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Preparation of *Vaikrant Sattva* and its Physico-Chemical Analysis

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ABSTRACT

Rasa Shastra is the science having the twin aim of attaining *Deha siddhi* and *Loha siddhi*, but in the due course of time, this science has become more oriented towards *deha siddhi* and for the therapeutic purpose. *Vagbhat* in his comprehensive compilation *Rasa Ratna Sammucchay* has accredited second place to *Vaikrant* amongst the eight *rasas*. Amongst various types of *vaikrant*, *Krishna vaikrant* is used for *deha siddhi*. Even though the *sattva* bears more potency than *bhasma*, the actual usage of *sattva* in clinical practice is rare. This arouses a dire need to study the preparatory methods of *sattva* and its physico chemical analysis along with its merits and demerits.

KEYWORDS

Vaikrant, Sattvapatan, Black Tourmaline, Vaikrantsattva, Krishna Vaikrant



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INTRODUCTION

Rasa Shastra is a multifaceted spiritual science which virtually means the “science of *rasa*”. *Rasa Shastra* is the science having the twin aim of attaining *Deha siddhi* and *Loha siddhi*, but in the due course of time, this science became more oriented towards *deha siddhi* and for the therapeutic purpose¹. *Vagbhat* in his comprehensive compilation *Rasa Ratna Sammucchay* has accredited second place to *Vaikrant* amongst the eight *rasa*². *Vaikrant* gains its name from the fact that it can produce *vikruti* in *loha*³. Enumerating the virtues of *Krishna Vaikrant* it is mentioned as *dehasiddhikaram krishna*⁴. The *bhasma*, *sattva* and *druti* of various *rasa-dravyas* are utilized for the accomplishment of *deha siddhi* (medicinal use)⁵. In the present era, more focus is laid on the manufacturing process of *bhasma* and its application. And the other basic *siddhantas* of *sattva*, *bija* and *druti* remain unexplored. Even though the *sattva* bears more potency than its counterpart, the actual usage of *sattva* in clinical practice is rare. So far numerous studies have been done on *Vaikrant bhasma* but its *sattva* remains unexplored.

Study of the *Rasa* texts in chronological order reveals that the earlier *rasa* texts like *Rasendra Mangal*, *Rasa Hriday Tantra*,

Rasarnav have given more importance and explained *sattvapatan* procedure in detail as compared to the *marana* procedure. While the texts written in 12th century like *Rasendra Chudamani*, *Rasa Prakash Sudhakar*, *Goraksha Samhita* has imparted equal importance to *marana samskar* and *sattvapatan*. Compilation works done thereafter in 15th century gradually showed more inclination towards *marana* procedure and the *sattvapatan* was not much explained. This arouses a dire need to study the preparatory methods of *sattva* and its merits and demerits. Also the pharmaceutical applications and the utility of *sattva* need to be studied. This experimental study is a humble effort to boost use of *Vaikrant sattva* in practice.

AIM

Preparation of *Krishna Vaikrant sattva*.

OBJECTIVES

- 1) Identification of the *Krishna Vaikrant*.
- 2) To study *Krishna Vaikrant sattvapatan* procedure.
- 3) Physico- chemical analysis of *Krishna Vaikrant*.
- 4) Physico- chemical analysis of *Krishna Vaikrant sattva*.

MATERIALS

a. Literature review of *Vaikrant*, *sattva*, *sattvapatan* procedure from authentic *rasashastra* texts. Table 1.

Table 1 “Different references for *Vaikrant sattvapatan* procedure”

Sr.No.	Name Of Texts	References
1.	<i>RasendraMangal</i>	2/23-25
2.	<i>Rasarnav</i>	6/134-136
3.	<i>Rasa RatnaSammuchay</i>	2/69-71
4.	<i>Rasa Ratnakar-RiddhiKhanda</i>	13/63,64-66,67-69,70
5.	<i>Rasa HridayTantra</i>	10/4-5
6.	<i>Rasarnav</i>	6/132-133,136
7.	<i>Anandakanda</i>	8/182-184,185,186,187
8.	<i>Rasa Manjiri</i>	3/88-89
9.	<i>RasendraChudamani</i>	10/66
10.	<i>Ayurveda Prakash</i>	5/171,172-173
11.	<i>Rasa PrakashSudhakar</i>	5/66-69
12.	<i>Bruhat Rasa Raj Sundar</i>	Pg 209

b. *Shodhita Krishna Vaikrant* sample (Black Tourmaline)⁶. Figure No.1, Figure No.2.



Figure 1 “Raw Krishna Vaikrant”



Figure 2 “Shodhita Krishna Vaikrant”

c. *Shuddha Rakta Gunja* seeds, *Shuddha Guggulu*, *Shuddha Tankana*, *Goghrita* (cow ghee), *Madhu* (honey), *Guda* (jaggery).

d. *Koshti* for *hatagni* (*tivragni*) was built using fire bricks and fire clay; electric blower (was attached to the *koshti*).The dimensions of *koshti* used for *sattvapatan* of *Krishna Vaikrant* sample:

- i. Circumference of *koshti*=60 inches
- ii. Outer diameter of *koshti*=19inches
- iii. Inner diameter of *koshti*=10inches
- iv. Depth of *koshti* (within) =33inches
- v. Depth upto iron rods (within) =24inches

e. *Vajra Musha* (crucible), pair of tongs.

METHODS

This experimental study includes two parts as-

1. Pharmaceutical study
2. Analytical study

1. Pharmaceutical study:-

a. *Collection and authentication of materials.*

i. Authentication of *Shodhita Krishna Vaikrant*, *Shodhita Tankana*, *Shodhita Guggulu*, *Shodhita Rakta Gunja* seeds collected from our L.K.R.A.M. college pharmacy was done by the *Rasashastra* and



Bhaisjya kalpana dept. and *Dravyaguna* dept. of L.K.R.A.M.college.

ii. The sample of *Krishna Vaikrant* i.e., black tourmaline was authenticated again from the dept. of geology.

b. *Sattvapatan of Krishna Vaikrant*, that includes -

i. Preparation of *dravakagana*⁷:Figure3.



Figure 3 “*Dravakagana*”

Reference: R.R.S. 10/95

Material: *Khalvayantra*, Steel plates, Spoon, Measuring glass, weighing machine.

Ingredients: Table No.2

Table 2 “Ingredients of *Dravakagana*”

Sr.No.	Ingredient	Quantity
1.	<i>ShodhitaRaktangunja</i> (Botanical name: <i>Abrusprecatorius</i> Linn., Family: Leguminosae- Papilionatae, Part used: Seeds)	40 gms
2.	<i>ShodhitaGuggulu</i> (Botanical name: <i>Commiphoromukul</i> Engl., Family: Burseraceae, Part used: Gum Resin)	40 gms
3.	<i>ShodhitaTankana</i> (Borax, Latin name: Sodium pyro borate, Chemical formula: $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$)	40 gms
4.	<i>Goghruta</i> (Cow Ghee- Clarified butter)	40 gms
5.	<i>Guda</i> (Jaggery)	40 gms
6.	<i>Madhu</i> (Honey)	40 gms

Procedure:

1. *Shuddha Gunja* and *Shuddha Tankana* were grounded to a mixture.

2. This mixture was taken in *khalwayantra* and *guda* was added to this and triturated until properly mixed.

3. Then *Shuddha Guggulu* was added and triturated until it was properly mixed.

4. Afterwards *Goghruta* and *Madhu* were added to this mixture and triturated to obtain a soft paste like consistency.

ii. *Krishna Vaikrant sattvapatan* procedure as per R.R.S 2/72⁸: Figure No.4.



Figure 4 “*Sattvapattan in koshti with thermocouple*”

Reference:

“*Sattvapatanayogenmarditaschavatikrutah Mushastoghatikadhmatovaikrantaksatvautsr ujet*” [R.R.S. 2/72]

Material: *Khalwayantra*, *Musha*, Stainless steel spoons, Steel plates, Weighing



machine, Coal, Long iron pair of tongs, Electric blower, Thermocouple

Ingredients:

1. *Shodhita Krishna Vaikrant* (Black tourmaline) =200gms
2. *Dravaka Gana*= 200gms

Procedure:

1. The *Shodhita Krishna Vaikrant* in the above quantity and equal quantity of *Dravaka Gana* was added in *khalwayantra* and triturated to mix them well.
2. Then *chakrika* were prepared from the mixture and weighed.
3. Afterwards the *chakrika* were kept in *musha*.

Table 3 “*Grahya sattva lakshana*”

Sr.No.	Name Of Text	Reference	SattvaLakshana
1.	<i>Rasa HridayTantra</i>	10/5	<i>Sphulingaakara, Muktanikarpraaya, LohaNibhama</i>
2.	<i>Rasarnav</i>	6/136	<i>Indragopasama</i>
3.	<i>Rasa Ratnakar- RiddhiKhanda</i>	13/67-69	<i>SankhakundaenduSamkasham, RajatvadBhavet</i>

9. When the *musha* attained room temperature, the contents within the *musha* were scrapped and collected in steel vessel.
10. The collected scrapped material was separated into *sattva*, *kitta* and ash and stored in separate containers for analysis. The *sattva* was collected according to the *sattva grahya lakshana*. Table no.3

Observations:

1. Thermocouple used in the practical had its upper limit of 1400°C.

4. In the *koshti* 1 kg charcoal was placed over the iron rods and saw dust was sprinkled over it and set on fire.
5. With the help of electric blower the fire was augmented.
6. Then slowly 3 kg of coal was added into the *koshti*, which begun to burn briskly within 5 minutes.
7. The *musha* was then kept in burning coal in *koshti* for 24 mins in such a way that the burning coal does not mix with contents of *musha*.
8. At the end of 24 minutes the *musha* was taken out of *koshti* with the help of long iron tongs and allowed to cool.

2. After 2 mins of *musha*'s placement in *koshti*, the temperature rose upto 1050°C.
3. Then after within another 1-2 min, *musha* with its contents appeared red hot in colour and the contents within *musha* began to melt from the periphery.
4. Within 6-8 min, smelting process begun in *musha*. Figure 5.



Figure 5 “*Koshti with sattva smelting from Krishna Vaikrant chakrikas*”

2. Analytical study: -This includes Physico-chemical analysis of *Krishna Vaikrant* and *Krishna Vaikrantsattva*.

A. *Physical analysis:*

➤ *Megascopic Examination of Crude*

Krishna Vaikrant sample:

- Colour = Black
- Streak = Colourless
- Luster = Vitreous
- Diaphanity = Opaque
- Cleavage = Rhombohedral; Difficult
- Fracture = Uneven to subconchoidal
- Hardness = 7 to 7.5
- Form = prismatic crystals three-sided in cross section, with Hexagonal prism and

trigonal prism, terminated by trigonal pyramid; hemimorphic; needle like radiating groups of crystals.

- Crystal system = Hexagonal, trigonal (rhombohedral) division
- Class = Ditrigonal – pyramidal, hemimorphic
- Type Mineral = Tourmaline
- Occurrence = In pegmatite, in association with quartz, feldspar, mica etc., collected from Kadaval.

➤ *Organoleptic tests:* Table No.4

B. *Chemical analysis:* Table No.5

Table 4 “Organoleptic tests results”

Sr.No.	Name of test	Ashodhit Vaikrant	Shodhit Vaikrant	Vaikrant sattva
1.	<i>Sabdha</i>	--	--	--
2.	<i>Sparsha</i>	<i>Kathina , Slakshna</i>	<i>Kathina, Slakshna</i>	<i>Kathina, Slakshna</i>
3.	<i>Rupa</i>	Shining black colour	Shining black colour	Shining silver colour
4.	<i>Rasa</i>	Tasteless	Tasteless	Tasteless
5.	<i>Gandha</i>	<i>Nirgandha</i>	<i>Nirgandha</i>	<i>Nirgandha</i>

Table 5 “Chemical analysis results”

Sr. No	Parameters	Sample 1 (in %)	Sample 2 (in %)	Sample 3 (in %)	Sample 4 (in %)	Sample 5 (in %)
1.	Moisture content	0.34	0.62	0.29	0.27	0.23
2.	Ash content	95.12	94.78	96.31	95.88	95.89
3.	SiO₂ content	58.79	58.24	57.38	56.81	57.46
4.	Al₂O₃	21.08	21.92	21.63	22.16	22.76
5.	Fe₂O₃	0.34	0.37	0.89	0.42	1.34
6.	MnO	<0.1	<0.1	<0.1	<0.1	<0.1
7.	MgO	0.18	0.21	0.20	0.26	0.28
8.	CaO	0.16	0.165	0.18	0.17	0.21
9.	Na₂O	4.68	4.72	4.89	5.02	5.12
10.	K₂O	5.67	5.94	5.98	6.04	6.88

Sample 1: Crude *Vaikrant Sample*

Sample 2: *Shodhit Vaikrant Sample*

Sample 3: *Vaikrant Sattva Sample-I* (small shining balls of metals)

Sample 4: *Vaikrant Sattva* Sample-II (*kitta*)

Sample 5: *Vaikrant Sattvapatan* Ash



Figure 6 “Obtained *Krishna Vaikrant Sattva* according to *sattva grahya lakshana*”

RESULTS

a) Physical Analysis:

As per the *grahya lakshana* of *Vaikrant sattva* mentioned in classical texts, we have found the following observations in our practical:

➤ *Grahya lakshanas* observed in obtained *Krishna Vaikrant sattva* were: *Muktanikarpraay*, *rajatvadbhavet*. Figure no.6.

➤ The obtained *sattva* was shining silvery white ball- like structures and the raw *tourmaline* was blackish smooth hexagonal structure.

b) Chemical Analysis:

1. **Moisture Content:** The moisture content of raw *Krishna Vaikrant* sample was 0.34%, after *shodhan* it increased to 0.62% and after *sattvapatan* the moisture content

reduced considerably. In *sattva* (small shining metal balls) it was 0.29%, in *kitta* it was 0.27 % and in the *sattvapatan* ash it was least 0.23%.

2. **Ash content:** The ash content of raw *Krishna Vaikrant* was 95.12%, *shodhita Krishna Vaikrant* showed 94.78% ash, *sattva*, *kitta* and *sattvapatan* ash had 96.31%, 95.88% and 95.89% ash content, respectively.

3. **SiO₂ content:** The SiO₂ content in raw *Krishna Vaikrant* was 58.79%, after *shodhan* it was 58.24% and *sattva*, *kitta* and *sattvapatan* ash had 57.38%, 56.81% and 57.46% SiO₂ content, respectively.

4. **Al₂O₃ content:** Al₂O₃ in raw *Krishna Vaikrant* was 21.08%, after *shodhan* it was 21.92%, in *sattva* it was 21.63%, in *kitta* it was 22.16% and ash contained 22.76% Al₂O₃.

5. **Fe₂O₃ content:** Raw *Krishna Vaikrant* sample had 0.34% Fe₂O₃, *shodhita Krishna Vaikrant* had 0.37%, *sattva* had 0.89%, *kitta* had 0.42%, *sattvapatan* ash had 1.34%.

6. **MnO content:** All the samples contained less than 0.1% MnO.

7. **MgO content:** MgO in raw *Krishna Vaikrant* was 0.18%, after *shodhan* it was



0.21%, in *sattva* it was 0.20%, in *kitta* it was 0.26% and ash contained 0.28% MgO.

8. **CaO content:** Raw *Krishna Vaikrant* sample had 0.16%, *shodhita Krishna Vaikrant* had 0.165%, *sattva* had 0.18%, *kitta* had 0.17%, *sattvapatan* ash had 0.21%.

9. **Na₂O content:** Raw *Krishna Vaikrant* sample had 4.68% Na₂O, *shodhita Krishna Vaikrant* had 4.72%, *sattva* had 4.89%, *kitta* had 5.02%, *sattvapatan* ash had 5.12%.

10. **K₂O content:** K₂O content was minimum in raw *Krishna Vaikrant* sample with only 5.67%, after *shodhan* it increased upto 5.94, *sattva* had 5.98%, *kitta* had 6.04% and *sattvapatan* ash had 6.88% K₂O.

DISCUSSION

Sattvapatan is an important process that beholds a solid niche in *rasa karma* for *dehasiddhi* and *lohasiddhi* as *Vaikrant*, *kanta*, *sasyak*, *makshik*, *vimal* etc., even after being *shuddha* do not participate in *dwanda* formation nor does *parad do* their *grasa* unless they are in *sattva* form. The minerals that occur in crude natural form are explained in *rasa shastra* with context to *grahya lakshana*, and to extract the essence of these minerals *sattvapatan* procedure is explained. And the *sattva* thus gained is

used in various further processes like *bija nirman*, *jaran samskar*, and different *parad banda* and for *rasayan* purpose⁹. Also the *sattva* is subjected to *maran* and used for medicinal purpose.

Vaikrant sattvapatan:

The *Vaikrant sattvapatan* was conducted according to the R.R.S. 2/72. Here it is necessary to understand the meaning of the above verse to explore the *sattvapatan* procedure from practical point of view.

➤ ***Sattvapatan* yog:** In this context *rasa Vagbhat* in R.R.S 8/34 has explained that *kshara varga*, *amla varga* and *dravaka gana* are used for the *sattvapatan* of *rasa*, *maharasa* etc. Further in R.R.S 10/95 he has defined *dravaka gana* by *guda*, *guggulu*, *gunja*, *goghru*, *madhu* and *tankana*¹⁰. *Rasarnavam* in 5th patala, 43rd verse explains the importance of *amla dravya* being *prabodhak*, *kshardravya* being *malahar*, *visha dravya* being *tamohagnani* and *sneha dravya* being *mardavkara*¹¹. The contents of the *dravaka gana* possess all the above merits, so this *dravaka gana* has been used in the *Krishna Vaikrant sattvapatan* practical.

➤ ***Marditashchvatikrut:*** Trituration of *Krishna Vaikrant* and *dravaka gana* was carried out to mix them properly, so that *vati*



or *chakrika* can be formed properly from them.

➤ **Mushasthohatikadhmatto:** As already mentioned black tourmaline is taken as *Krishna Vaikrant* for *sattvapatan* procedure. Tourmaline is a type of “Igneous rock” and is formed through the cooling and solidification of magma¹². So very high temperature is required for melting tourmaline and hence the *musha* used in the practical was such that it can sustain more than 1500°C temperature. According to *Man paribhasha Ghatika* means 24 mins¹³. So the *musha* was subjected to *tivragni* in *koshti* for 24 mins. The time limit 24 min may have been told to avoid the reaction between the *musha* and the melted *Vaikrant chakrikas*. The word “*dhmaato*” here is used specifically to point out the fact that continuous *tivragni* is required throughout the *sattvapatan* process for the extraction of *sattva*. To fulfil this requirement the *koshti* was built such that it can produce and sustain more than 1500°C and the electric blower was affixed to the *koshti* to attain continuous high degree temperature. The coal was used as fuel to generate such high amount of heat.

➤ **Vaikrant sattvamutsrujet:** When the *chakrikas* are subjected to high degree temperature (more than 1500°C) for 24 min

they start melting. During this melting process the *sattva* smelts from the *chakrikas*.

➤ **Agni Samskar on Vaikrant:** In the process of *sattvapatan* we triturate the *Krishna Vaikrant* with *dravakagana* and then do *agnisamskar* in *koshti*. *Charakacharya* in context of *samskar* has explained¹⁴:

“*Samskarohigunanantaradhanaamuchyate* |
” (*Ch.Sa.Vi. 1st chp*)

Here because of the *mardana* with *dravakagana* and *agni samskar* the properties like *sukshamatva*, *laghutva*, *ashukaritva*, *vyavayi guna*, *vikashi guna* are developed in the *Vaikrant sattva*. Because of the virtue of these developed *gunas Vaikrant sattva* becomes assimilable by the *jatharagni*.

CONCLUSION

The physical analysis of Raw *Krishna Vaikrant*, *shodita Krishna Vaikrant*, *Krishna Vaikrant sattva* was done. There was insignificant change in raw *Krishna Vaikrant* and *shodhita Krishna Vaikrant*. There were significant changes seen in *Krishna Vaikrant* after *sattvapatan*. The changes seen were as:

➤ Colour: Black colour of *shodita Krishna Vaikrant* changes to shiny silver *sattva*.

➤ Appearance: hexagonal elongated structure of *shodita Krishna Vaikrant* changed to oblong – spherical structure of *sattva*.

➤ The obtained *sattva* was examined for the *grahya lakshana* of *sattva* as per the classical references and found to possess those *lakshanas*.

The chemical analysis of raw *Krishna Vaikrant*, *shodita Krishna Vaikrant*, *Krishna Vaikrant sattva*, *kitta* and *sattvapatan* ash was done. All the samples show presence of SiO_2 , Al_2O_3 , Fe_2O_3 , MnO , MgO , CaO , Na_2O , K_2O in variable percentage. The obtained *Krishna Vaikrant sattva* contains more amount of SiO_2 i.e 57.38% and Al_2O_3 i.e., 21.63%. It also contains Fe_2O_3 , MnO , MgO , CaO , Na_2O , K_2O in lesser quantity.



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