

Bhasmas in Ayurveda: Bridging Ancient Wisdom and Modern Nanotechnology for Holistic Healthcare"

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ABSTRACT

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Ayurveda, an ancient Indian system of medicine, incorporates principles that resonate with modern nanotechnology, particularly in the preparation of *Bhasmas*, which are herbo-metallic compounds. These formulations, characterized by nanoscale particle sizes, are produced through meticulous processes of purification (*Shodhana*) and calcination (*Marana*), enabling enhanced absorption, targeted delivery, and reduced toxicity. This report gives the historical evolution of *Bhasmas*. Each type of *Bhasma*, possesses distinct therapeutic properties, ranging from rejuvenation and immunity enhancement to treatment of chronic conditions like diabetes and respiratory disorders. Recent scientific validation through advanced analytical techniques underscores the bioavailability and safety of *Bhasmas*, bridging traditional wisdom and contemporary material science. This synthesis highlights the relevance of Ayurveda in addressing modern healthcare challenges while preserving its holistic ethos.

1 Introduction

Ayurveda, the traditional Indian system of medicine, incorporates numerous formulations and practices that align with the principles of nanotechnology, even though the latter is a contemporary field. The preparation of therapeutic formulations, such as *Bhasmas* (herbo-metallic compounds), which have nanoscale dimensions and characteristics, is described in Ayurvedic writings [1]. These are made via a painstaking process that includes purification and calcination to produce fine particles. According to recent studies, these *Bhasmas* frequently have particle sizes in the nano range [2], which improves absorption, enables targeted distribution, and lowers toxicity—all of which are fundamental ideas in nanotechnology. The Indian knowledge system places a strong emphasis on a comprehensive view of nature, where spirituality and science coexist. This philosophy is fundamental to Ayurveda, which sees health as a state of equilibrium between the environment, the body, and the mind. This viewpoint is supported by nanotechnology, which bridges the gap between ancient ideas and contemporary science by enabling exact molecular interventions.

In this report, discussion has been done on different kind of *bhasmas* used in Ayurvedic treatments. A special type of

Ayurvedic formulations, *bhasmas* are mineral or herbo-metallic treatments that are prized for their medicinal effectiveness, high bioavailability, and tiny particle size. To transform metals and minerals into safe and biocompatible forms, these formulations are made by a painstaking process of purifying (*Shodhana*) and cremation (*Marana*) [3]. In Ayurvedic medicine, each form of *Bhasma* has unique qualities and uses.

1.2 History of *Bhasmas*:

Figure 1: Historical development of *Bhasmas*



Bhasmas, in Ayurveda, have a long history that stems from India's ancient medical customs and spans thousands of years. The **Charaka Samhita**, **Sushruta Samhita**, and eventually specialised **Rasa Shastra** (alchemy) the works of



the works of **Shastra** and

iatrochemistry) were among the core Ayurvedic texts that detailed their spiritual practices, alchemical inventions, and empirical knowledge [4]. Figure 1 shows the historical development of *Bhasmas*.

1.3 The *bhasmas*' production process:

1.3.1. Shodhana (Purification): Toxins and impurities are eliminated from metals and minerals as the initial stage in the creation of *Bhasmas*. Since raw minerals and metals can be poisonous or useless in their natural state, this is a crucial process. The metals are purified by soaking them in particular herbal decoctions or acids, then heating or boiling them.

1.3.2. Marana (Incineration): After purification, the metals go through a process called *Marana*, in which they are heated to high temperatures under carefully monitored conditions. The metal or mineral is reduced to a fine ash or powder by this process. The metal changes chemically during this period, becoming medicinal and biologically accessible. For instance, Swarna Bhasma is made by repeatedly heating and cooling gold, occasionally combined with particular liquids or herbs. Iron is heated in particular herbal liquids to make Lauha Bhasma, which helps transform it into a non-toxic form.

1.3.3. Repetition and Refinement: To guarantee the *Bhasma's* potency and purity, the incineration procedure is carried out multiple times. The intended particle size and therapeutic effect are also attained with the aid of several heating and cooling cycles. To improve their therapeutic qualities, some *Bhasmas* are further processed with herbs [4].

1.4.1. Swarna Bhasma (Gold Ash): Gold has been employed in Ayurvedic medicine since the Vedic period for its healing powers.

Following table 1.1 provides the details about the above mentioned *Bhasmas* in various ayurvedic treatments:

Sr. No.	Types of Bhamas	Properties	Applications
1	Swarna Bhasma (Gold Ash)	Rejuvenator, immune booster, anti-aging	Used in managing neurological disorders, arthritis [5], cardiac issues, and infertility

Deeply ingrained in **Rasa Shastra**, the process of turning gold into a safe, therapeutic form involves purifying and burning the metal to produce its medical properties, which include rejuvenation and vitality.

1.4 Significant *Bhasmas* and their origins:

Figure 2: Some important *Bhasmas* used in Ayurveda

1.4.2. Lauha Bhasma (Iron Ash): Iron has long been used in Ayurveda, especially to treat anaemia and **Vata** diseases. *Lauha Bhasma* is made by calcining and purifying iron, which is subsequently used as a haematinic to increase blood circulation.

1.4.3. Rajata Bhasma (Silver Ash): Silver Ash, also known as *Rajata Bhasma*, is used to cure **Pitta** diseases and enhance mental clarity because of its cooling qualities. To improve its therapeutic qualities, silver is purified and then calcined with herbal solutions.

1.4.4. Abhraka Bhasma (Mica Ash): During the classical era, mica was recognised for its therapeutic properties. The multi-step method of preparing it into *Abhraka Bhasma* improves its bioavailability and restorative properties.

1.4.5. Shankh Bhasma (Conch Shell Ash): Conch shells have traditionally been used in Ayurveda to treat gastrointestinal and calcium-related issues. *Shankh Bhasma*, or conch shell ash, is a calcium supplement made from cleaned and calcined conch shells.

Apart from above mentioned types some other types of *bhasmas* are: Vanga Bhasma (Tin Ash), Mukta Bhasma (Pearl Ash), Yashada Bhasma (Zinc Ash), Tamra Bhasma (Copper Ash), Naga Bhasma (Lead Ash), Mandura Bhasma (Ferric Oxide Ash) etc.

2	Lauha Bhasma (Iron Ash)	Hematinic, detoxifier, and general tonic	Treats anemia, fatigue, liver disorders, and reproductive issues, Urinary disorders [6, 7]
3	Tamra Bhasma (Copper Ash)	Anti-inflammatory, digestive stimulant, and detoxifier	Effective in managing liver disorders, obesity, and skin ailments [7]
4	Abhraka Bhasma (Mica Ash)	Rejuvenator, anti-diabetic, and respiratory enhancer	Beneficial in chronic conditions like asthma, tuberculosis, and diabetes.
5	Yashada Bhasma (Zinc Ash)	Antidiabetic, skin protector, and immune modulator	Used for diabetes, wound healing, and eye disorders
6	Shankh Bhasma (Conch Shell Ash)	Antacid, calcium-rich, and digestive aid	Treats acidity, gastritis, and calcium deficiency-related disorders [8]
7	Mukta Bhasma (Pearl Ash)	Cardiotonic, anti-inflammatory, and anti-stress	Used in anxiety, eye disorders, and calcium deficiencies
8	Vanga Bhasma (Tin Ash)	Digestive stimulant, fertility enhancer, and anti-obesity	Addresses reproductive disorders, digestive issues, and metabolic conditions

1.5 Contemporary Verification of Bhasmas: The nanoscale size, purity, and therapeutic qualities of *Bhasmas* have been validated by recent developments in analytical methods such as atomic absorption spectroscopy (AAS) [9], transmission electron microscopy (TEM), and X-ray diffraction (XRD) [10]. This establishes Ayurveda as a forerunner of modern material science by bridging the gap between traditional wisdom and scientific validation.

1.6 Conclusion: *Bhasmas*, which combine spiritual insights with factual science, are prime examples of the depth of the Indian Knowledge System. Their significance stems from their capacity to offer secure, efficient, and long-lasting remedies for both contemporary and historical health issues. We can advance medical research while maintaining the core of Ayurveda's holistic concept by fusing this traditional knowledge with modern scientific instruments.

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