



PREPARATION AND SHODHANA METHODS OF RASA KARPURA (MERCURIC CHLORIDE)

Dr. Pradeep Kumar Jain

Lecturer & Head,
Department of Rasa Shastra and
Bhaishajya Kalpana, Bundelkhand
Govt. Ayurvedic College & Hospital,
Jhansi (Uttar Pradesh) India.

Dr. Vishnu Prasad Gautam

Associate Professor & Head, Department
of Rasa Shastra and Bhaishajya Kalpana,
MSM Institute of Ayurveda, BPS Women's
University, Khanpur Kalan, Sonapat
(Haryana) India.

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*Correspondence for Author

Dr. Pradeep Kumar Jain

Lecturer & Head,
Dept. of R. S. & B. K.,
Bundelkhand Govt. Ayurvedic
College, Jhansi (U.P.) India.
e-mail: drpradeepjain.md@gmail.com

ABSTRACT

Rasa Karpura is a well known and popular non-sulphur compound of Ayurvedic mercurial preparation. Chemically Rasa Karpura is a mercuric chloride. Highly toxic, corrosive to mucous membranes. Ingestion may cause severe nausea, vomiting, hematemesis, abdominal pain, diarrhoea, malena, renal damage, prostration. 1-2 gm is frequently fatal, poisoning and death also have occurred from intra uterine douches.

Toxicity study revealed that Mercuric Chloride in therapeutic doses proved to be least toxic. It must be used after its proper purification; otherwise it may be harmful or toxic for the body. After Shodhana of Rasa Karpura is used therapeutically for bacteriostatic and bactericidal effect. This Research work is completed in NIA, Jaipur in 2006.

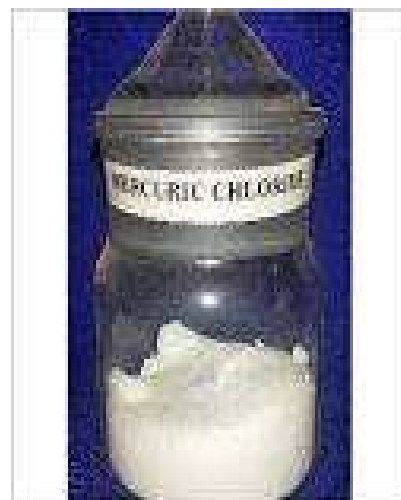
KEYWORDS:

Rasa Karpura, Mercuric Chloride, Toxicity, Shodhana, Therapeutic use of Mercury products, Antimicrobial properties of Mercuric Chloride.

INTRODUCTION:

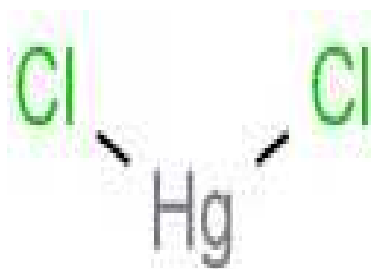


Needle shaped (*Suchyakrity*)



Crystalline powder form

IMAGES OF RASAKARPURA (MERCURIC CHLORIDE)



RASAKARPURA (Mercuric Chloride)⁽¹⁾

| | | |
|--------------------------|---|---|
| Synonyms | : | Mercury bi Chloride, Corrosive sublimate, Mercury per Chloride, Corrosive Mercury Chloride. |
| Sanskrit | : | <i>Rasa-Vidhu, Rasa Karpura, Rasa-Chandra</i> ⁽²⁾ |
| Chemical Symbol | : | HgCl ₂ |
| Molecular Weight | : | 271.52 |
| Composition | : | Hg – 73.88%, Cl – 26.12% |
| pH | : | 4.7 |
| Density | : | 5.4 |
| Sublimation point | : | 300 ⁰ C |
| M.P. | : | 277 ⁰ C |

Rasa Karpura is a well known and popular non sulphur compound of Ayurvedic mercurial preparation. There are nearly 45 formulae of *Rasa Karpura* available in literature. Historically its formula was found mentioned since 10th century A.D. initially by **Rasarnava**⁽³⁾. But *Bhava Mishra* first coined the term *Rasa Karpura* for *Phiranga Roga* (Venereal diseases) in 16th century A.D. All these formulae have sulphate compounds in them. Which are likely to produce standard quality of *Rasa Karpura*. Chemists also proved that chlorides of Mercuric or Mercurous must be prepared with sulphates of mercuric or Mercurous Salts.

Twenty Nine compound preparations (*Yogas*) of *Rasa karpura* are found mentioned in Ayurvedic literature. In 20th Century texts sulphuric acid was found used in different proportions for the preparation of *Rasa Karpura* instead of *Kasisa*, *Tuttha* and *Sphatika* etc. ingredients recommended in ancient texts in formula of *Rasa Karpura*.

Hence Ayurvedic scholars of 20th century have designed such formulae in which Mercury first gets reacted with Con. H₂SO₄ to convert into Mercuric or Mercurous Sulphate and then with NaCl to get converted into Mercuric or Mercurous Chloride.

CHEMICAL STUDY:

There are different opinions of *Rasa Karpura*'s chemical composition. According to Vaidya Sri. V.M. Dwivedi, Pandit Girija Dayalu Sukla Shastri, Dr. Siddhi Nandana Misra, Dr. Ajit S. Patel and Pandit Viswanath Dwivedi, *Rasa Karpura* is Mercuric Chloride.

Whereas Dr. Vaman Ganesh Desai, Dr. Nadakarni and Kaviraj Dr. Prabhakar Chatarjee described it as Mercurous Chloride so there is a lot of controversy while studying the chemical composition of *Rasa Karpura*. Dr. G. Prabhakar Rao (B.H.U.) practically proved in his thesis in 1991 that chemically *Rasa Karpura* is a Mercuric Chloride and the best quality of *Rasa Karpura* could be prepared with 1½ part concentrated Sulphuric acid and with equal part *Saindhava Lavana* (Sodium Chloride). But if Sulphuric acid is taken ½ parts to Mercury then final product will be Mercurous Chloride.

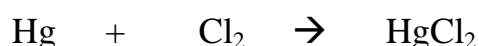
PROPERTIES

It is found in form of heavy, colourless or white, odourless, crystalline powder or crystalline masses. It volatilizes unchanged at about 300°C and also slightly volatile at ordinary temperature appreciably so at 100°C.

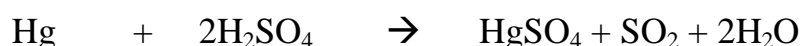
Solubility : 1 gm dissolves in 13.5 ml. hot water.

PREPARATION OF MERCURIC CHLORIDE

It may be prepared by heating Mercury in a current of Chlorine.



It is commercially prepared by heating Mercuric Sulphate with an equal quantity of Sodium Chloride in the presence of little MnO₂. Mercuric Sulphate needed is obtained by evaporating a solution of Mercury in hot concentrated Sulphuric Acid.



The mixture is heated in a long neck, round bottom flask when Mercuric Chloride sublimes and collects in the upper cooler parts. MnO₂ prevents the formation of any Mercurous Sulphate.

I Preparation of *Rasakarpura*⁽⁴⁾

Rasa Karpura is prepared in two steps

- Preparation of Intermediary Product (Mercury powder-HgSO₄) of *Rasa Karpura* (*Jarana of Gandhakamla in Parada*)
- Preparation of *Rasa Karpura* in *Valuka Yantra*.

(a) Preparation of Intermediary Product (Mercury powder) of *Rasa Karpura*-

Ingredients : *Shudha Parada* - 100 gm
: *Gandhakamla (Sandra)* - 150 ml

(Con.H₂SO₄)

Equipments : Glass beaker, Measuring cylinder, Glass rod, Tripod-Stand, Wire gauze, Gas-stove etc.

Procedure

- ❖ The purified Mercury was taken in a glass beaker and then Sulphuric acid (*Gandhkamla*) was added to it.
- ❖ The beaker was placed on tripod stand over wire gauze. The heat was given with gas-stove (Low flame). It was stirred well with the glass rod and mixture attained the shape of a paste.
- ❖ The heating was done for 6 Hours per day for 7 days.
- ❖ The Mercury converted into powder form was collected carefully and stored in deccicator.

Results (Quantitative Measures)

- ❖ The finished product (HgSO₄) was obtained in a quantity of 162 gms.
- ❖ The excess of weight 62 gms. may be attributed to the reaction of mercury with sulphuric acid.

(b) Preparation of *Rasa Karpura* in *Valuka Yantra*-

Equipments : *Valuka Yantra*, Glass rod, *Kanch Kupi*, *KhalvaYantra* etc.

Ingredients : Mercury powder (Intermediate product) - 162 gm
: *Saindhava Lavana* (Roasted) - 162 gm.

Procedure

- ❖ Mercury powder and *Saindhava lavana* in equal proportion mixed well by triturating it for 1 hour in *khalva Yantra*.
- ❖ Then above powdered material was filled in a glass bottle which is covered with seven layers of mud smeared cloth. After it is kept in

Valuka Yantra. A *Abhraka* sheet is also kept to the bottom of the pot to resist the temperature directly to the glass bottle.

- ❖ Empty space is filled with sand up to the neck of the bottle so that heat is applied through sand only. Before the heating, a rod of thermocouple is kept in sand to measure the temperature.
- ❖ The *Valuka Yantra* with *kanch kupi* should be heated with mild, moderate and high temperatures required for it. Initially for 2 hours the temperature should be low (mild) (150⁰C-200⁰C) after getting the smoke and moisture evaporated the temperature may be raised to moderate heat and after complete loss of moisture, the temperature may be raised again to high temperature. In the end, *Valuka* should be removed from the neck of the bottle up to 2 inches. The maximum temperature should be maintained till smoke ceases to appear from the mouth and material starts to collect at the neck.
- ❖ Then seal the mouth of the bottle by cork and *kapada mitti*. Then temperature should be increased gradually up to 450⁰C for 3 hours.

Observation

- ❖ The white coloured crystals containing needle like material and resembling with camphor was collected from the neck of the bottle and the residue remained at the bottom was discarded.

Results (Quantitative Measures)

- ❖ Total Heating time required for *Rasa Karpura* - 10 hours
- ❖ Total weight of *Rasa Karpura* from the neck - 100 gm
- ❖ Total weight of powdered material (whitish-gray colour)
Of the bottom of bottle - 183 gm
- ❖ Initial weight of mercury taken for preparation
Of *Rasa Karpura* - 100 gm

Note

- ❖ The prepared *Rasa Karpura* was collected from the neck of bottle with the help of hot water. Then, this *Rasa Karpura* was dissolved into hot

water and evaporated, needle shaped crystal of *Rasa Karpura* was obtained, these crystals collected in a porcelain pot, then kept a funnel opposite in porcelain pot. Sublime the material of *Rasa Karpura* at very low temperature up to 80°C. After complete sublimation of *Rasa Karpura*, it was kept for self cooling and collects the *Rasa Karpura*.

TOXIC EFFECT:

Highly toxic, corrosive to mucous membranes. Ingestion may cause severe nausea, vomiting, hematemesis, abdominal pain, diarrhoea, malena, renal damage, prostration. 1-2 gm is frequently fatal, poisoning and death also have occurred from intra uterine douches.

Toxicity study revealed that mercuric chloride in therapeutic doses proved to be least toxic.

PURIFICATION METHODS OF *RASA KARPURA* (ACCORDING TO AYURVEDA) :

Methods of purification of *Rasa Karpura* are described in many texts. It must be use after its proper purification otherwise it may be harmful or toxic for the body. So purification methods are summarized as below –

1. According to *Rasa Yoga Sagar* the purification of *Rasa Karpura* is described under the formulation of *Bhandya Rasa*. In this preparation, *Rasa Karpura* is kept in the fruit of *Averrhoa carambola* Linn. (*Kamarakha*) and heated in cow's dung cakes until it dries. This method is applied repeatedly for 8 times⁽⁵⁾.
2. According to *S.B.M.M.* in the treatment of *Sujakoupadansha*, *Rasa Karpura* is purified by heating it into the iron pot which contains *Gharita* for 3 *Prahara* (9 Hours) at low temperature⁽⁶⁾.
3. In the quantity of 1.5 *Tola* *Rasa Karpura* is mixed into the *Gharita* in an iron pot, and then heated it by adding with *Prakshepa* of total 10 *Tola* of *Syzygium aromaticum* Linn. (*Lavanga*) powder for 108 times in minutest quantity. Ignite the material by the burning flame and then covered by the

- lid. So that the flame extinguished, then take the material out and cover it by cow dung properly. Lastly wash it with water⁽⁷⁾.
4. A *pottali* containing 4 *tola Rasa Karpura* is suspended in the *Dola Yantra* containing 1 *Prastha* of lime water (*Churnoudaka*). Heat it till water evaporates on a low flame⁽⁸⁾.
 5. Heat *Rasa Karpura* in a *Dola Yantra* containing 16 times *Gharita* at low temperature for 12 hours⁽⁹⁾.
 6. Take 10 gm of *Rasa Karpura* in Muslin cloth and cook it with the 250 gm leaves of *Sphaeranthus indicus* (*Mundi*) in 1 Lit. *hukka's* water until half of water is left⁽¹⁰⁾.
 7. Make a *pottali* of *Rasa Karpura* and heat it in cow milk containing 250 gm of *Cannabis sativa* Linn. (Indian hemp/*Bhanga*) until 1/3 of milk is remaining left⁽¹⁰⁾.
 8. Take *Rasa Karpura* in a muslin cloth and heat it in honey. Repeat this procedure for 2 to 4 times⁽¹⁰⁾.
 9. For purification of *Rasa Karpura* take 10 gm of *Rasa Karpura* with 250 gm of *Gogharita*. Put this mixture in *Sharava* and then *Samputa* it for *Satva Patana*⁽¹⁰⁾.
 10. Remove the nut shell of Date (*Phoenix dactylifera* Linn.) and refill it with *Rasa Karpura*, then it should be tied with the thread. Make a ball (baati) of Wheat flour with *Snuhi Ksheer*. (Milk of *Euphorbia neriifolia* Linn.). Keep the date inside the ball (baati) and heat it as *Putra Paka*. Repeat this procedure. Then collect the *Rasa Karpura* from it and use it for treatment. In this procedure water soluble part of *Rasa Karpura* may be absorb by date fruit and remaining part is *Rasa Pushpa*. *Rasa Pushpa* is less toxic in internal use. (*Anubhuta*)

ANTIMICROBIAL PROPERTIES:

Anti bacterial study proved that *Rasa Karpura* is bacteriostatic and bacteriocidal effect and it is found most effective against diarrhoeagenic bacteria and

Pseudomonas Auriginosa which is one of the most resistant bacteria in hospital environment.

ABSORPTION AND EXCRETION:

Mercuric Chloride is readily absorbed from the gastro – intestinal tract and its effects are usually evident within 10 – 15 minutes.

Excretion of Mercuric salts immediately after absorption, mainly by way of the kidney and colon and to a lesser extent via the bile and saliva. Small amounts are also excreted in volatile elemental form through both the lungs and the skin. Most of the Mercury is excreted within 6 days after administration but traces may be detected for months, even years.

THERAPEUTIC USES:

1. Mercuric Chloride is an antibacterial substance. To some extent its effect can be reserved by sulphadryl compounds.
2. 0.1 % solution was formerly used as a disinfectant for skin.
3. Solutions of 0.001 to 0.025 % were formerly used for cleansing wounds and 0.001 % solutions for vaginal irrigation. Stronger concentration should not be applied to raw surfaces or mucous membranes because Mercuric Chloride is rapidly absorbed may cause acute toxicity.

DOSE:

A 1/64 – 1/32 Ratti⁽¹¹⁾ (2-4 mg)

B

| | |
|-------------------------|----------------|
| <i>Suddha Navasadar</i> | <i>5 Ratti</i> |
| <i>Rasa Karpura</i> | <i>5 Ratti</i> |
| <i>Sheetal Jala</i> | <i>60 Tola</i> |

Dose – 30-60 drops orally⁽¹²⁾

C

Dalchini Churna

5 Masa

Rasa Karpura

1 Ratti

Bhavana with Nimbukamla

Dose – 1 Ratti⁽¹³⁾

CONCLUSION AND RESULTS:

Rasa Karpura is a white colour substance of mercurial preparation of Chloride. It is chemically Mercuric Chloride. It dissolves in to hot water. It is very toxic and corrosive sublimate, so it is used in Ayurveda in very lesser dose after proper *Shodhana*. It is used in 2 to 4 mg with other Ayurvedic drugs like *Dalchini powder*, *Navasadar*, Water etc. It is not used as single drug. It is used externally as well as internally with caution. In Ayurveda *Rasa Karpura* is prepared in 2 steps. It is concluded that 100 gm quantity of *Rasa Karpura* is derived from same quantity of *Parada* (Mercury).

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