IAMJ

INTERNATIONAL AYURVEDIC MEDICAL JOURNAL

Research Article ISSN: 2320-5091 Impact Factor: 6.719

# AN AMELIORATIVE STANDARD OPERATING PROCEDURE (S.O.P) OF DIURETIC AYURVEDIC DRUG TANKANA (BORAX) PURIFICATION

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https://doi.org/10.46607/iamj0312052024

**(Published Online: May 2024)**

**Open Access**

**Article Received:** 11/04/2024 - **Peer Reviewed:** 29/04/2024 - **Accepted for Publication:** 13/05/2024.

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## ABSTRACT

**Background-** Purified *Tankana* (Borax) is widely used in daily clinical practice. *Tankana* (Borax) is also known for its forced diuretic action, antidotal activity against schedule "E" irritant poison and as a chelating agent against heavy metal poisoning. 500 gm unpurified *Tankana* (Borax) was collected from the West Bengal (India) local market and identified as a raw product. Then *Tankana* (Borax) authenticated critical macroscopic and organoleptic study and analysis at Sri Dharmasthala Manjunatheshwara College of Ayurveda Pharmacy, Hassan, Karnataka (India). Tankana Sodhan was done in the Department of Rasa Shastra, Sri Dharmasthala Manjunatheshwara College of Ayurveda, Hassan, Karnataka (India). Authentication Reference-SDMCAH/MD (Ayu)/SINO-03/2017. *Tankana* (Borax) purification is done with the help of Standard Operating Procedure.

Our study aimed to present a unique and ameliorative approach to the standard purification process of Tankana (Borax). This approach, detailed in our research, offers a new perspective on the purification of Tankana (Borax) and its implications in Ayurvedic medicine.

Observation and Result—The purification process significantly impacted the properties of Tankana (Borax). After the process, Tankana (Borax) lost 50% of its total weight. This study revealed that we obtained 250gm of purified Tankana (Borax) out of the initial 500gm of unpurified Tankana (Borax). This finding underscores the transformative effect of the purification process on the substance.

Conclusion—The purification process is genuinely transformative for Tankana (Borax). The crystalline, unpurified raw product changes remarkably into a puffy white powder. This process results in a significant weight loss of the raw unpurified Tankana (Borax), which we attribute to the evaporation of water and the elimination of other unwanted harmful substances. This finding piques our curiosity about the potential implications for clinical practice and pharmaceutical applications.

**Keywords:** S.O.P, Borax, Toxicity, Diuretic, Antidote

## INTRODUCTION

*Tankana* is a borax mineral ($Na_2B_4O_7$, 10 $H_2O$) known as Tincal[1]**.** *Tankana* (Borax) have quality likes- *visha marana*[1] (Anti poisonous activity), *sthavara visha nasak*[2] (antidotal activity against irritant plant poison), *tridosha nashak*, diuretic properties. Tankana (borax) is a joint chelating agent that subsides heavy metal poisoning[3]. Ancient Ayurveda classics- Ayurved Prakash[4] and Rasendra Chintamani[5], *Tankana* (Borax), and Ghrita (Clarified cow butter) are indicated in any poisoning. It is a concept of the Universal Antidote in poisoning treatment. *Tankana* (Borax) is also used to make buffer solutions in biochemistry, as a fire retardant, as an antifungal compound agent, as a flux in metallurgy, Neutron capture shields for radioactive sources, as a texturing agent in cooking and as a precursor for other boron compounds. *Tankana* (Borax) is a component of many detergents, cosmetics, and enamel glazes. However, improper purification and adulteration by Pharma Industries and Industries West products of Tankana (Borax) lead to public health hazards like – Vomiting, Giddiness, Palpitation and other subacute and chronic toxicological symptoms. So, for the betterment of human beings, it's necessary to purify the *Tankana* (Borax) before therapeutic administration. So, this study was conducted to guide the Standard Operating Procedure (S.O.P)

**Synonyms[6]:**

| **Language** | **Name** |
|---|---|
| Sanskrit | Tankana, Tanga, Tanka, Saubhāgya |
| Bengali | Sohāgā |
| English | Borax, Tincal |
| Gujarati | Tankana Khāra, Khadiyo Khāra |
| Hindi | Suhāgā |
| Kannada | Biligāra, Belgār |
| Malayalam | Pongaaram |
| Marathi | Tankana Khāra |
| Punjabi | Sohāgā |
| Tamil | Venkaram (S.F.I.) |
| Telugu | Veligāram |
| Urdu | Tankar, Suhaga (N.F.U.M.) |

**Origin and occurrence:**

*Tankana* occurs as deposits from volcanic emanations (fumaroles) and hot springs and is dried up in shallow basins (Playa) or saline lakes. It occurs mainly in the waters of various saline lakes in the salt deposits formed through the evaporation of such lakes. The origin of *Tankana* involves simple concentration and evaporation, accompanied by some chemical and mineralogical transformations to give rise to *Tankana* (borax). As an evaporating mineral, it occurs and is associated with halites, sulphates, carbonates, and other borates like ulexite and colemanite.

Economically workable deposits of *Tankana* have not yet been discovered in India, and the domestic need is met by imports of crude borates, which are refined to produce Tankana and boric acid. However, a small quantity of Tankana has been obtained from salt lakes in the Leh district of Jammu and Kashmir and Tibet since early times, where it occurs today also. Non-exploitable occurrences of *Tankana* are known in Surendranagar district in Gujarat and Jaipur and Nagaur districts in Rajasthan.

**Available Formulations in Market:** *Ānandabhairava rasa, Candrāmrta rasa, Icchābhedi rasa, Saubhāgya vatī, Tribhuvanakīrti rasa, Mrtyunjay rasa, Tankanaamrita malahar, Pratapalankeshwara rasa, Kanaksundara rasa* and *Trailokyacintamani rasa*.

**Therapeutic Indication[7]:** Kāsa (cough), Śvāsa (Asthma), Vāta roga (diseases due to Vāta dosa), Sthāvara visa (poisoning by plant or mineral), Ādhmāna (flatulence with gurgling sound), Vrana (wound/ulcer).

**Dose of Tankana:** 125 - 250 mg

**Adjuvant of Tankana:** Honey, Water, Milk

**Properties and Actions:**

*Rasa – Katu; Guna - Rūksa, Ushna, Tikta, Sāraka Virya - Usna Vipaka – Katu; Karma - Hridya, Balya, Sāraka, Kapha nissāraka, Dipan, Strī puspajanana, Mūkhagarbhapravartaka*.

**METHODOLOGY:** *Tankana* was collected from the local market in West Bengal (India), authenticated, and analysed at Sri Dharmasthala Manjunatheshwara College of Ayurveda Pharmacy, Hassan, Karnataka (India). Tankana sodhan was done in the Department of Rasa Shastra, Sri Dharmasthala Manjunatheshwara College of Ayurveda, Hassan, Karnataka (India).

***Tankana* analysis reports:**

| | | | |
|---|---|---|---|
| Nature | | | Crystalline lumps |
| Colour | | | White |
| Streak | | | White |
| Cleavage | | | Poor |
| Fracture | | | Conchoidal |
| Lustre | | | Vitreous |
| Tenacity | | | Brittle |
| Transparency | | | Translucent |
| Hardness | | | 2 to 2.55 |
| Sp. Gr. | | | 1.65 to 1.70 |
| Taste | | | Sweetish alkaline in taste |

**Optical properties**: Biaxial, Negative, with ηα, 1.447, ηβ, 1.469 and ηγ, 1.472

**Chemical Properties:**

**Effect of Heat:** Tankana bubbles up and fuses to a clear glassy bead when heated on a burner flame using a blowpipe. It colours the flame yellow due to sodium, and when moistened with sulphuric acid and alcohol, it gives a green flame due to boron.

**Reaction with acids:** In cold conditions, hydrochloric acid gives a yellow solution that dissolves thoroughly when boiled. In cold conditions, sulphuric acid gives a colourless solution that dissolves thoroughly when boiled.

**Solubility in water:** *Tankana* is entirely soluble in purified water, producing an alkaline solution as tested by a red litmus paper turning blue.

**Assay:** The raw tankana sample contained less than 35% B2O3 (Boron trioxide) and 14.89 % Sodium (Na).

**Heavy metals and Arsenic:** It was found that *Tankana* does not contain more than the stated limits for the following: - Arsenic = 5 ppm and Cadmium = 4 ppm.

**SOP of Tankana purification:**

500 g *Tankana* (Borax) was purchased from the West Bengal local market and authenticated at Sri Dharmasthala Manjunatheshwara College of Ayurveda Pharmacy, Hassan. Then, the *Tankana* (Borax) was made into fine powder in a mortar and pestle under an aseptic technique at the department of Rasasastra, Sri Dharmasthala Manjunatheshwara College of Ayurveda Hassan, Karnataka, India. After that, the raw powder was kept in a pan, heated with mild fire and then subjected to moderate. After 30 minutes, some sound came.1st, it was sticky, then it became light white powder. The final product was 250 g in weight. Then, the powder was preserved in an airtight container. After purification, 50% of the weight of the Tankana was reduced due to the evaporation of water from the *tankana.*

**OBSERVATIONS & RESULTS:**

| Parameters | Observations |
|---|---|
| Before purification Tankana | 500gm |
| After purification Tankana | 250gm |
| Loss of raw drug | 250gm |
| After 30 minutes of purification | some crackling sound came, and it became sticky |
| Total duration of the purification procedure | 90 min |
| Final product | White-coloured puffy powder |

**Chemical analysis of before and after purification of Tankana (Borax):** Raw *Tankana* and Purified samples separately 01gm were transferred into 250 ml flask mixed with distilled water and shaken till the sample dissolved in distilled water.

## DISCUSSION & CONCLUSION

In this study, we found that before purification, the raw product was 500gm in weight and solid Crystalline in nature. However, after purification with the S.O.P technique, the final product lost its weight due to the evaporation of the water portion from the product above. The final purified product weighed 250gm and was puffy white powder in nature. It easily dissolves in distilled water.

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**Source of Support: Nil**
**Conflict of Interest: None Declared**

How to cite this URL: Sourav Ballav & Gouranga Maity: An ameliorative standard operating procedure (s.o.p) of diuretic ayurvedic drug tankana (borax) purification. International Ayurvedic Medical Journal {online} 2024 {cited May 2024} Available from: http://www.iamj.in/posts/images/upload/846_851.pdf


**Figure-1-**Raw product before purification.

**Figure-2-**Raw product in Mortar pestle.

**Figure-3-**Product during the purifying process.


**Figure-4**-Final product after purification.

**ACKNOWLEDGEMENT—The Author would like to acknowledge Professor (Dr.) Ashwinkumar S Bharati, Department of Agadtantra SDMCAH, Department of RSBK SDMCAH, Dr Sourav Rang, Department of RSBK NEIAH,** and Dr Sourav Pal.