



Research Article

UNVEILING THE SIGNIFICANCE OF SHODHAN WITH SPECIAL EMPHASIS ON SAMANYA SHODHANA OF PITTALA

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ABSTRACT

Shodhana, a crucial procedure in the pharmaceutical preparation of metals and minerals, aims to eliminate impurities and undesirable properties from raw materials, rendering them suitable for further processing. This study focuses on *Samanya Shodhana* of *Pittala*, a *Mishra Loha*, following the guidelines outlined in *Rasa Ratna Samucchya*. The process involves heating raw *Pittala* until red-hot and subsequently quenching it in *Tila Taila*, *Takra*, *Gomutra*, *Kanji*, and *Kulatha Kwatha* for seven iterations. Post-*Shodhana*, observations were made regarding the weight loss of *Pittala*, as well as pH and color changes in the respective liquid media. Results indicate a total weight loss of 7.0% in *Pittala* after *Samanya Shodhana*, suggesting effective impurity eradication.

INTRODUCTION


Metals are abundantly found in nature, yet only a select few are acknowledged for their medicinal properties. Ancient texts categorize these metals under "Dhatu" (metal). Upon procurement, these metals undergo *Shodhana* (purification) and *Marana* (incineration) processes, ultimately being utilized in the form of *Bhasma*.^[1] In Rasa Shastra, most raw materials used for *Bhasma* preparation are of mineral or metal origin, which increases the likelihood of impurities, heterogeneity, and undesired qualities. The pharmaceutical procedures involved in *Bhasma* preparation, such as *Shodhana* (purification/processing), *Bhavana* (trituration), *Putta* (heating), and *Marana* (incineration), aim to purify the medicinal substance, eliminating toxicity and rendering it suitable for therapeutic use.^[2]

Shodhana is a process specifically designed to eliminate impurities from a substance. This multifaceted process involves various techniques such as *Kshalana* (washing), *Mardana* (pounding), *Bhavana* (levigation), *Swedana* (boiling), *Bharjana* (frying), *Nirvapa* (heating and dipping in specified liquids), and more.

These methods are employed on mineral drugs to ensure thorough purification, thus enhancing the quality and efficacy of the final product.^[3] It is indeed a detoxification process aimed at eliminating physical and chemical blemishes as well as toxic materials from a substance. By undergoing *Shodhana*, the material becomes purified and devoid of impurities, rendering it suitable for further processing and utilization in various applications. This process enhances the material's overall quality and suitability for its intended purposes.^[4] *Pittala* has been classified as *Mishra Loha Varga*.^[5]

The objectives of *Shodhana* are multi-faceted and encompass several key aspects:

- 1. Elimination of Undesired Impurities:** *Shodhana* aims to remove physical and chemical impurities present in the material, ensuring its purity and quality.
- 2. Reduction or Removal of Toxicity:** By undergoing *Shodhana*, toxic substances within the material are minimized or eliminated, enhancing its safety for use.
- 3. Transformation of Material Properties:** *Shodhana* facilitates the transformation of hard and heterogeneous materials into softer, more brittle, and homogeneous forms. This transformation enhances the material's usability and effectiveness in various applications.
- 4. Optimization of Efficacy:** *Shodhana* is instrumental in potentiating the efficacy of the material by

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inducing desirable physicochemical changes and qualities. This process optimizes the material's therapeutic or functional properties, maximizing its beneficial effects.

Overall, *Shodhana* plays a crucial role in ensuring the purity, safety, and efficacy of materials, making them suitable for further processing and utilization in diverse fields such as medicine, manufacturing, and research.^[6]

Types of *Shodhana*^[7]

***Samanya Shodhana* (general purification)**

It is a common procedure used for drugs of a particular group where the drugs of a particular group are subjected to a similar procedure individually.

***Vishesha Shodhana* (specific purification)**

It is a specialized technique or procedure employed for a single particular drug individually.

MATERIAL AND METHODS

In this study, *Samanya Shodhana* of *Pittala* was done as per mentioned in *Rasa Ratna Samucchya*.^[8]

Equipment

Long-handled ladle, lpg gas stove, sieve, stainless steel vessel, pair of tongs, weighing machine, measuring jar, spatula.

Ingredients

Raw *Pittala*: 500 gm, *Tila taila*, *Takra*, *Gomutra*, *Kanji*, and *Kulattha Kwatha*: Q.S.

Procedure

Raw *Pittala*, sourced from Moradabad, was subjected to *Shodhana* process. Initially, it was placed on a long-handled stainless-steel ladle and heated over a gas stove until reaching a red-hot state. Subsequently, it was sequentially quenched seven times in *Tila Taila*, followed by *Takra*, *Gomutra*, *Kanji*, and *Kulattha Kwatha*, with each liquid medium utilized for seven iterations. Following each heating and quenching cycle, *Pittala* was promptly collected from the liquid medium, thoroughly washed with hot water, and then dried. This rigorous procedure was repeated seven times, with fresh quantities of the same liquid media used each time. Throughout the process, the records were maintained, documenting the weight of *Pittala* and the volume of liquid media after each quenching cycle. The entire *Shodhana* process spanned a duration of 15 days.



Raw *Pittala*



Heating till red hot



Quenching in *Tila Taila*



After quenching in *Tila Taila*



Takra



Quenching in *Takra*



Figure 1: Samanya Shodhana of Pittala

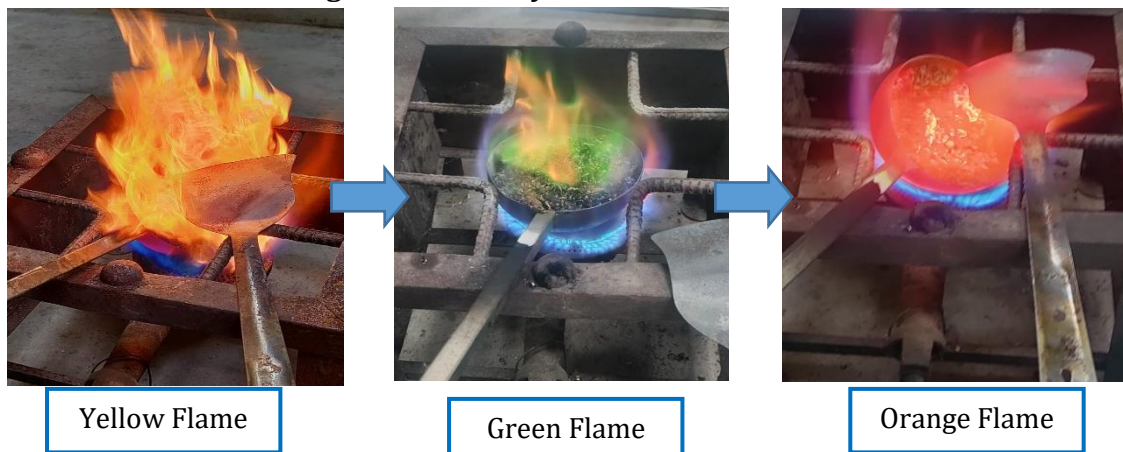


Figure 2: The colour of flames observed while heating *Pittala*

RESULTS

Observations

A) Shodhana in Tila Taila

In Pittala: Throughout the *Shodhana* process, notable transformations were observed in the physical characteristics of *Pittala*. Initially bright yellow, the color gradually transitioned to black. The metallic luster of *Pittala* diminished, and certain portions even exhibited powdering after the initial phase of heating post the seventh quenching. Notably, a distinct hissing sound accompanied the heating process. Additionally, during the fifth quenching, an initial green flame was observed, subsequently transitioning to yellow as combustion ensued. Despite thorough washing with hot water, some residual oil persisted on *Pittala* surfaces, contributing to an increase in weight.

In media: Concurrently, transformations were evident in the liquid media utilized during the *Shodhana* process. The color of the oil shifted from light yellow to light brown, with an increase in viscosity post-*Shodhana*. On observation, the oil exhibited combustible properties during quenching, emitting dense fumes upon ignition. Moreover, a pungent odor accompanied by a surge of black fumes was witnessed post-quenching.

Time taken in the quenching process: The average time taken during the quenching of *Pittala* in *Tila Taila* is 13 minutes and 46 seconds.

B) Shodhana in Takra

In Pittala: As the quenching process commenced, a distinct hissing sound resonated, indicative of the interaction between *Pittala* and the liquid medium. A vibrant deep yellow flame emerged during the quenching phase, gradually diminishing as *Pittala* transitioned to a red-hot state.

In media: The liquid medium exhibited dynamic behavior during quenching, with noticeable boiling observed. During this process, separation occurred, with the formation of solid and liquid phases, the former settling down. A smoky odor emanated during quenching, likely stemming from the interaction between the liquid medium and *Pittala*. The fine particles of *Pittala* suspended in *Takra* posed challenges during collection due to the medium's viscosity.

Time taken in the quenching process: The average time taken during the quenching of *Pittala* in *Takra* is 07 minutes and 45 seconds.

C) Shodhana in Gomutra

In Pittala: The color of *Pittala* underwent a significant transformation from black to jet black following the quenching process. Post-quenching, *Pittala* emitted a

distinct odor reminiscent of *Gomutra*. Remarkably, a portion of *Pittala*, approximately one-fourth, fractured into small pieces, while the remaining portion became coarse powder, indicative of changes in its structural integrity. Furthermore, the brittleness of *Pittala* exhibited an increase subsequent to *Shodhana*.

In Media: *Gomutra* exhibited intriguing behavior during the *Nirvapa* (quenching) process, boiling vigorously yet remaining contained within the vessel. *Gomutra* transitioned from its initial light yellow hue to a dark-reddish brown color. Additionally, a pungent odor characteristic of *Gomutra* was discernible throughout the quenching process.

Time taken in the quenching process: The average time taken during the quenching of *Pittala* in *Gomutra* is 09 minutes and 28 seconds.

D) Shodhana in Kanji

In Pittala: During the heating of *Pittala*, an initial green flame was observed, which transitioned gradually to yellow before ultimately turning orange. The metal underwent a note-worthy change in its physical properties, becoming more brittle and prone to breakage. Concurrently, the color of *Pittala* shifted to a blackish hue, with powdery residue accumulating at the base of the vessel. Post-quenching, a distinctive aroma characteristic of *Kanji* permeated the environment.

In Media: Throughout the *Nirvapa* process, *Kanji* exhibited vigorous boiling while remaining contained within its vessel. This boiling action did not result in spillage. Moreover, the color of *Kanji* transformed a yellowish hue to a deep brown shade.

Time taken in the quenching process: The average time taken during the quenching of *Pittala* in *Kanji* is 08 minutes and 48 seconds.

E) Shodhana in Kulattha Kwatha

In Pittala: The brittleness of *Pittala* intensified further, rendering it easily breakable. Following quenching, *Pittala* transitioned in color from black to reddish black. A distinct aroma reminiscent of *Kulattha Kwatha* emanated after the quenching process. Separating *Pittala* from the liquid media proved to be more challenging due to the presence of powdered *Pittala* residue.

In Media: *Kulattha Kwatha* underwent boiling during the *Nirvapa* process. After quenching, *Kulattha Kwatha* lost its original color, transitioning to a dark red hue.

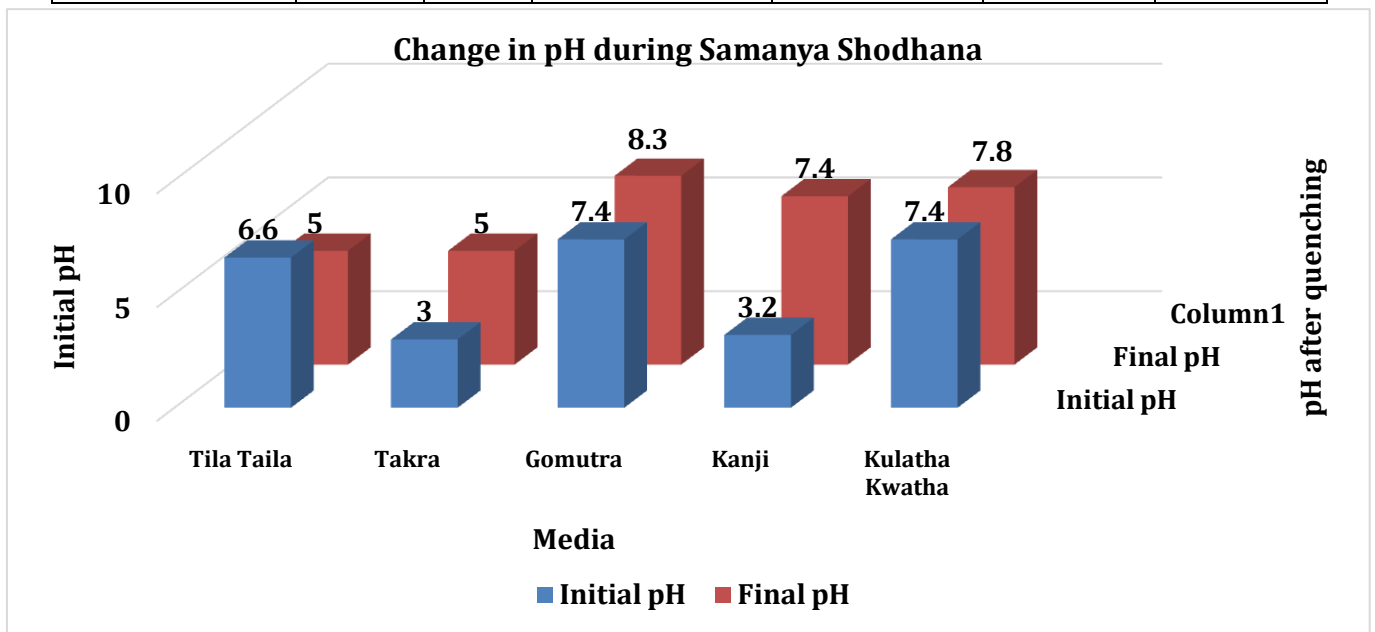
Time taken in the quenching process: The average time taken during the quenching of *Pittala* in *Kulattha Kwatha* is 06 minutes and 08 seconds.

Table 1: Changes in weight of Pittala after 7 Nirvapa in each media during Samanya Shodhana

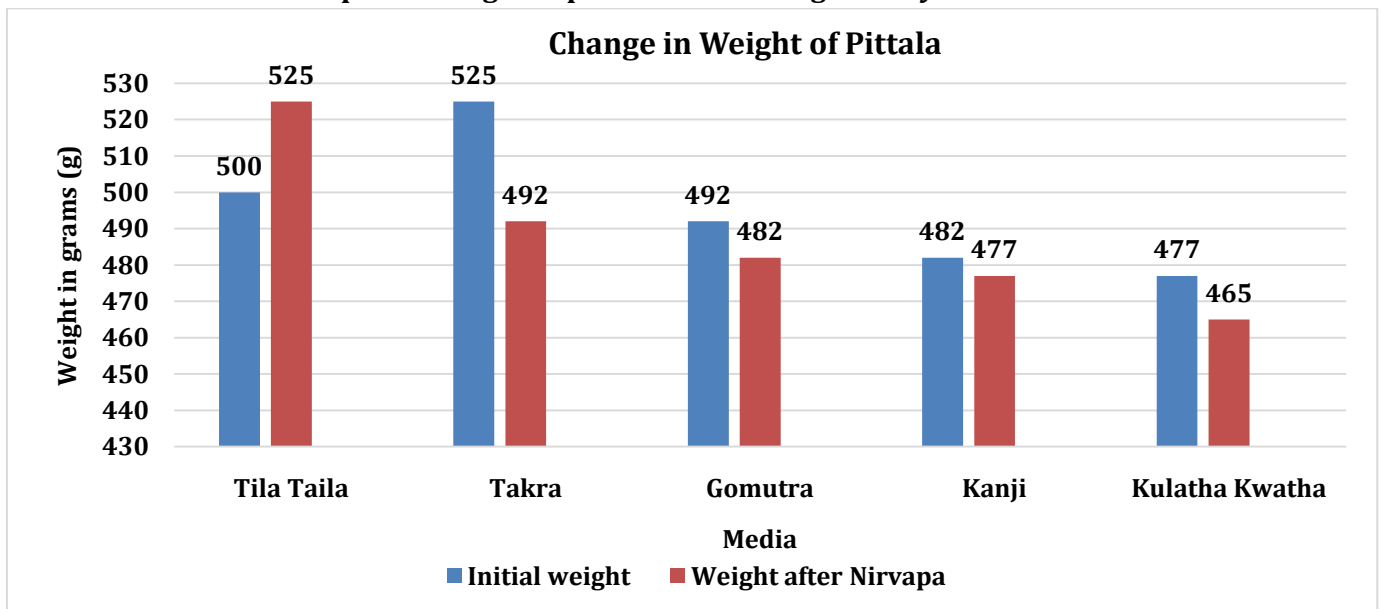
Initial Weight of Pittala (g)	Weight of Pittala ↑/↓ after 7 Nirvapa (g)					Total Weight loss after Samanya Shodhana	
	Tila Taila	Takra	Gomutra	Kanji	Kulatha Kwatha	g	%
500	525 ↑	492 ↓	482 ↓	477 ↓	465 ↓	35 ↓	7.0 ↓

Table 2: The changes in Media during Samanya Shodhana

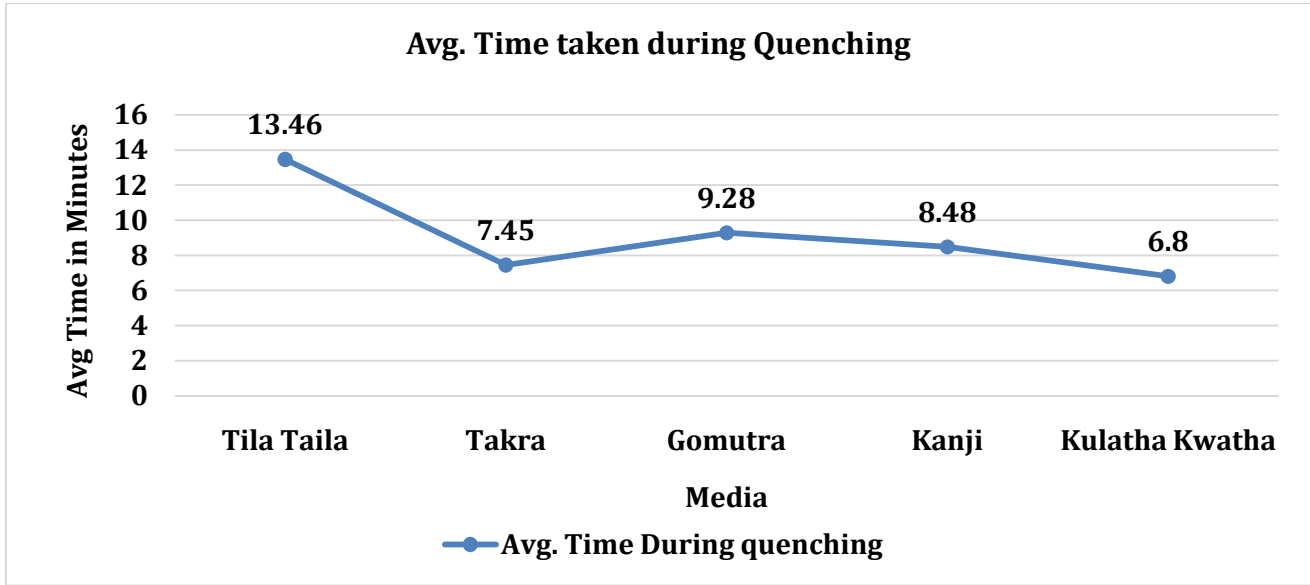
Media	pH		Colour of the media		Quantity	
	Initial	Final	Initial	Final	Initial	Final
Tila Taila	6.6	5	Light Yellow	Light Brown	12 l	11.48 l
Takra	3	5	White	Yellowish	12 l	10.13 l
Gomutra	7.4	8.3	Light Yellow	Dark Reddish	12 l	10 l
Kanji	3.2	7.4	Yellow	Brown	12 l	10.78 l
Kulatha Kwatha	7.4	7.8	Reddish	Dark Reddish	12 l	11.23 l



Graph 1: Changes in pH of media during Samanya Shodhana



Graph 2: Avg. Change in weight of Pittala during Samanya Shodhana



Graph 3: Avg. time taken during quenching of Pittala
 Table 3: Loss in weight of Pittala after Samanya Shodhana

Initial weight of Pittala take for Samanya Shodhana (g)	Final weight of Pittala after Samanya Shodhana (g)	Weight Loss	Weight Loss %
500 g	465 g	35 g	7.0%

DISCUSSION

Pittala underwent a significant weight loss of 7.0% following the Samanya Shodhana process, suggesting successful purification from impurities. Tila Taila, with its Snigdha, Sukshma, and Ashukari properties, facilitated rapid penetration into Pittala's voids and intermolecular spaces, forming a coating film. Further heating triggered chemical reactions and compound formation, potentially imparting organic properties from Tila Taila's active principles. Kanji's acidic nature and Tikshna, Bhedana, and Shithilikarana properties counteracted Tila Taila's Snigdha, enhancing Pittala's brittleness. Additionally, Gomutra and Kanji's Ksharana, Pachana, and Bhedana properties aided in impurity eradication and reduced Pittala's hardness. Kulatha Kwatha's Ashmari Bhedhana property contributed to Pittala size reduction.

Quenching involved heating Pittala to elevated temperatures followed by immersion in fluids to control cooling rates and effect metallurgical changes. Various quenchant facilitated desired microstructural alterations and served as cooling agents, with slower rates allowing longer thermodynamic forces for microstructure changes. The sediment accumulation increased with each quenching.

The weight gain in Tila Taila was attributed to adhered residue despite rigorous rinsing. Takra showed suspended black particles, challenging collection. The maximum sediment was found in Kanji due to its strong acidity and Tikshna properties. The pH measurements before and after Nirvapana

indicated neutral to acidic shifts, reflecting impurity release during Shodhana.

The stability of red-hot brass when interacting with compounds present in various substances is intricately linked to the pH and the specific chemical composition of these substances. In Tila Taila, while the neutral pH generally doesn't directly affect brass stability, the presence of acidic contaminants can accelerate corrosion, compromising its structural integrity. Takra, with its slightly acidic nature, can induce corrosion on the metal surface, weakening the material and promoting brittle fracture, potentially leading to surface degradation over time. Gomutra, being basic, can cause hydrogen embrittlement. Hydrogen atoms may diffuse into the brass matrix during exposure to basic solutions, leading to embrittlement and increased susceptibility to brittle fracture. Similarly, Kanji, a slightly acidic fermented beverage, can promote brass corrosion due to its acidic conditions, impacting both the stability and composition of the brass material. The alkalinity of Kulattha Kwatha can help mitigate the risk of brass degradation, contributing to the longevity of brass. Quenching metal in acidic media can indeed increase its brittleness, although the effect depends on several factors, including the type of metal, the specific acidic solution used, and the quenching process.

When heating Pittala, which is an alloy often composed of copper and zinc, the color of the flames can vary depending on the specific composition and impurities present in the alloy. Typically, when heating Pittala, a range of colours in the flames, including blue,

green, and yellow hues were observed. These colours can result from the oxidation of the metals in the alloy and the release of energy as light. The exact colours and their intensity can be influenced by factors such as the temperature of the flame and the specific proportions of copper and zinc in the alloy.

The observations of a green flame during quenching suggested copper presence on *Pittala's* surface. The media color changes from light yellow to light brownish (*Tila Taila*), milky white to yellowish (*Takra*), light yellowish to dark reddish (*Gomutra*), yellow to brown (*Kanji*), and red to dark reddish (*Kulatha Kwatha*) indicated chemical interactions.

The quenching process comprised heating, rapid cooling, and post-quenching stages, leading to particle disintegration and size reduction. Alternating heating and quenching in basic and acidic media induced corrosive changes, removing soluble impurities. These natural media historically provided basic and acidic sources.

CONCLUSION

The significant 7.0% weight loss observed in *Pittala* post-*Samanya Shodhana* underscores the effective removal of impurities. This highlights that *Shodhana* isn't merely about eliminating physical, chemical, and natural impurities (*Doshnivaran*) but also about enhancing the potency and efficacy of the substance while mitigating toxicity (*Gunaantardhan*).

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