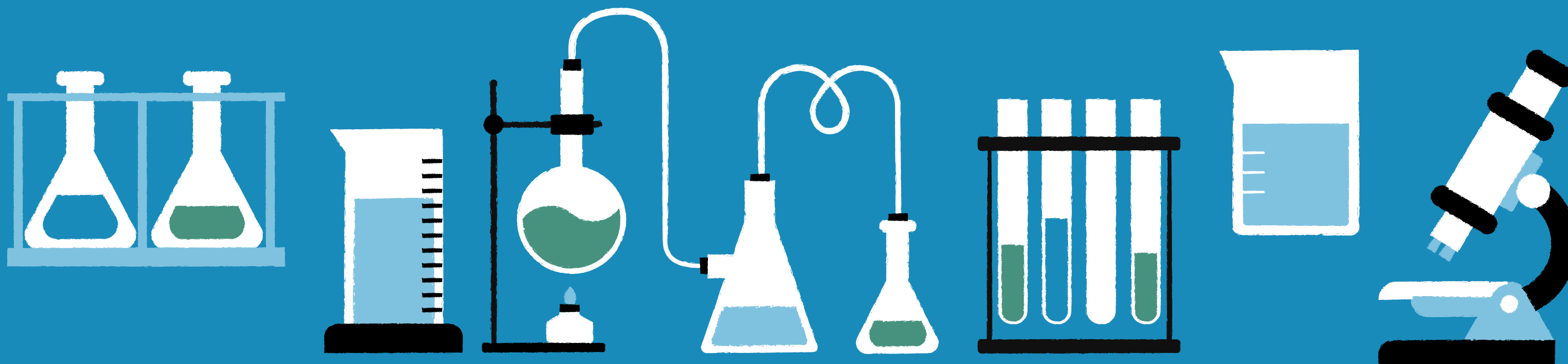


# Ancient Indian Chemistry 'The Rasayan Shastra'

By Dr. Madhvi Prasad,  
Assistant Professor, Amrita Darshanam



# Chemicals react to change

In ancient India, chemistry was called “Rasayana” in Sanskrit. Rasayana derived its name from “Rasa,” which means “extract,” maybe from roots, leaves, and stems of plants.

Did you know?  
The paintings on the walls of Ajanta and Ellora, over 1000 years old, still appear fresh, showcasing the advanced chemical science achieved in ancient India.



# LEARNING OUTCOMES

- Objectives of Ancient Indian Chemistry
- Ancient Indian Alchemy
- Atomism & Nano Technology
- Chemistry in Early Literature
- Chemical Sciences in India
- Lab & Apparatus
- Key Alchemical Instrument
- Benefits

## Ancient Indian Chemistry





# OBJECTIVES OF ANCIENT CHEMISTRY

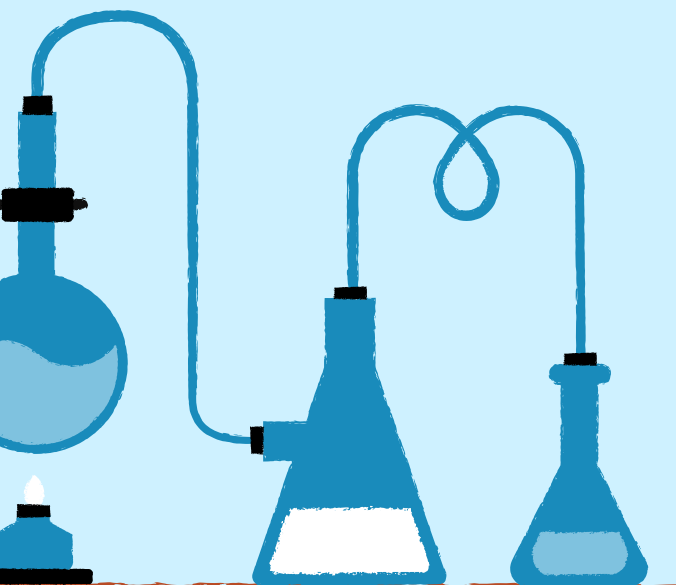
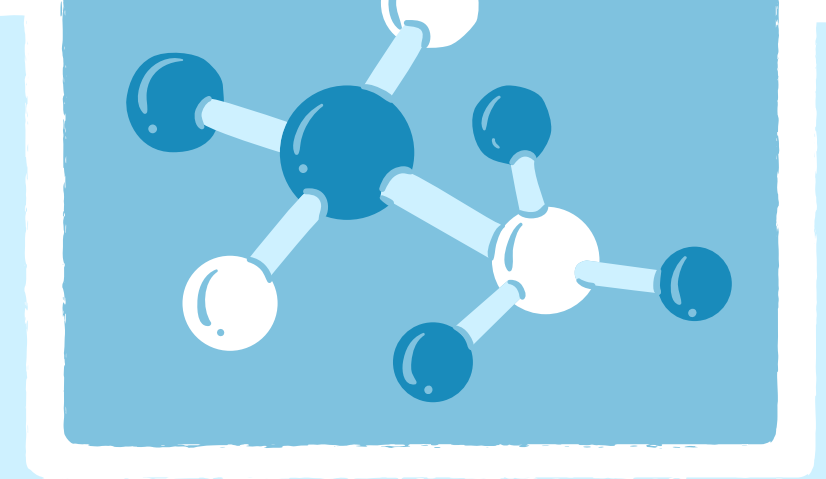
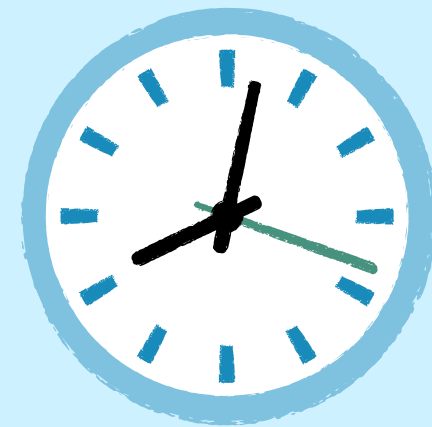
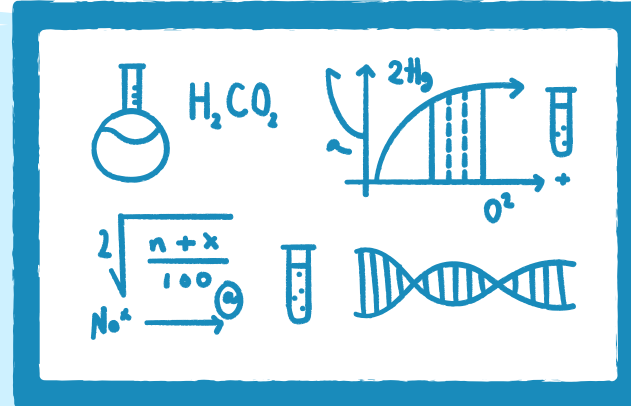
## Dehavedha/Deha siddhi

Using rasashastra to preserve health and vitality, leading to the creation of medicines that supported overall well-being. It leads to the attainment of salvation while being alive(Jivan Mukti).

## Lohavedha/Lauha Siddhi

Converting lower metals into gold through trial and error, aimed at commercial gain.





# Ancient Indian Alchemy

Alchemy is a type of speculative thought in ancient times that aimed to change basic metals like lead or copper into silver or gold, as well as discover a cure for disease and a method of extending life.

Ancient Indian alchemy began with the Vedas, evolved through yoga, and flourished in Tantra. Nagarjuna was the most prominent scholar in the field of Indian alchemy.

# Nagarjuna's Alchemy

In Nagarjuna's Alchemy, the word rasa has many meanings, such as essence, taste, sap, or juice, but in this context refers to mercury, seen as one of the most important elements.

Despite mercury compounds being poisonous, cinnabar ( $\text{HgS}$ ) underwent 18 complex processes (saṃskāras), including mixing with medicinal plant juices, sulphur, mica, and alkaline substances.

The resulting mercury compound was then declared fit for consumption and believed to lead to the body's rejuvenation.

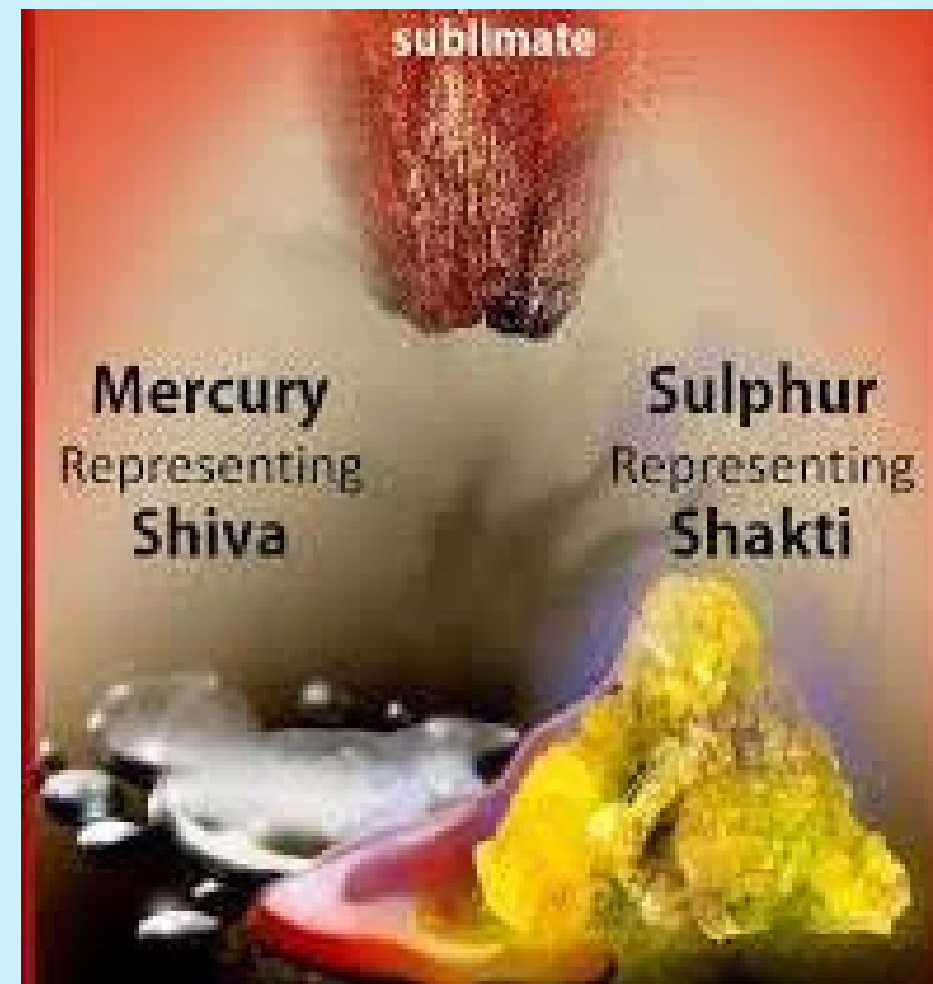


**Cinnabar mercury ore**



# Did you know?

In ancient Indian alchemy, Mercury (Rasaraja) represented the male principle (Shiva), while Sulphur symbolized the female principle (Shakti). Together, they were believed to grant powers such as longevity, invisibility, and levitation.

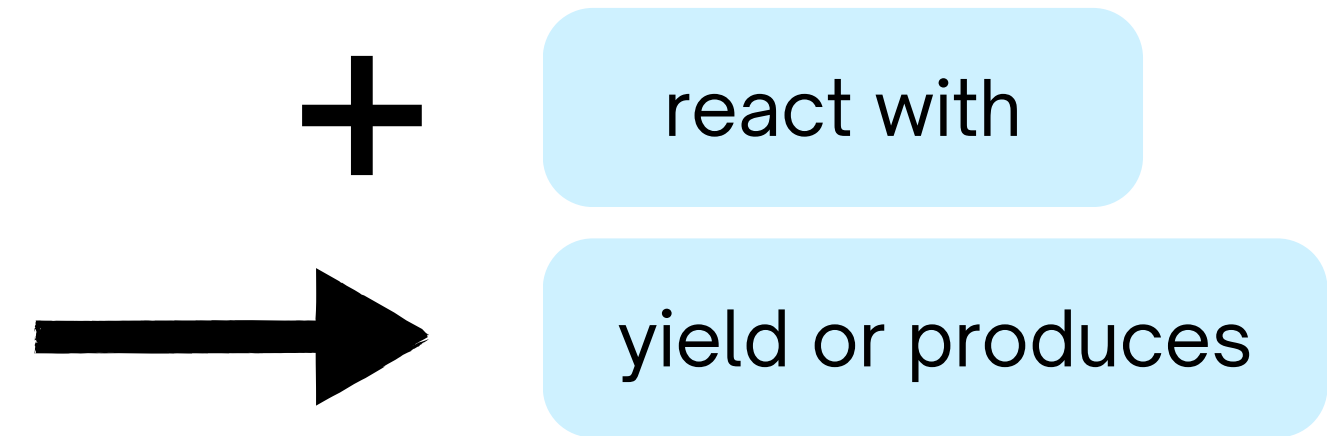




# Acharya Kanada is the "Father of Atomic Theory"

Acharya Kanada's concept of "Anu" (atoms) states that all matter is composed of indivisible particles that form molecules. In his Vaisesika Sutras, he explained the dimensions, motion, and chemical reactions of these particles.

## ANU – THE ATOM



## CHARACTERS:

molecules

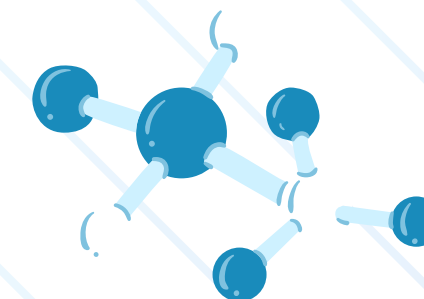
product



# Charak Samhita & Nano Technology.

Caraka Samhitā discusses the reduction of metal particle sizes, a concept now recognized as nanotechnology (1-100 nanometers).

Nanotechnology is used in various fields, including chemistry, biology, physics, materials science, engineering, and medicine.



# CHEMISTRY IN EARLY LITERATURE

## KAUTILYA'S ARTHASHASTRA



01 Kautilya's Arthashastra discusses the properties of precious stones, fermented juices (sugarcane, honey, fruits), and oil extraction techniques.

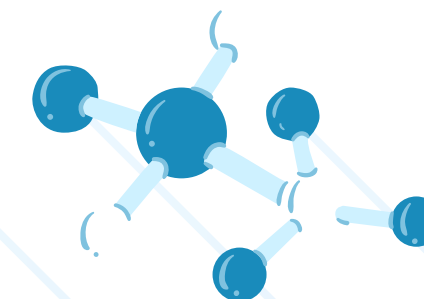
It also covers mining, metallurgy, and purification methods.

Notably, it states that the heaviness of ore indicates its metal content, a concept similar to modern chemistry, where denser ores typically have higher metal concentrations.





# CHARAKA SAMHITA ET SUSHRUTA SAMHITA



02

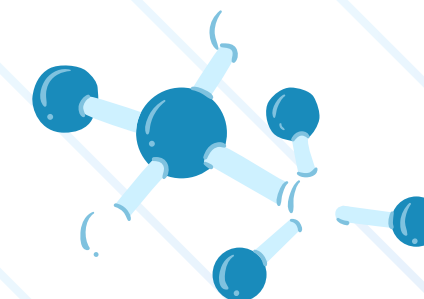
The Āyurvedic Medical System in the Atharvaveda recognizes plants and vegetables for disease treatment. Key texts include the Caraka Saṁhitā (focused on medicine) and Suśruta Saṁhitā (focused on surgery).



Indian alchemical texts (rasavidyā) describe the use of both organic and inorganic substances in treatments. Mercury, a key alchemical element, was processed through 18 steps before being used for medicinal purposes.

According to the Sushruta Samhita, alkalis, or kshara, are prepared by burning the entire plant with lime stones and sesame stalks. The ash is then dissolved in water, filtered, and boiled down.

Tamil texts describe the creation of gunpowder and fireworks using various chemicals.



## BRIHAT SAMHITA

03

Brihat Samhita: Includes recipes for making a glutinous material from plant extracts, used for coating roofs and walls of houses and temples.



It was prepared entirely from extracts of various plants, fruits, seeds, barks.

which, after being boiled and concentrated, were then treated with various resins.

# EVIDENCES OF EARLY CHEMISTRY



Bleached beads from Harappa



**Ornaments:** bangles in conch and faience ear-studs in steatite and faience).Indus Valley settlement



# Chemical Science in India

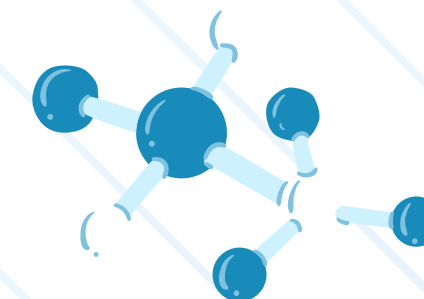


## Ancient Distillation Techniques

Alkaloid Extraction (by grinding plant parts into slurry), Damaru Yantra (apparatus in Ayurveda for distillation).

## Iron Use in Ancient India

"Loha Bhasma" used to treat anemia, showing knowledge of iron's role in hemoglobin. Patanjali's work mentioned rust-free steel produced by melting iron stones.



# LABORATORY AND APPARATUS

## 2. Common Equipment

The lab used mortars, pestles, bellows, sieves, pans, and specialized tools for various processes.

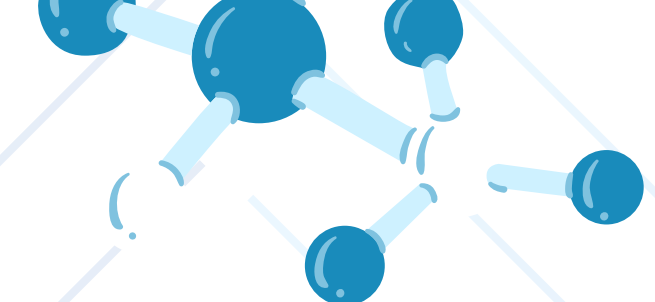
## 1. Laboratory Layout

The lab had a spiritual layout: Rasaliga (alchemy symbol) in the east, furnaces in the southeast, and instruments in the northwest.

## 3. Rasamantapa

A worship space near the lab for Lord Shiva and Mercury, with musa yantra crucibles made of white clay, rice husk, and iron dust.





# KEY ALCHEMICAL INSTRUMENT

- Koshti Yantra: Two rimmed vessels for extracting metal essences; heated by fire and side blower.
  - Swedani Yantra: Used for heating or steaming substances.
  - Dola Yantra: Likely for mixing or rotating substances.
  - Patana Yantra: Apparatus for distillation or purification.
  - Aadhana Yantra: Used for grinding or triturating.
  - Dhupa Yantra: Likely used for fumigation or vaporizing substances.
- 
- 



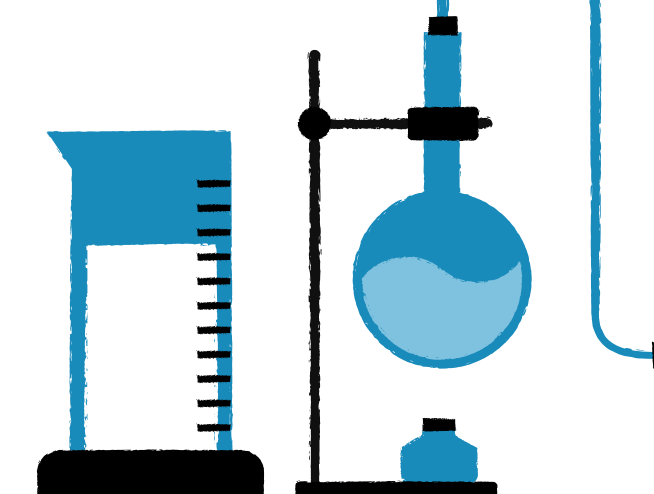
This apparatus, Kosthi Yantra, was mainly used for extracting minerals.

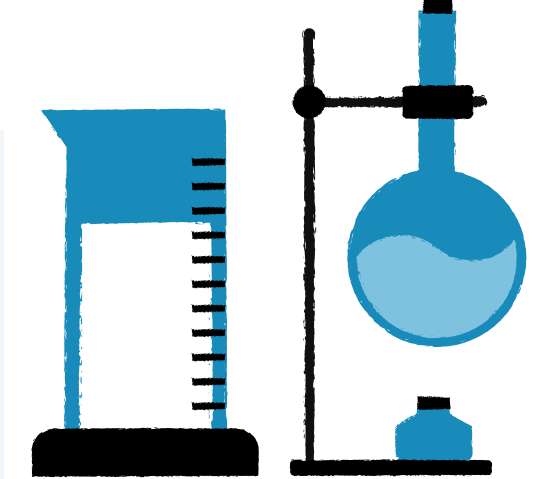
#### Procedure:

This apparatus has a special furnace of angulas in width and one hasta (18") in length and one hasta in height. Two Mushas (crucibles used in the laboratory) are taken, one of which has a lid with a hole.

The Musha with the lid is filled with ore and is fixed upside down on the furnace, surrounding the upper Musha is filled with hard charcoal made of Bamboo, Khadira, Madhuka and Badari wood.

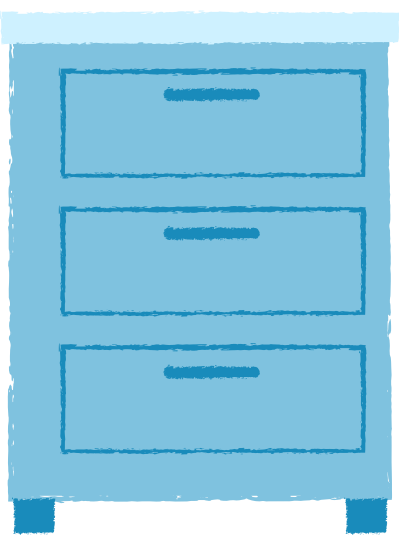
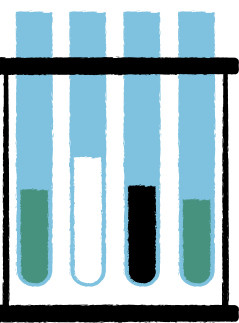
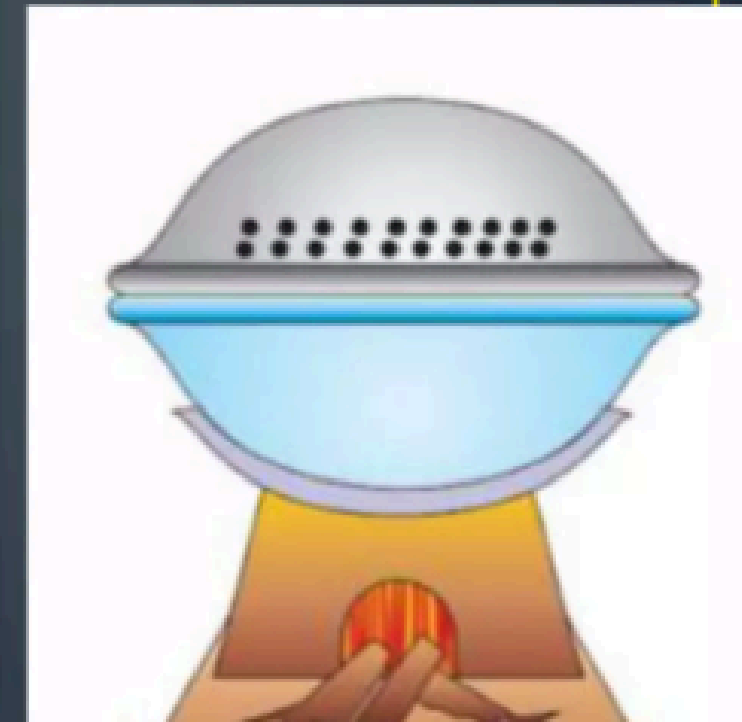
A fire is lit in the charcoal and has to keep raging, by blowing air with the help of bellows. Gradually the essence of the mineral gets collected in the lower pot.



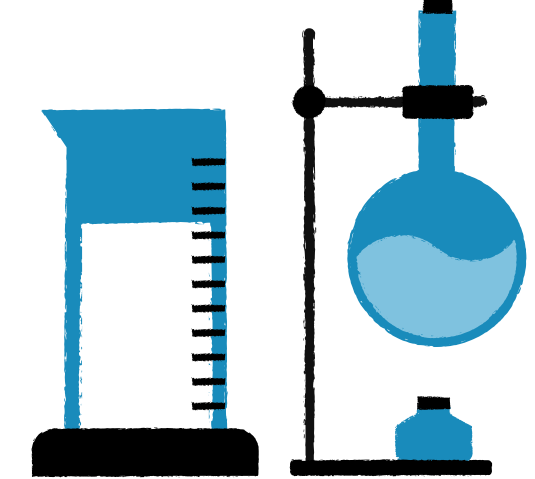


Swedani Yantra

**Swedani Yantra** was used for continuous slow heating of ingredients. Procedure: A pot with boiling water has its mouth covered with a piece of cloth and the substance to be steamed is placed on it, and a second pot is arranged in an inverted position over the rim of the first.



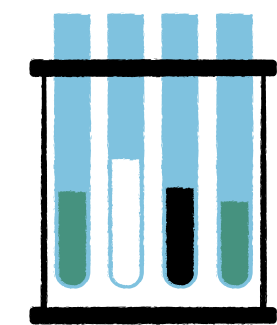
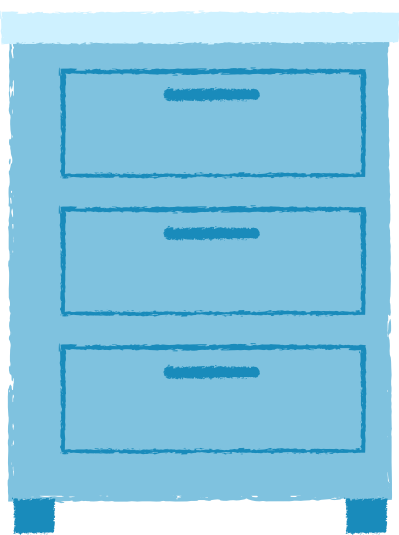




The **Dola Yantra** was mainly used for causing the chemical to perspire by exposing them to medicated steam.

Procedure:

In this yantram, a vessel filled with some liquid substance to half of its capacity is taken. Two holes are made opposite to each other near the mouth of the vessel. A rod is then arranged through the two holes across the mouth. A bundle containing the material which is boiled is suspended into the liquid by tying it at the middle of the rod. Then the vessel is heated as required.





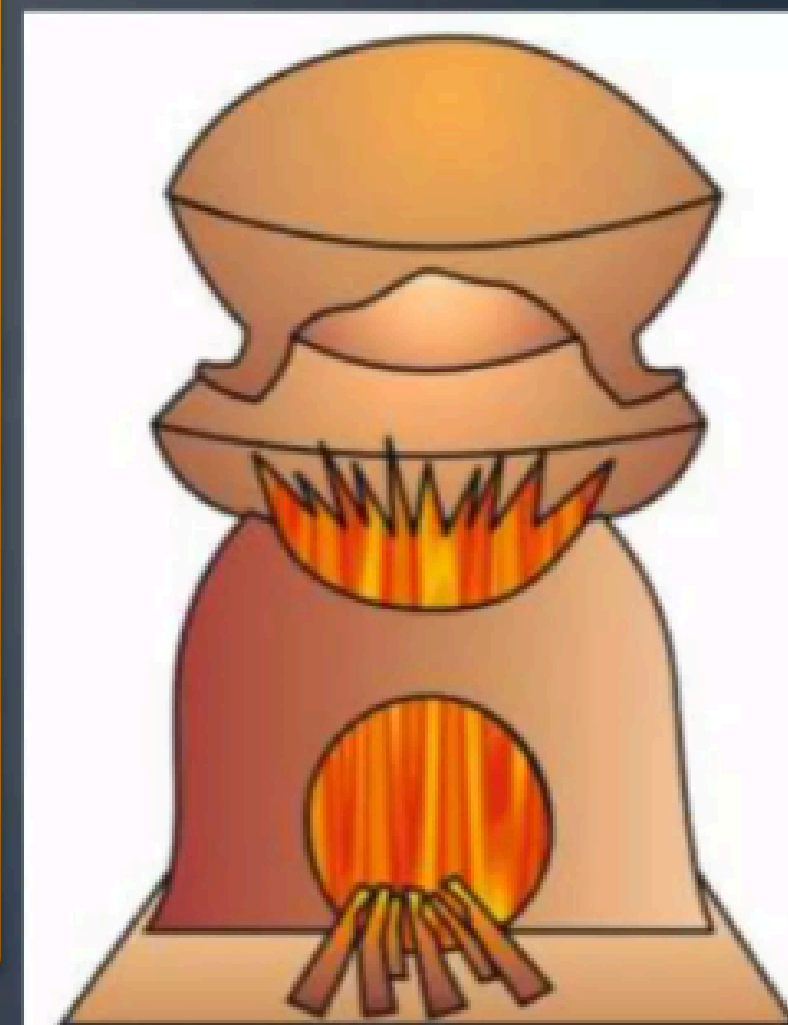


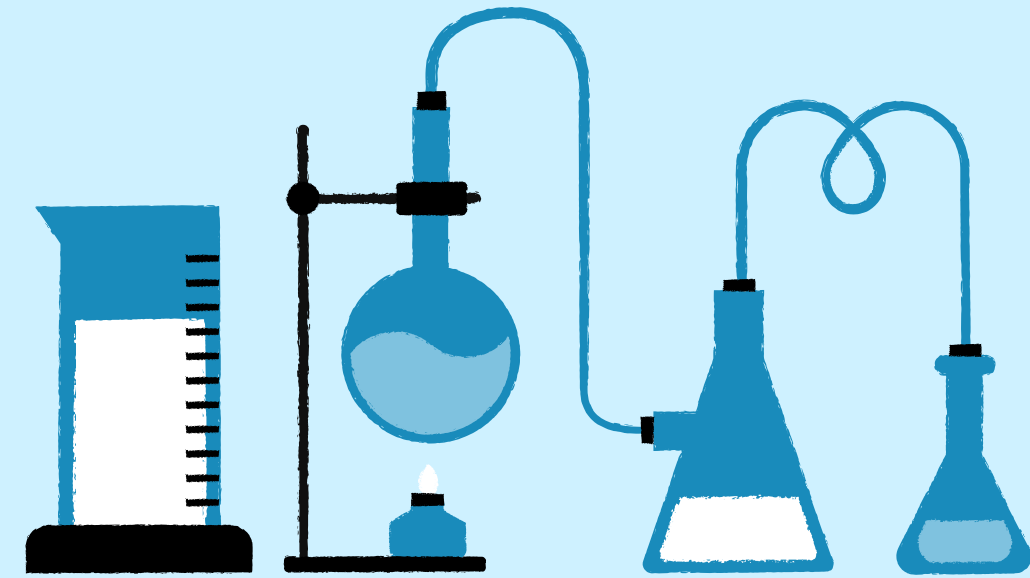
Patana Yantra was an apparatus used for sublimation and distillation.

Procedure:

Two vessels are adjusted so that the neck of the one fits into that of the other.

The junction of the necks is luted with a composition made of lime, raw sugar, rust of iron, and buffalo's milk.

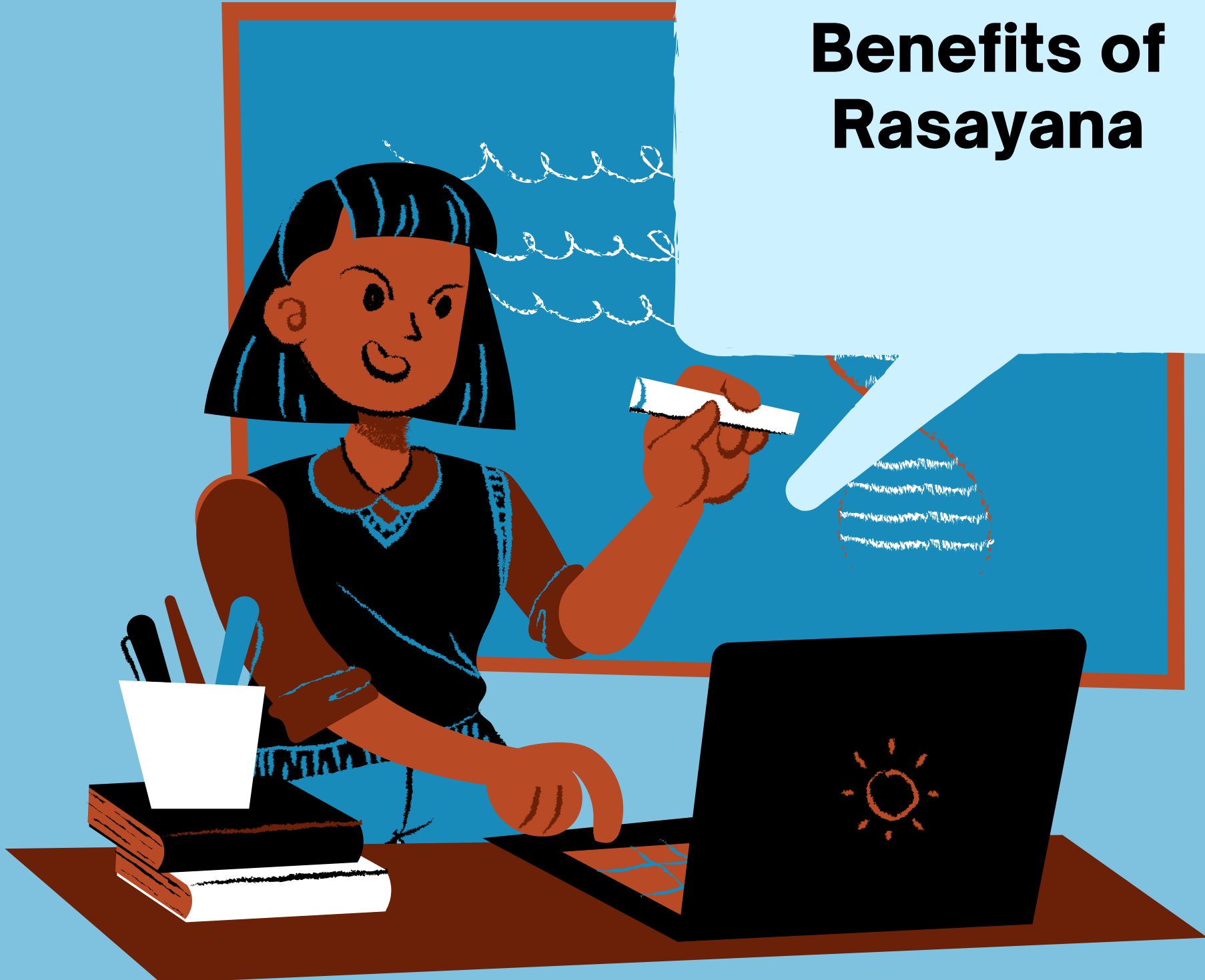




## Rasashala: Ancient Indian Alchemical Lab (click here)

Rasashala, a typical alchemical laboratory of Nagarjuna is recreated in "our Science and Technological Heritage of India" gallery of National Science Centre, Delhi.





## Benefits of Rasayana

**R** for Restoration of Health

**A** for Agility (Restoring youthful agility)

**S** for Strengthening the Immune System

**A** for Anti-aging (Reversing signs of aging)

**Y** for Youthfulness (Restoring youth and vitality)

**A** for Adaptability (Improving mental clarity and flexibility)

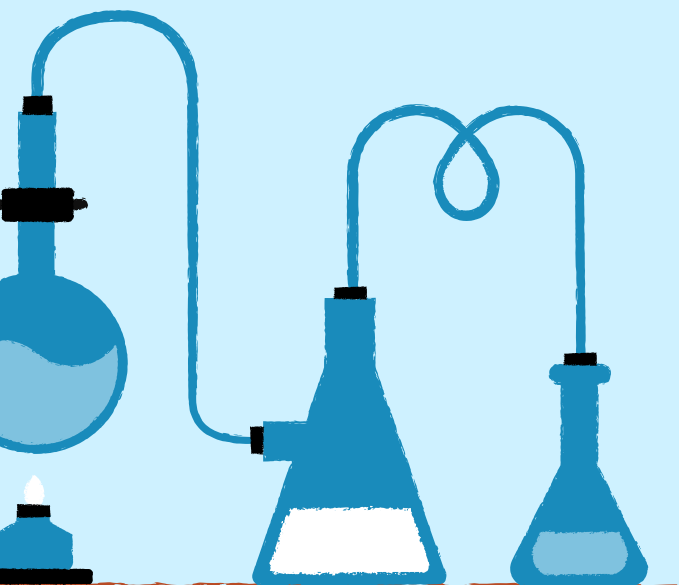
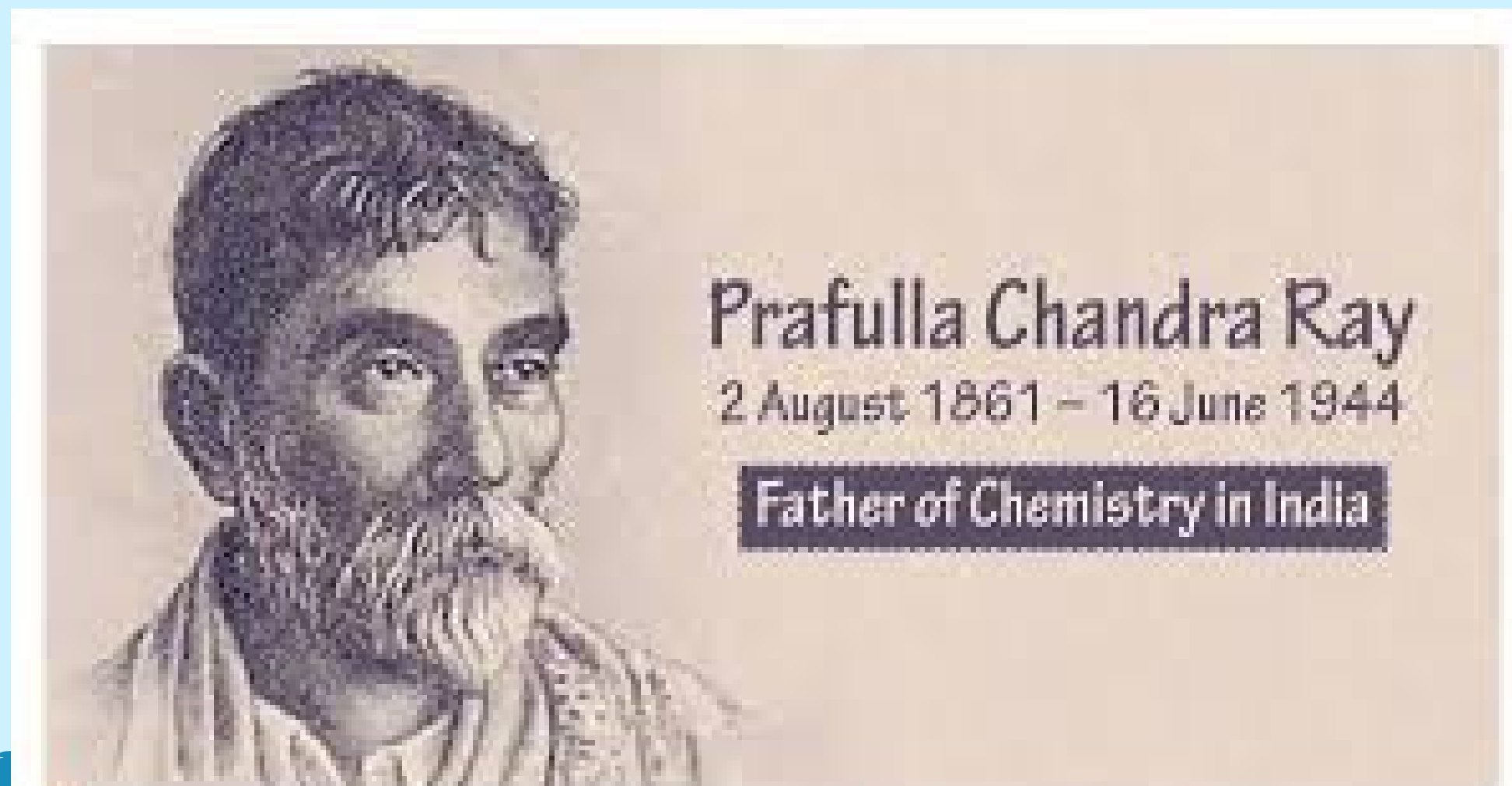
**N** for Nourishing the Body

**A** for Augmenting Physical Strength and Sensory Abilities



# Did you know?

Prafulla Chandra Ray (1861-1944), also known as PC Ray, was an Indian chemist and scientist who wrote a book on the history of Hindu chemistry. He is known as the "Father of Indian Chemistry"





# Further Readings

A History Of Hindu Chemistry Vol. 1

by

Praphulla Chandra Ray.