Outside-310 ⁰ C	Inside-100 ⁰ C Outside-360 ⁰ C	Inside-110 ⁰ C Outside-310 ⁰ C	Yellow mixed white fumes started to appear. Particles of <i>Navasadar</i> started to deposit on the neck and mouth of bottle.
	<i>Gandhaka Jarana</i> under process	4:00 hrs	Inside-108 ⁰ C Outside-330 ⁰ C	Inside-110 ⁰ C Outside-380 ⁰ C	Inside-124 ⁰ C Outside-350 ⁰ C	Yellow fumes appeared. Sulfur crystals started to deposit on inner part of the neck of bottle which was cleared through red hot iron rod to avoid blockage of bottle.
		5:00 hrs	Inside-130 ⁰ C Outside-360 ⁰ C	Inside-145 ⁰ C Outside-400 ⁰ C	Inside-143 ⁰ C Outside-375 ⁰ C	When hot iron rod was inserted blue flame appeared
The stage of moderate temperature		6:00 hrs	Inside-168 ⁰ C Outside-390 ⁰ C	Inside-160 ⁰ C Outside-410 ⁰ C	Inside-152 ⁰ C Outside-378 ⁰ C	Heat was increased. Blue fumes appeared with the smell of burning sulfur on insertion of hot iron rod.
		7:00 hrs	Inside-170 ⁰ C Outside-398 ⁰ C	Inside-175 ⁰ C Outside-430 ⁰ C	Inside-170 ⁰ C Outside-396 ⁰ C	<i>Gandhaka</i> fumes were still present but now fumes has became dense.
	<i>Gandhaka Jarana</i> was still under process	8:00 hrs	Inside-178 ⁰ C Outside-410 ⁰ C	Inside-177 ⁰ C Outside-460 ⁰ C	Inside-178 ⁰ C Outside-420 ⁰ C	Copper coin was placed over the mouth of bottle for few minutes and removed. It turned black which indicates that sulfur was still present.
	<i>Gandhaka Jarana</i> continued	9:00 hrs	Inside-191 ⁰ C Outside-	Inside-190 ⁰ C Outside-	Inside-194 ⁰ C Outside-	Copper coin again turned black Indicating <i>Gandhaka Jarana</i> in process. Few fumes were

			438 ⁰ C	465 ⁰ C	450 ⁰ C	present.
		10:00 hrs	Inside-195 ⁰ C Outside-450 ⁰ C	Inside-197 ⁰ C Outside-480 ⁰ C	Inside-202 ⁰ C Outside-475 ⁰ C	Very few fumes were still coming out of bottle
		11:00 hrs	Inside-200 ⁰ C Outside-480 ⁰ C	Inside-201 ⁰ C Outside-498 ⁰ C	Inside-210 ⁰ C Outside-480 ⁰ C	Fumes of <i>Gandhaka</i> not disappeared completely
	<i>Gandhaka Jarana</i> completed	12:00 hrs	Inside-205 ⁰ C Outside-495 ⁰ C	Inside-210 ⁰ C Outside-510 ⁰ C	Inside-220 ⁰ C Outside-502 ⁰ C	Fumes were disappeared completely. Copper coin does not show any change neither it turned black nor white. Which indicates that <i>Gandhaka Jarana</i> was completed.
The stage of Corking		12:00 hrs				No fumes and flame were present. <i>Sheeta Shalaka</i> test was done. Corking of the <i>Kupi</i> was done with a brick made cork smeared with mud cloth
The stage of temperature maintenance		12:00 hrs -18:00 hrs				Moderate temperature was maintained for 6 hours after corking
The stage of self cooling		18:00 hrs				Heat was stopped and it was allowed for self cooling and on next day bottle was taken out, broken and product was collected.

Table 3.19 Showing Result of Final Product.

Batch	Wt. of <i>Kajjali</i>	Wt. of SV	Yield %
SV III (a)	190 g	73 g	38.42%
SV III (b)	190 g	72 g	37.89 %
SV III (c)	190 g	75 g	39.47%

Table 3.20 Showing Characters of Final Product.

Batch	Color	Taste	Odour	Texture	Consistency
SV III (a)	Golden Brown	Tasteless	Odourless	Compact	Soft
SV III (b)	Golden Brown	Tasteless	Odourless	Compact	Soft
SV III (c)	Golden Brown	Tasteless	Odourless	Compact	Soft

Table 3.21: Showing duration of *Paka* in nine batches.

Sr. no.	Batch	Duration
1.	<i>SwarnaVanga I- (a)</i>	15 hrs
2.	<i>SwarnaVanga I- (b)</i>	17 hrs 30 min
3.	<i>SwarnaVanga I- (c)</i>	17 hrs
4.	<i>SwarnaVanga II- (a)</i>	16 hrs
5.	<i>SwarnaVanga II- (b)</i>	17 hrs 30 min
6.	<i>SwarnaVanga II- (c)</i>	18 hrs
7.	<i>SwarnaVanga III- (a)</i>	18 hrs
8.	<i>SwarnaVanga III- (b)</i>	18 hrs
9.	<i>SwarnaVanga III- (c)</i>	18 hrs

Parada Shodhana



AshudhaParada



Trituration with Lime powder



Filtration through cotton cloth



Trituration with Lashuna Kalka & Saindhava Lavana



Greyish colour of paste



ShudhaParada

Raw Material of Swarna Vanga



Parada



Vanga



Gandhaka



Navsacara



Nimbu



SaindhavaLavana

Gandhaka Shodhana



Ashudha Gandkaka



Melting of Gandhaka in

Go-Ghrita



Molten Gandhaka



Filtration through cloth in

Godugdha



After Filtration



Shudha Gandhaka

Navsadar Shodhana



Ashudha Navsadara



Dissolved in water



Process of Evaporation



Shudha Navsadara

Samanya Shodhana of Vanga



Dhalanain Tila Taila



Dhalana in Takra



Dhalana in Gomutra



Dhalana in Kaanji



Dhalana in Kulattha Kwatha

Vishesha Shodhana of Vanga



Dhalana in Churnodaka

Swarana Vanga Kajjali Preparation



Material



Parada + Vanga



Dhatu Pishti



Addition of Saindhava Lavana



Trituration with Nimbu Swarasa



After washing with water



Addition of Shudha Gandhaka



After Trituration with Gandhaka



Additon of Shudha Navsadara



After Trituration with Navsadara



Swarna Vanga Kajjali

Swarna Vanga Kupipakwa Preparation



Mud Smeared Kanchkupi



Swarna Vanga Kajjali



Kupa Paka in Baluka Yantra



Temperature Measurement



Emission of fumes



Corking of Kupa



Breaking of Kupa



Broken Kupa



SwarnaVanga



SwarnaVanga Capsules

Final Product



SwarnaVanga I a



SwarnaVanga I b



SwarnaVanga I c



SwarnaVanga II a



SwarnaVanga II b



SwarnaVanga II c



Swarna Vanga III a



Swarna Vanga III b



Swarna Vanga III c

DISCUSSION AND CONCLUSION

- The aim of the study was to prepare the *Swarna Vanga* by three different methods mentioned in *Rasamritam* and *Rasa Tarangini* and to evaluate their comparative therapeutic efficacy on the patients of *MedoRoga* w.s.r. to Dyslipidemia.
- In pharmaceutical study, the following procedures were done and their findings have been discussed:

1. *Parada Shodhana*
2. *Gandhaka Shodhana*
3. *Navasadar Shodhana*
4. *Vanga Shodhana*
5. *Swarna Vanga Preparation*

1. *Parada Shodhana*

- Parada Shodhana* was done according to reference of *Rasa Tarangini*(5/27-30). *Parada*, *Chuna*(Lime) *Lashuna*(Garlic) and *Saindhava Lavana*(Rock salt) are the ingredients mentioned for *Parada Shodhana* in text.
- First of all, *Parada* was triturated with equal quantity of lime for 32 hours and after that when the *Parada* was totally mixed with lime then it was filtered through double layered cotton cloth.
- Some amount of *Parada* which was still present in *Sudha Churna* after passing through cotton cloth was obtained by dissolving it in water.
- The *Parada* so collected was then weighed and triturated with *Samaguna Lashuna* and *Ardhguna Saindhava Lavana* till the mixture turned black.
- It was then washed with luke warm water and *Shudha Parada* was obtained.
- Total percentage loss was 15.58%, which may be due to method of handling and various *Gati* of *Parada* during process.

2. *Gandhaka Shodhana*

- Gandhaka Shodhana* was carried out according to reference given in *Rasaamritam*2/3.
- Gandhaka*, *Go-Ghritta* and *Go-Dugdha* are the ingredients mentioned for *Gandhaka Shodhana* in text.

- First of all, *Gandhaka* was melted with *Go-Ghritta* in an iron ladle, then it was poured in a stainless steel vessel containing milk. After that it was taken out and washed with hot water. This procedure was repeated three times.
- Fat soluble impurities got dissolved in *Go-Ghritta* and *Go-Dugdha*.
- Total percentage loss was 6% this may be due to separation of impurities and wastage of small amount of *Gandhaka* during process.

3. *Navasadar Shodhana*

- Navasadar Shodhana* was done according to the reference given in *Rasa Tarangini* (14/3-4). *Navasadar* was powdered and dissolved in water 3 times to *Navasadar*.
- After complete dissolution in water it was filtered through cotton cloth and water content was evaporated by heating it on the LPG stove. After complete evaporation of water, white colored powder was obtained at the base of container and it was stored as *Shudha Navasadar* and used for further process.
- Total percentage loss was 2%, which may be due to removal of impurities.
- Water soluble impurities got dissolved in water and separated after filtration.
- It was heated until the complete loss of moisture content.

4. *Vanga Shodhana*: *Vanga Shodhana* was carried out in two steps

- a) *Samanya Shodhana*
- b) *Vishesha Shodhana*

The process for *Shodhana* of *Vanga* mentioned in text is *Dhalana* Process.

a) *Samanya Shodhana*

- Vanga* was taken in a long handled iron ladle and heated to melt. Then its *Dhalana* was done in following 5 media-*Tila Taila*, *Takra*, *Gomutra*, *Kanji* and *Kulattha Kwatha* respectively 7 times in

each. After melting instant *Dhalana* is important because repeated immediate cooling after melting leads to breaking and oxidation of material.

- Some chemical reactions take place between *Vanga* and the liquid media used for *Shodhana* process. Probable chemical changes may be oxidation, reduction, sublimation, salt formation, neutralization etc.
 - **Observations in *Tila Taila***– *Vanga* has low melting point, hence it melts quickly within 2-5 minutes. Fat soluble impurities may get dissolved in oil. Tin cry was found absent after completion of *Dhalana* process in *Tila Taila*. Volume of oil reduced after process which may be due to burning of small amount of *Tila Tail*.
 - **Observations in *Takra***– Some part of *Vanga* got oxidised and got converted to black powder form. Acid soluble impurities got dissolved in *Takra*. Volume of *Takra* was reduced after process due to evaporation.
 - **Observations in *Gomutra***– A lot of fumes were produced with a particular odour of cow's urine. As *Gomutra* is acidic in nature it reacts with *Vanga* leading to separation of acid soluble impurities. Oxidation of *Vanga* also took place and some particles got converted to black coloured powder. Volume of *Gomutra* got decreased due to evaporation.
 - **Observations in *Kaanji***– Acid soluble impurities were separated and volume of *Kaanji* also decreased due to evaporation. The colour of *Kaanji* was found greyish because burnt particles of *Vanga* got mixed with *Kaanji* was found greyish because burnt particles of *Vanga* got mixed with *Kaanji*.
 - **Observations in *Kulttha Kwatha***– Due to the oxidation process metallic form of *Vanga* was converted into black fine oxidized particles. Volume of *Kwatha* was also reduced.
- b) ***Vishesh Shodhana***: For *Vishesh Shodhana* of *Vanga*, *Churnodaka* was prepared according to reference mentioned in *Rasa Tarangini*(11/216-218). *Vanga* obtained after *Samanya Shodhana* was subjected for heating in an iron ladle until it melts and then poured in *Churnodaka*, the same process was repeated for 7 times successively. After this process maximum quantity of *Vanga* was found converted to black powder form and color of *Churnodaka* also changed to greyish.

Total percentage loss after *Shodhana* was 14.05% which may be due to repeated *Dhalana* and the chemical reactions that occurred in whole process. During *Shodhana*, color of *Vanga* changed to greyish black. This is because during molten state, *Vanga* reacts with atmospheric oxygen. The repeated heating and *Dhalana* in these basic and acidic liquid media leads to corrosive changes in the metal and may cause removal of acid and alkali soluble impurities from the metal. Variability in melting point may be attributed by the presence of oxidized particles appearing every time.

5. *Swarna Vanga Preparation*

- In present study, *Swarna Vanga* was prepared by three different methods mentioned in text. Three *Kupipakwa* of each three methods chosen has been prepared, So total nine batches of *Swarna Vanga* has been prepared
 - ***Swarna Vanga I***: *Swarna Vanga I* (a), *Swarna Vanga I* (b), *Swarna Vanga I* (c)
 - ***Swarna Vanga II***: *Swarna Vanga II* (a), *Swarna Vanga II* (b), *Swarna Vanga II* (c)
 - ***Swarna Vanga III***: *Swarna Vanga III* (a), *Swarna Vanga III* (b), *Swarna Vanga III* (c)
- Ingredients of the formulation were same in all three methods except the *Saindhava Lavana* was absent in *Swarna Vanga*– III. The ratio of ingredients was different in all three but method of preparation was same.
- Steps involved in preparation of *Swarna Vanga*:
 - i. ***Dhatu Pishti Nirmana***
 - The molten *Shudha Vanga* and *Shudha Parada* were taken in a *Khalva*. Trituration done to form amalgam and then *Saindhava Lavana* and *Nimbu Swarasa* were added to it for lavigation. In *Swarna Vanga*–III, *Saindhava Lavana* was not added.
 - After lavigation for sometime its color turned black then it was washed with lukewarm water until black color was gone completely. This black color was produced due to chemical reaction of citric acid with *Dhatupishati*.
 - After washing its color changed to silver grey and it was then allowed to dry in sunlight.
 - ii. ***Addition of Shudha Gandhaka***
 - After *Dhatupishati* was completely dried *Shudha Gandhaka* was added to it and trituration was continued.
 - When *Gandhaka* was added then its color was changed to black. It turned black, uniform due to bonding of sulfur with mercury and this mixture became homogenous and fine.

iii. *Addition of Shudha Navasadar*

- When *Navasadar* was added and triturated with above mixture it became uniform and homogenous
- *Navasadar* was added to mixture because it disintegrates the metal and has the property of *Parada Jarana*. (R.R.S.3/129)

Swarna Vanga Kajjali: *Swarna Vanga Kajjali* was black, uniform, very fine but was not very smooth like *Kajjali* of *Rasa Sindoor*, because in *Rasa Sindoor* only *Parada* and *Gandhaka* are present but in this *Kajjali* another metal *Vanga* was present and *Navasadar* was also present. That's why this *Kajjali* was not as smooth as *Rasa Sindoor Kajjali*. It means if the *Kajjali* is formed from *Dhatupishati*, it does not become very smooth.

iv. *Swarna Vanga Kupipakwa preparation*

- Green color bottles were preferred for *Kupipakwa* preparation due to heat tolerance property. Because

it is very easy to break the glass bottle and to collect the final product.

- **Kapadmitti:** Cotton cloth was taken and dipped in *Multani Mitti* paste. And this mud smeared cotton cloth was wrapped around the bottle for 7 times and dried properly in sunlight. Only after complete drying of first layer next layer was applied.

Observations

- The procedure requires keen observation and vigilance till the completion of *Paka* stage.
- In *Swarna Vanga Kupipakwa* preparation temperature given was not that high it was maintained upto moderate, otherwise prepared material was found at the neck of *Kupi* and properties and name of material was changed i.e. *Vanga Sindoor*.
- In 1st hour *Navasadar* was sublimated and white fumes appeared. And after 4 hours of heating sublimation of *Navasadar* was completed.
- In first stage, temperature was maintained at a low level, where *Kajjali* was liquefied. After 6 hours

heat was increased and moderate temperature was maintained.

- After 3-4 hours of heating, *Gandhaka Jarana* was started temperature was around 350⁰ C-400⁰ C and completed in 11-12 hours of heating at temp around 450⁰ C- 500⁰ C.
 - Corking of bottle was done after the fumes emerging from bottle were subsided and after that moderate temperature was maintained for 5-6 hours.
 - After 5-6 hours of heating it was stopped and *Baluka Yantra* was left for self-cooling.
- v. **Breaking of bottle:** After self-cooling bottle was taken out carefully from *Baluka Yantra* and *Kapadmitti* was removed. A cotton/ jute string dipped in kerosene was wrapped around the bottle in the lower middle and ignited because it breaks the bottle in two equal parts with no glass particles.
- vi. **Final product:** Final product was found in the lower part of bottle and at the base of bottle. The color of this material was golden yellow. The color was due to addition of *Navasadar* and material was very light in nature because *Navasadar* and *Parada* both disintegrate the metal in very fine form.

Table 6.1: Showing Results of all nine batches of Swarna Vanga.

Batch	Swarnavanga-I			Swarnavanga-II			Swarnavanga- III		
	Wt. of Kajjali	Wt. of SV	Yield%	Wt. of Kajjali	Wt. of SV	Yield%	Wt. of Kajjali	Wt. of SV	Yield%
(a)	193 g	78 g	40.41%	193 g	60 g	31.08%	190 g	73 g	38.42%
(b)	193 g	58 g	30.05%	193 g	66 g	34.19%	190 g	72 g	37.89 %
(c)	192 g	69 g	35.93%	194 g	70 g	36.08%	190 g	75 g	39.47%

1. Causes of loss

- Sublimation of *Navasadar*.
- Removal of sulfur in the form of sulfur dioxide.

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