

A PHARMACEUTICAL STUDY OF TUTTHA SATVAPATANA W.S.R. TO MRIDU SATVAPATANA

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ABSTRACT

Rasashastra includes various metals, minerals, precious and semiprecious stones etc. and their different characters along with therapeutic uses. The knowledge of Tuttha (Copper sulphate) was known to Indians, since early ages of medical practice. It is having the Rasayana, Emetic, Purgative, Blood purifying properties. Essence of Tuttha is clinically indicated for all doshas, toxicity, colic pain, Anorectal disorders, Acidity and constipation. It is powerful astringent, antiseptic stimulant, styptic and mild caustic. Tuttha is found as a solidified minerals mainly in volcano and have the therapeutic properties as well as toxic property. Ashodhita Tuttha causes Vanti (vomiting) and Bhranti (mental illusion). So it should be used after

Shodhana only. Various pharmaceutical procedures i.e. *Shodhana* (Purification), *Marana* (Incineration), *Satvapatana* (Extraction of metal from mineral) etc. converts deadly toxic mineral, metallic substances into safe and potent therapeutic agent. This paper aims to make available standard manufacturing process of *Tuttha satva-patana*. *Satva patna* process performed by method described in *Rasa Tarangini*. The aims to evaluate the temperature in when Tuttha gives the features of Bijavarta and Shuddhavarta, and also an approach to evaluate the temperature for Tuttha Satvapatana. In this study temperature and amount of fuel required for Mridu Satvapatana as Tuttha Satvapatana have been evaluated. In this work, I

found 20 gm of *satva* from 120 gm of Tuttha mixture compound (Shodhita, Nirmalikrita and Pindikrita Tuttha).

KEYWORDS: Tuttha, Satva, Essence, Satvapatana.

INTRODUCTION

Ayurveda is the applied science, which is still in the practice having the unbroken continuity. Rasashastra is a branch of Ayurveda, which deals with a knowledge of alchemy (Lohavada) and Pharmaceutical process. Satvapatana is the most important and widely described topic. Satva denoted “purity, literally, existence, reality” and brightness. Satvapatana is an important process which applies after Shodhana. So various trace elements are added and molecular changes have been seen in the particular drug during the procedure of Shodhana to Satvapatana. To obtain the metallic part from the Minerals/Ores/Compounds with the help of Dravaka gana by strong heating in Koskthi (Specially prepared Fired place), here Satvapatana is Smelting process.^[1] (R.T.2/32). According to rasaratna samucchya any mineral compound, animal origin or any ore is mixed and rubbed with the drugs prescribed in Kshara varga, Amla varga and Dravaka varga. Then it is kept in a closed crucible and heated intensively, in a koskthi (furnace). By this, the metallic essence portion of that compound can be obtained, which is nothing but Satva.^[2] (R.R.S. 8/34). After Satvapatana potency of these drugs remains for longer period. Satva requires minimal dose & easy for administration. More potent as compared to other preparations. Abhraka Satva form is eight time more potent than abhraka patra form.^[3] (R.H.T.8/19). Rasakalpas containing Tuttha is used in treatment of various diseases. Tuttha is said to be very harmful if it's Shodhana and Marana is not done properly. Tuttha is copper sulphate or blue vitriol and chemical formula is $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$. It is a blue coloured crystalline copper mineral. It is applied in indolent ulcers, exuberant granulation, sinuses and fistula in ano, eczema, impetigo and eye disorders. In classics of Rasashastra eight Doshas of Tamra have been mentioned. If source Tamra taken for preparation of medicine is not of good quality it may be poisonous. So in context of Tamra Rasatarangini and Rasaratnasamucchya have been mentioned about Sasyaka, mayurpiccha and Bhunaga Satvapatana. Their Satva may be used as a source of Tamra. In Satvapatana, time of heating, number of heating amount of fuel and temperature is not mentioned by Rasacharya may be due to variations in drugs but to observe of Satvapatna some features are clearly mentioned which indicates sign of obtaining Satva i.e. Bijavarta and Suddhavarta. In this present study Tuttha is subjected for mridu Satvapatana. To evaluate the temperature in which Tuttha gives

the features of Bijavarta and Shuddhavarta, and to explore the temperature when obtain Satva from Tuttha. In this study required amount of heat and fuel for Mridu Satvapatana as Tuttha Satvapatana have been evaluated.

Types of Satva

Satva is said to be two types: Metallic and Herbal. Rasaushashi (Jangama and Mineral drugs) contains metallic satva while Kashtha aushadhi contains herbal satva.

The process of Satvapatana always needs strong heat but some drugs releases their essence in low temperature. So according to time, temperature and fuel needed for Satvapatana, Metallic satvapatana is divided in two types – Mridu and Khara.

i. Mridu Satva – The drug which releases their Satva in low temperature (below 1000°C like Tuttha).

ii. Khara Satva – The drug which releases their Satva in very High Temperature above 1300°C and need repeated attempt e.g. Bhunaga, Abhraka, Mayur Piccha etc^[4] (R.R.S.5/224)

AIMS AND OBJECTIVES

1. To prepare the Satva of Tuttha by the nirmalikaara, Shodhana and Satvapatana process according to rastarangini.
2. To evaluate the temperature in which Tuttha gives the features of Bijavarta and Shuddhavarta.
3. To explore the temperature when obtain Satva from Tuttha.
4. To evaluate the amount of fuel needed for mridu Satvapatana as Tuttha Satvapatana.

MATERIAL AND METHOD

Raw Tuttha was procured by Govt. Ayurveda College, Chhattisgarh through demand letter. Other allied materials lemon juice, raw Tankana were collected from the local market.

The whole pharmaceutical work can be divided into three steps:

- A. Tuttha nirmalikaara
- B. Tuttha shodhan
- C. Tuttha Satvapatana

A. Tuttha nirmalikaarana

Tuttha nirmalikaarana was done according to Rasatarangini 21/73-75^[5]

1. Ashuddha Tuttha is broken in small pieces or coarse powder by using mortar & pestle.
2. Now water was boiled in a Stainless steel vessel by using of heater.
3. Then coarse powder of Ashuddha Tuttha mixed in boiled water.
4. Now consistent heat was given and steered till Ashuddha Tuttha was properly dissolved in water.
5. Then solution was filtered by cotton cloth.
6. Now this filtered solution was kept in glass jar for crystallization.
7. Now crystals of Tuttha were dried by cotton cloth and preserved in glass jar.

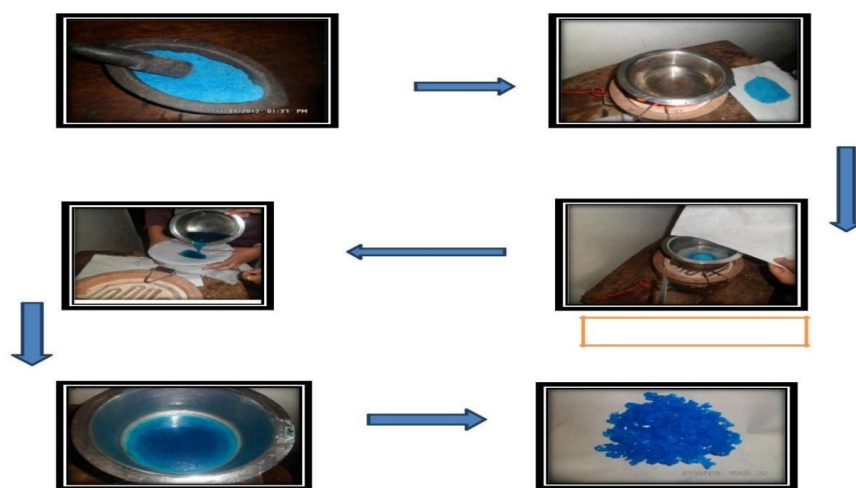


Fig. 1: Procedure of Tuttha Nirmalikaarana.

OBSERVATION

The coarse powder of Tuttha was light blue in colour. The colour of water was gradually turned into light bluish colour and at the end of process it became more darken and bluish. After 4 hr. total solution converted into crystal form. Nirmalikaarana Tuttha became dark blue in colour.

B. Tuttha Shodhana

Tuttha Shodhana was done according to reference of Rasatarangini 21/106-107.^[6]

Procedure

1. Nirmalikaarana Tuttha was weighed exactly 500 gm & triturated in stone mortar & pestle, to a fine powder.

2. In first day 370 ml of lemon juice was added. The quantity was sufficient to immerse Tuttha fine powder.
3. Cautiously, the paste was subjected for continuous trituration, till juice was completely absorbed.
4. As lemon juice, in the paste was completely absorbed, it was considered as the completion of process.
5. Then again sufficient quantity of juice was added & mixture was triturated.
6. The same process was repeated for 5 days (15 hr.).
7. Each time, fresh lemon juice was used.

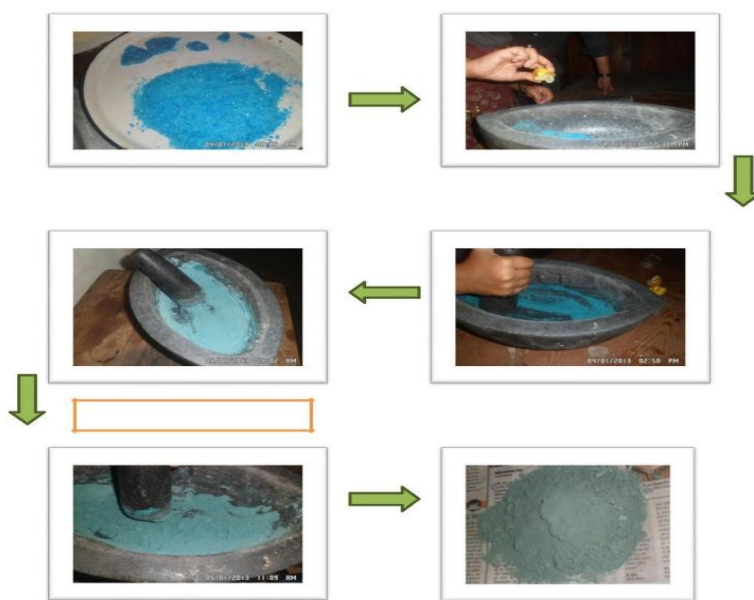


Fig. 2: Procedure of Tuttha Shodhana.

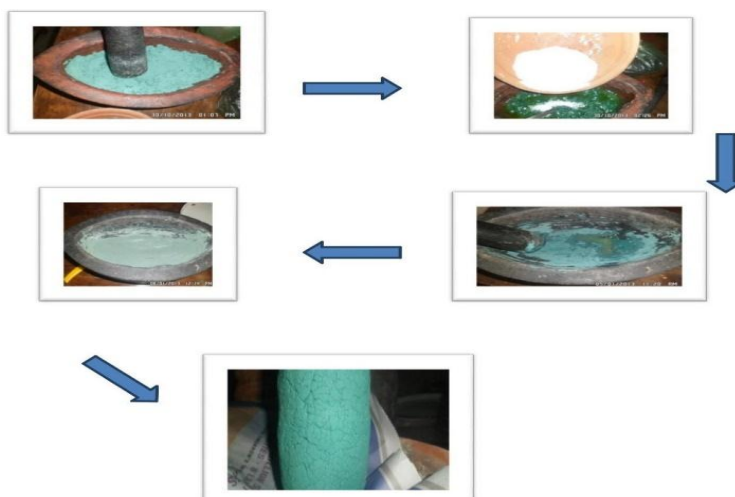


Fig. 3: Procedure of Ball formation.

OBSERVATION

The colour of Ashuddha Tuttha was deep blue which was changed after every bhavana. The colour of Tuttha became dull after each bhavana. The paste became smoother after each bhavana.

C. Tuttha Satvapatana

Tuttha Satvapatana was done according to Rasatarangini 21/137.^[7] The part is divided into 2 part: Ball (Pinda/Vataka) formation of Tuttha for Satvapatana and Tuttha Satvapatana.

(1) Ball (Pinda/Vataka) formation of Tuttha for Satvapatana**Procedure**

1. Shuddha Tuttha was weighed exactly 300 gm & equal quantity of Ashuddha Tankana (300 gm) triturated in stone mortar & pestle, to a very fine powder.
2. In first day 400 ml of lemon juice was added. The quantity was sufficient to immerse above mixture.
3. Cautiously, the paste was subjected for continuous trituration, till juice was completely absorbed.
4. As lemon juice, in the paste was completely absorbed, it was considered as the completion of process.
5. Then again sufficient quantity of juice was added & mixture was triturated.
6. The same process was repeated for 3 days (9hr.).
7. Each time, fresh lemon juice was used.
8. On Last day ball was prepared by triturated mixture.
9. Ball was dried against direct contact of sunlight.

(2) Tuttha Satvapatana**Procedure**

1. Crucible was prepared by wrapping 3 layers of cloth & clay on it, then drying in sunlight every time.
2. The crucible was filled with 1/2rd portion, i.e. 400 gm.
3. Crucible was closed by lid dish/pidhanaka having small hole in the centre of lid dish.
4. Sealing of joint of crucible with lid dish by wrapping cloth & clay and drying in sunlight.
5. In koshthi (Special prepared fire place) wood coal, cow dung and mine coal arranged in specific pattern. (In koshthi order of fuel arrangement was as follows below to above – wood coal, cow dung, mine coal, crucible, mine coal cow dung, wood coal)

6. Crucible kept in mid part of koshthi between fuels for getting proper heat.
7. After worshipping Lord Shiva and Nagarjuna heating was started with the help of continuous blowing by electric blower to make it intensive heat.
8. Temperature recorded after every 30 minute.
9. After 30 minute temperature in crucible were recorded 750°C.
10. After 5 hr. crucible seen red hot colour.
11. After 5.30 hour Tuttha started melting.
12. After starting of melting of Tuttha, process of removal of crucible and Abhisheka was done.
13. After Abhisheka crucible again kept in koshthi till total melting of ball was done.
14. Now crucible is left in koshthi for self-cooling.
15. Next day, when crucible became cool, then it was removed from koshthi.
16. Kapadamitti was removed & sealing of joint of crucible with lid dish was broken carefully.
17. Smelting material was carefully collected from crucible which was strongly adhered in bottom and surrounding of crucible.
18. Smelting material had crystalline (glass or plastic crystals) like appearance which contained shiny particle.
19. Now grinding of smelting material in stone mortar and pestle was done and Satva was identify as mentioned in conceptual study.

OBSERVATION

Fumes of sulphur (yellow colour with obnoxious odour) come out through centre hole of lid dish. That fumes gradually decreased and stopped to come out after 2hr of procedure. After 5hr. of procedure, crucible was seen with red hot colour and after it bluish colour flame appears. After this Tuttha started melting, blue flame increased (Bijavarta) & after then white flame appeared and gradually increased. After 2 hr. of bijavarta Tuttha completely melt and looked like lava. After self-cooling smelting material looked like glass/plastic were some bright shiny particle immersed, which was round and heavy in nature.

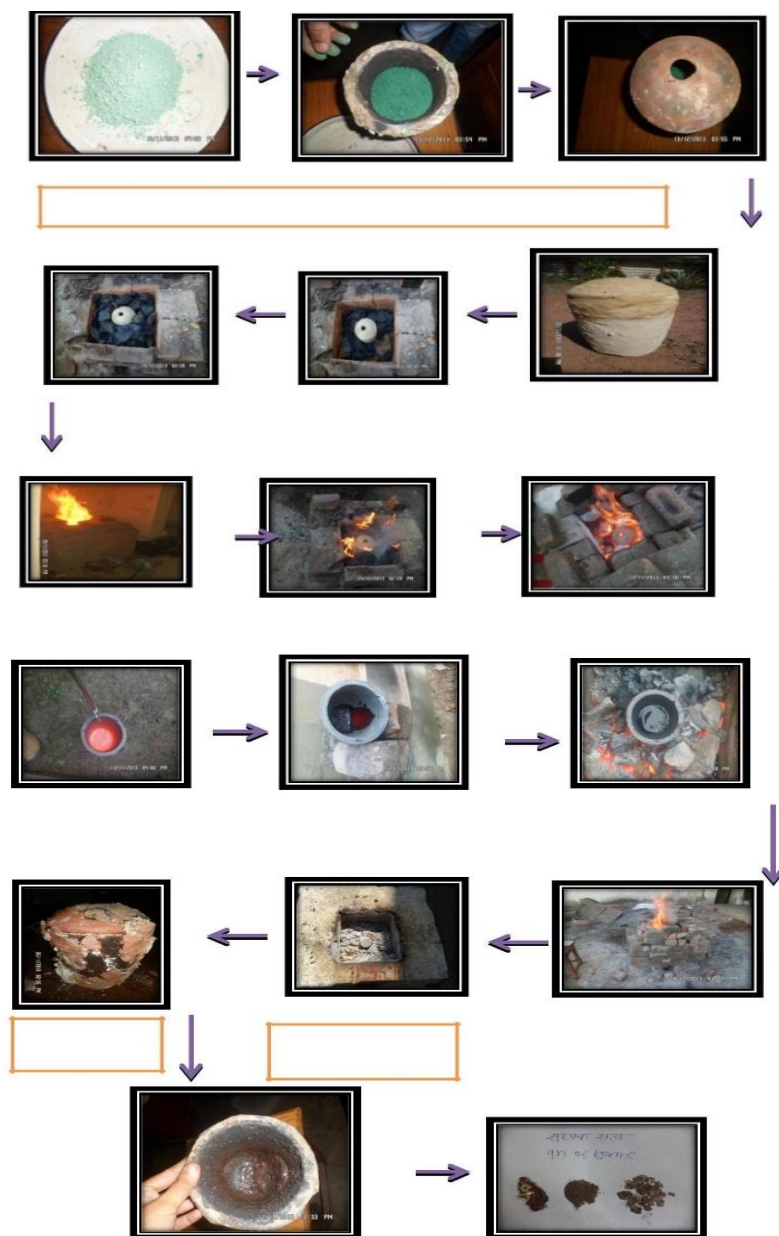


Fig. 4&5: Procedure of Tuttha Satvapatan.

RESULT AND DISCUSSION

For Nirmalikaran 1000gm Ashuddha Tuttha was taken and after process weight obtained 960 gm and Percentage yield was 96%. Time taken for nirmalikaran - 5 hours. Observations are shown in Table No.1.

For the process of Shodhana 500gm of Nirmalikrita Tuttha was taken and 640gm Tuttha yielded, which was 128%. Weight gain was 140 gm. Time taken for Shodhana 5 days. Findings are shown in Table No.2.

For Ball formation 600 gm of mixture was taken. Quantity of mixture obtained after ball formation - 710 gm. Total weight gain was 110gm which is 118.33%. Time taken for ball formation 4 days. Observations after Ball formation are shown in Table No.3.

For Satvapatana 120 gm of mixture/compound was taken. Temperature recorded & observations made during Tuttha Satvapatana are mentioned in Table No. 5. And Figure 6. Obtained Satva was 20gm. Percentage yield is 24%. Total time taken for preparation= 1 day (11.30 hr). Time required for swangasita was 1 day. Total fuel quantity used for Tuttha Satvapatana in one attempt of procedure is shown in Table No.4.

Table No. 1: Physical appearance on Nirmalikaarana.

Parameters	Ashuddha Tuttha	Nirmalikrita Tuttha
Appearance	Light shiny	Bright shiny
Colour	Blue	Darken blue
Touch	Hard	Hard
Smell	Sulphurous smell	Sulphurous smell

Table No. 2: Physical appearance on Shodhana.

Parameters	Ashuddha Tuttha	Shodhita Tuttha
Appearance	Stony hard	Powder
Colour	Bright Blue	Dull Blue
Touch	Hard & rough	Smooth
Smell	No smell	Smell of lemon

Table No. 3: Physical appearance on Ball formation.

Parameters	Mixture before trituration	Mixture After trituration
Appearance	Coarse Powder	Paste
Colour	light Blue	whitish Blue
Touch	Hard & rough	Smooth
Smell	No smell	Smell of lemon

Table No. 4: Total fuel quantity used for Tuttha Satvapatana.

Types of fuel	Quantity used in Tuttha Satvapatana
Mine Coal	20 Kg
Cow dung	6 Kg
Wood Coal	4 Kg
Wood	4 Kg
Total quantity	34 g

CONCLUSION

Satvapatana is a process of obtaining bright, pure, real, dense part of substance in downward direction. Whole aspect of Satvapatana (Musha, Sandhilepana, Khara - Mridu Satva, Koshtthi, Kokila, Vankanala, Bijavarta, Suddhavarta, Ekkolishikha, Musha-Aapyayan, Abhishek and Procedure of Satvapatana including Satvanam Mridukarnam, and important of Satvapatana is described in Rasratna Samuchchya but exact time of heating, number of heating, amount of fuel and temperature is not mentioned.

Table No. 5: Temperature recorded & observations made during Tuttha Satvapatana.

Time	Temp.	Observations
9.00am	30°c	Heating was started.
9:30	750°c	Mixture was dry & in ball form.
10:00	830°c	Mixture was dry & yellowish fumes started coming out.
10:30	900°c	Mixture was dry & yellowish fumes started coming out.
11:00	940°c	Yellowish fumes gradually decreased and stop to come out.
11:30	1150°c	Mixture became semi-liquid.
12:00	1200°c	Mixture still in semi-liquid state.
12:30	1250°c	Mixture still in semi-liquid state.
1:00	1250°c	Mixture still in semi-liquid state.
1:30	1250°c	Mixture still in semi-liquid state.
2:00	1260°c	Red hot of crucible.
2:30	1280°c	Smelting of mixture started & blue flame appear (Bijavarata) & fumes disappeared.

Crucible again kept on Koshtthi

3:00	1280°c	Removal of crucible and Abhisheka samskara done
3:30	1320°c	Smelting of mixture.
4:00	1320°c	White Flames appeared
4:30	1350°c	White Flame increased (Shuddhavarta) and mixture completely melt.
5:00	1000°c	Decrease of temperature.
5:30	900°c	Decrease of temperature.
6:00	830°c	Decrease of temperature.
6:30	750°c	Decrease of temperature.
7:00	700°c	Decrease of temperature.
7:30	700°c	Left for self-cooling.

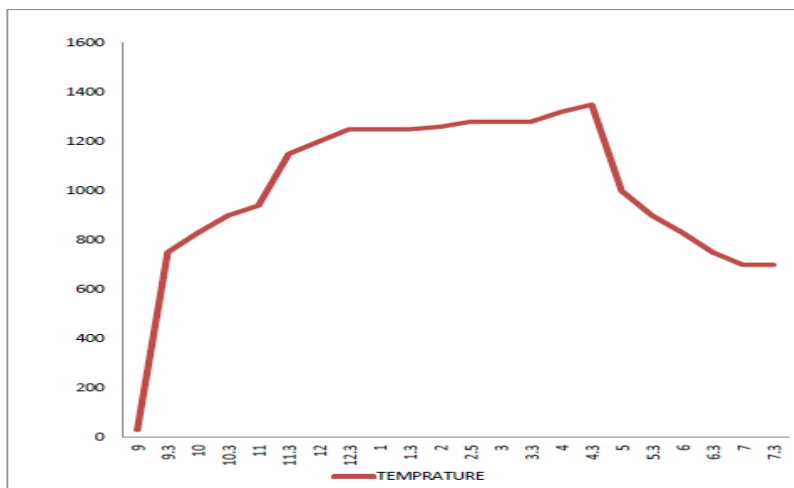


Fig. 6: Graphical presentation of Temperature pattern of Satvapatana.

Table No. 6: Appearance & Color of essence of Tuttha.

S. No.	Appearance & Color	References
1	Indragopasamkasham	R.A. 7/42, R.R. 13/74, R.R.S. 2/133, A.K. 2/255
2	Tamrarupam	R.P.S. 5/77, R.R.S. 2/134
3	Kinshukprabhama	R.R. 13/52
4	Kirtundasaprabhama	R.R. 13/55, A.T. 4/55, B.R.S.
5	Shobhanam	R.R. 13/74, B.R.S.
6	Tamrakam	A.P. 4/44
7	Tamramayam	B.R.R.S.
8	Tapayajsamam(Rakta & mridu)	R.H.T. 10/9 & 11
9	Shoditabindu	A.P. 4/56
10	Shukapicchanta	A.K. 2/251-252
11	Kanchanbindhubhi	A.K. 2/251-252

1. At 1280⁰C smelting of mixture started & blue flame appear i.e. Bijavarata.
2. At 1350⁰C white flame increased i.e. Shuddhavarta) and mixture completely melt.
3. After self-cooling smelting material looked like glass/plastic were some bright shiny particle immersed i.e. Satva.
4. Total yield of Satva was 24% from its raw material.
5. Weight gain after Shodhana was 28%.
6. Weight gain after ball formation was 18.33%.
7. Percentage yield of Satva was 24% after Satvapatana process.
8. Satva was bright, shiny particle were round in appearance.
9. Smelting material was obtained at bottom of crucible which was strongly adhered in bottom and surrounding of crucible.

10. Smelting material had crystalline (glass or plastic crystals) like appearance which contained shiny particle~Satva.

I found the appearance of essence~Satva same as per mentioned in different classics, which is discussed in Table No.6. In different text of Rasashastra Andha Musha (Blind crucible) is mentioned for Tuttha Satvapataan. But due to formation of Sulphur dioxide blind crucible get blast. So in Satvapataana procedure I have taken Andha Musha with a small hole in the center of lid dish which allows- (a) Observation of smelting process (b) Allow to Pass out of gases.

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