Research Article

www.ijrap.net

(ISSN Online:2229–3566, ISSN Print:2277–4343)

EXPLORING JWALA PARIKSHA IN THE CONTEXT OF TAMRA SHODHANA

Anjali Arya [1]*, Shuchi Mitra [2], Usha Sharma [3], Khem Chand Sharma [4]

[1] PG Scholar, PG Department of Rasa Shastra and Bhaishajya Kalpana, Uttarakhand Ayurved University, Rishikul Campus, Haridwar, Uttarakhand, India

[2] Associate Professor, PG Department of Rasa Shastra and Bhaishajya Kalpana, Uttarakhand Ayurved University, Rishikul Campus, Haridwar, Uttarakhand, India

[3] Professor, PG Department of Rasa Shastra and Bhaishajya Kalpana, Uttarakhand Ayurved University, Rishikul Campus, Haridwar, Uttarakhand, India

[4] Professor and HOD, PG Department of Rasa Shastra and Bhaishajya Kalpana, Uttarakhand Ayurved University, Rishikul Campus, Haridwar, Uttarakhand, India

Received on: 13/5/26 Accepted on: 02/7/26

***Corresponding author**
E-mail: vaidyaanjali75@gmail.com

DOI: 10.7897/2277-4343.174134

ABSTRACT

The present study aimed to evaluate the classical concept of Jwala Pariksha in Tamra (Copper) and explore its relevance in light of modern flame-based analytical principles. Tamra (Copper) was subjected to Samanya and Vishesha Shodhana as per classical Rasashastra procedures, and flame characteristics were observed during the process. Consistent appearance of blue to blue-green flames corresponded with the classical description of Neela Jwala (Blue flame) for Tamra (Copper). Associated physical changes during Shodhana were documented as supportive observations. The findings validate the practical significance of Jwala Pariksha and demonstrate its correlation with modern concepts of flame emission and copper oxidation. The study highlights that classical parameters described in Rasagranthas reflect empirically grounded metallurgical observations and retain scientific relevance in contemporary Rasashastra practice.

Keywords: Jwala Pariksha, Tamra, Copper, Shodhana

INTRODUCTION

Jwala Pariksha, is a traditional qualitative approach for identifying substances based on their characteristic behaviour in flame. The concept is elaborated in the fourth Patala of Rasarnava, where Devi Parvati inquires of Lord Shiva regarding Yantra (equipments), Musha (crucibles), and Agnimana (patterns of heat).[1] in response, Lord Shiva explains the distinct flame colours produced by specific dravya when heated in a Musha. The text describes Peet varna for Swarna (gold), Sita for Rajata (silver), Neel for Tamra (copper), Krishna for Tikshanaloha, Kapota varna for Vanga (tin), Malin Dhumavarna for Naga (lead), Dhusara for Shilajatu, Kapila for Ayas, Dhumra for Ayasakanta lauha, Lohitavarna for Sasyaka, Nanavidha varna(many colors) for Vajra (diamond), and Pandura varna for Abhraka Satva.[2] Although rooted in traditional practice, the conceptual basis of Jwala Pariksha shows notable parallels with modern analytical techniques such as the flame test and flame photometry.

The flame test is a rapid and simple qualitative method used for the preliminary identification of certain metals operating on the principle of atomic emission spectroscopy. In this, a metal salt is introduced into a flame; thermal energy excites the metal ions to higher energy states. As the excited ions return to their ground state, they emit light of characteristic wavelengths, producing distinct flame colours. The observed colour may also vary depending on flame temperature and oxygen supply. The sensitivity of the flame test is limited; the presence of other elements may interfere with results. Therefore, it is generally employed as a preliminary tool alongside more precise analytical techniques.

Flame photometry, also known as flame emission spectroscopy, is a related quantitative technique used to determine the concentration of certain metals, particularly alkali and alkaline earth metals. Using a flame photometer, which comprises a flame source, sample introduction system, and detector, the sample is aspirated into the flame, where the atoms are excited and subsequently emit light. The emitted radiation is measured using detector. The intensity of emitted light is directly proportional to the concentration of the element present in the sample. Owing to its sensitivity and relative simplicity, flame photometry is widely applied in environmental monitoring, clinical chemistry, and industrial quality control.[3]

Rasarnava specifically mentions the production of a bluish flame in the case of Tamra (Copper) when subjected to heating. From a modern scientific perspective, when copper or copper-containing samples are introduced into a flame, copper atoms absorb thermal energy and become excited. Upon returning to the ground state, they emit light of characteristic wavelengths corresponding to the energy difference between excited and ground states. The intensity of this emission correlates with the concentration of copper present. Furthermore, copper exists in different oxidation states, namely Cu (I) and Cu (II), each producing distinct flame colours. Cu (I) typically emits blue light, whereas Cu (II) imparts a green colouration to the flame. Thus, the observed colour and its intensity may provide insight into both the concentration and oxidation state of copper, establishing a meaningful scientific correlation with the principles described in Jwala Pariksha.

MATERIAL AND METHODS

Samanya shodhana of Tamra (Copper) was done as per Rasa Ratna Samucchaya. Special emphasis is done to the Jwala Pariksha during heating of Tamra (Copper).[4]

Equipment: Long-handled ladle, LPG gas stove, sieve, stainless steel vessel, pair of tongs, weighing machine, measuring jar, spatula, trays

Ingredients: Raw Tamra: 1000gm, Tila taila (sesame oil), Takra (buttermilk), Gomutra (cow urine), Kanji (sour gruel), Kulattha kwatha (horsegram decoction): Q.S

Procurement: Raw copper strings were procured from Moradabad, Uttar Pradesh, and subsequently authenticated at Vasu Research Centre, Makarpura, Vadodara, Gujarat. Elemental analysis of the copper scraps was carried out using Inductively Coupled Plasma Mass Spectrometry (ICP-MS). As per the analytical report, the sample contained 98.95% copper, along with trace elements including zinc (51.531 ppm), silver (104.45 ppm), and gold (187.25 ppm). Tila Taila (sesame oil) was extracted from black sesame seeds procured from Joshimath, Uttarakhand. Takra (buttermilk) and Gomutra (cow urine) were collected from local vendors and a cow shed, respectively. Kanji (sour gruel) was prepared according to the reference described in Rasayana Sara.[5] Kulattha (*Dolichos biflorus* Linn.) was procured from the local market of Haridwar. All herbal materials were identified and authenticated in the Post Graduate Department of Dravya Guna, Rishikul Ayurvedic College, Haridwar, Uttarakhand, India.

Procedure (Samanya Shodhana of Tamra): Raw Tamra (Copper) was taken in a long-handled ladle, heated up to red hot and then immediately immersed in Tila taila. The same process was repeated seven times in each liquid medium. Each time, fresh liquid was used for Quenching.[6]

Procedure (Vishesha Shodhana of Tamra): Samanya Shodhita tamra (Copper) is mixed with Saindhava Lavana (rock salt), tied in pottali and dipped in a vessel containing freshly collected Gomutra (cow urine). This Dola yantra is kept on high heat for straight 6 hours for boiling. More Gomutra (cow urine) is added when the volume goes down.


Figure 1: Raw copper scraps


Figure 2: Heating till red hot


Figure 3: Quenching in Tila Taila


Figure 4: After quenching in Tila Taila


Figure 5: Heating till red hot


Figure 6: Quenching in Takra


Figure 7: After quenching in Takra


Figure 8: Heating till red hot


Figure 10: Quenching in Gomutra


Figure 11: After quenching in Gomutra


Figure 12: Heating till red hot


Figure 13: Quenching in kanji


Figure 14: After quenching in Kanji


Figure 15: Heating till red hot


Figure 16: Quenching in Kulattha Kwatha


Figure 17: After quenching in Kulattha Kwatha

Vishesha Shodhana of Tamra


Figure 18: Samanya shodhita Tamra + Saindhava


Figure 19: Pottali tied in muslin cloth


Figure 20: Swedana in Gomutra


Figure 21: After swedana for continuous 6 hours


Figure 22: Shodhita Tamra

RESULTS

Initially, the tamra (Copper) scraps were bright, shiny, copper-red coloured; on heating, the colour of the scraps changed to blackish copper Red due to oxidation. Lustre was decreased significantly. A bright blue-orange flame was observed, which indicates the oxidation state of copper as (Cu_2O). Tila Taila was yellow colored initially, afterwards changed to brown. High flames and black smoke were observed during successive heating. The obtained blackish tamra scraps were heated again and quenched in takra. Black colored powder of copper was seen floating over the surface of takra. A bright orange-blue-orange flame was observed, which indicates the oxidation state of copper as (Cu_2O). Takra was white colored initially; afterwards, it changed to white-yellowish, and it also curdled after quenching of tamra. The obtained blackish tamra straps were heated and quenched in gomutra. When tamra was removed from gomutra, it again appeared copper-red coloured but with no lustre. After drying, it turned blackish again. A bright green-coloured flame was observed, which indicates the oxidation state of copper as (CuO). The gomutra colour changed from yellow to brown. Instant Boiling of gomutra and a hissing sound were observed during Quenching. Blackish copper scraps were obtained when heated and quenched in Kanji; a yellow coating of haridra deposited over it, which eventually gets removed after drying. Till this step, about 20% of the scraps turned into powder. A bright blue mixed with green colored flame was observed, which indicates the oxidation states of copper as (Cu_2O) and (CuO). Gomutra was yellow before; after quenching, it turned a little brownish. After quenching in Kulattha Kwatha, about 30% of scraps became powder, while the remaining scraps were easily breakable when applied pressure. Bright blue orange colored flame was observed that detects the oxidation state of copper as (Cu_2O). Kulattha Kwatha turned a little more reddish after quenching.

Table 1: Colour and Weight Changes in Tamra (Copper) Before after Nirvapa

Media	Colour of tamra and media before nirvapa	Colour of tamra and media after nirvapa	Avg weight of tamra before nirvapa	Avg weight of tamra after nirvapa	Avg weight changes (in Tamra)
Tila Taila	Copper Red, Light Yellow	Black coated copper red, Light brown	1000gm	1250gm	+250gm
Takra	Black coated copper red, White	Black coated copper red, white yellow	1250gm	940gm	-100gm
Gomutra	Black coated copper red, Light Yellow	Black, dark reddish	940gm	900gm	-30gm
Kanji	Black, Yellow	Black, Brown	900gm	880gm	-20gm
Kulattha Kwatha	Black, Reddish	Black, dark reddish	880gm	850gm	-50gm

Table 2: Weight Changes in Tamra (Copper) after Vishesha Shodhana

Avg weight of Samanya Shodhita Tamra	Avg weight of Gomutra	Avg weight loss	Avg weight loss (%)
850gm	9 litres	20gm	830gm

During the Vishesha Shodhana of Tamra, the appearance of froth over Gomutra was observed approximately 10 minutes after the initiation of boiling. The temperature of Gomutra was consistently maintained between 96°C and 102°C throughout the procedure. Following completion of Swedana, Tamra (Copper) exhibited a greenish-black discolouration. Concurrently, the colour of Gomutra changed to blackish green and developed a pronounced pungent odour.

A portion of powdered Tamra (Copper) was found settled at the base of the vessel and became intermixed with the white froth of Gomutra, making its complete recovery difficult. The weight loss of Tamra (Copper) observed after Vishesha Shodhana is presented in Table 2.

DISCUSSION

Shodhana in Ayurveda is defined as "Shodhana karma vijneyam dravya dosha nivaranam", i.e., the process that eliminates blemishes is termed Shodhana[1]. It denotes the separation of unwanted materials, removal of defects, and enhancement of the inherent therapeutic properties of a substance. Two types of Shodhana are described: Samanya Shodhana and Vishesha Shodhana[2].

Samanya Shodhana is a general method employed for the purification of a group of drugs. It eliminates common impurities of metals and minerals and renders them into a suitable powdered form for further pharmaceutical processing. In the present context, continuous quenching in media such as Taila, Takra, Gomutra, Kanji, and Kulattha Kwatha converted Tamra (Copper) into a powdered form. By the completion of the quenching process, approximately 30% of copper was transformed into fine powder, while the remaining portion became brittle, facilitating further processing.

Vishesha Shodhana is a specific purification procedure adopted for individual metals or minerals to remove particular impurities[3]. In the case of Dhatu, classical references mention that Vishesha Shodhana aids in the elimination of heavy metals such as lead. During Vishesha Shodhana of Tamra (Copper), the medium Gomutra exhibited a distinct colour change from yellowish-brown to dark brown mixed with a bluish tinge, which may indicate the ongoing purification process.

An additional significant observation is the flame colour produced during the heating of copper. Jwala Pariksha, described in the classical text Rasarnava, elaborates the characteristic flame patterns of different metals and minerals[4]. Jwala Pariksha refers to the specific colouration exhibited by substances upon heating. The flame colour depends upon the oxidation state of the metal or mineral and the availability of oxygen. Copper, upon heating, exhibits two stable oxidation states: Copper (I) and Copper (II). Copper (I), known as cuprous oxide or red oxide of copper (Cu_2O), is formed at high temperatures (approximately 600-700°C). The flame colour observed during the formation of this oxide is typically blue. The chemical reaction involved is as follows:

$$4Cu + O_2 — 2Cu_2O$$

The other oxide formed is Copper (II), known as cupric oxide or the black solid oxide of copper (CuO). This oxide is formed at approximately 600-700°C and is associated with green flame colouration. During the heating of Tamra (Copper), both red oxide (Cu_2O) and black oxide (CuO) were formed, as evidenced by the observation of blue and green flame patterns, respectively. A similar description of flame colouration for copper is documented in Rasarnava, which supports the classical correlation of Jwala Pariksha findings with practical observations.

Quenching refers to the rapid cooling of a heated workpiece in media such as water, oil, gas, polymer solutions, or air to obtain desired material properties. It involves abrupt temperature reduction, thereby minimizing the time available for phase transformations to occur. In the present study, repeated quenching of Tamra (Copper) contributed to a reduction in crystal grain size, accompanied by an increase in brittleness. This structural modification facilitates further pharmaceutical processing, particularly for Bhasmikarana.

CONCLUSION

A significant weight loss of approximately 170 g was observed in Tamra (Copper) during the entire Shodhana process. This reduction indicates the removal of specific impurities while simultaneously rendering the material progressively brittle and powdered, thereby making it suitable for subsequent incineration procedures.

REFERENCES

1. Tripathi I, Rasarnavam, Chaukhamba Amarbharti Prakashan, Varanasi, 4thEdition, 2009, Chapter 4, Verse 1.
2. Tripathi I, Rasarnavam, Chaukhamba Amarbharti Prakashan, Varanasi, 4thEdition, 2009, Chapter 4, Verse 49-51.
3. Modern chemistry correlation: General principles of flame photometry and emission spectroscopy. (n.d.). In Standard text of instrumental methods of analysis. New Delhi: CBS Publishers
4. Shri Acharya Vagbhata Virachita, Rasa Ratna Samuchchaya, Hindi Commentary by Kaviraj Shri Ambikadutta Shastri, Chaukhamba Amarbharti Prakashan, Varanasi, 10th Edition 2014, Chapter 5, Verse 29.
5. Vaishya P.S.S, Rasayanasara, Chowkhamba Krishnadas Academy, Varanasi, Edition 2005, Part 1, Paribhasha Prakrana, Verse 55-60, P 59.
6. Honwad SV, Patil MB, Dedge MC. Shodhana methods and their suitability (heating and dipping–Tapana and Nisechana). Int J Res Ayurveda Pharm. 2012;3(1):52-56.

Cite this article as:

Anjali Arya, Shuchi Mitra, Usha Sharma and Khem Chand Sharma. Exploring Jwala pariksha in the context of Tamra shodhana. Int. J. Res. Ayurveda Pharm. 2026;17(4):46-49
doi: http://dx.doi.org/10.7897/2277-4343.174134