

METALLURGY IN ANCIENT INDIA

In many ways, the usage of metals in antiquity is tied to the history of civilization. Metals have been given names to several periods of early human civilization. The ability to extract metals yielded a large number of metals and ushered in a number of changes in human society. It provided weapons, tools, jewellery, utensils, and other items, as well as enriching cultural life.

The Seven metals of antiquity are gold, copper, silver, lead, tin, iron and mercury.

Despite the fact that contemporary metallurgy grew at an exponential rate during the Industrial Revolution, many current metallurgical principles have their roots in ancient traditions that predate the Industrial Revolution. India has a long history of metallurgical expertise dating back over 7000 years.

Important sources for the history of Indian metallurgy

Archaeological digs and literary evidence are the two most important sources for the history of Indian metallurgy. The first evidence of metal in the Indian subcontinent was discovered in the Balochistan town of Mehrgarh when a little copper bead dated to around 6000 BCE was discovered. It's believed to be native copper, meaning it wasn't removed from the ore. Copper metallurgy in India dates back to the Chalcolithic societies in the subcontinent, according to spectrometric tests on copper ore samples discovered from ancient mine pits at Khetri in Rajasthan and metal samples cut from representative Harappan artefacts unearthed from Mitathal in Haryana. Indian chalcolithic copper items were almost certainly manufactured on the continent.

Chalcopyrite ore resources in the Aravalli Hills provided the ore used to extract metal for the artefacts. The Archaeological Survey of India produced and released a collection of archaeological literature from copper plates and rock inscriptions throughout the last century. Copper plates were used to engrave royal records. Famine relief attempts are

mentioned in the earliest known copperplate, which is a Mauryan record. It contains one of India's few pre-Ashoka Brahmi inscriptions. Gold and silver were also used by the Harappans, as well as their own alloy electrum. In ceramic or bronze pots, a variety of ornaments such as pendants, bangles, beads, and rings have been discovered. Indus Valley sites such as Mohenjodaro have yielded early gold and silver jewellery. DD tccd

Alluvial Gold according to Rigveda

Indirect references to alluvial placer gold deposits in India can be found in Rigveda hymns. In ancient times, the Sindhu River was a major gold producer. It has been reported that there are still large gold mines in the Manai8sarovar and Thokjalyug areas. Anguttara Nikaya, a Pali classic, describes the process of recovering gold dust or particles from alluvial placer gold deposits. Although evidence of gold refining may be found in Vedic texts, Kautilya's Arthashastra, written presumably in the 3rd or 4th century BCE during the Mauryan era, contains a long section on mines and minerals, including metal ores of gold, silver, copper, lead, tin, and iron. The gold variety rasviddha, which is a naturally occurring gold solution, is described by Kautilya. Such alternatives were also mentioned by Kalidas.

The colour of native gold varies based on the nature and amount of impurities present. The various colors of native gold were most likely a primary driving force in the development of gold refining.

Recent Excavations

Excavations in the central Ganges Valley and the Vindhya hills have revealed that iron was produced there as early as 1800 BCE. Iron furnaces, artefacts, tuyeres, and layers of slag were discovered during recent excavations by the Uttar Pradesh State Archaeological Department. They were discovered between 1800 and 1000 BCE, according to radiocarbon dating. The findings suggest that knowledge

of iron smelting and the production of iron items was widespread in Eastern Vindhya and that it was in use in the Central Ganga Plains. The amount and variety of iron artefacts, as well as the level of technological achievements, suggest that ironworking would have begun considerably earlier. The evidence points to the early usage of iron in other parts of the country, demonstrating that India was a self-contained center for the development of ironworking.

Iron in earlier history

- Iron smelting and use were particularly common in South Indian megalithic societies. The crucible technique was used to make steel in India, according to Greek reports. Iron, charcoal, and glass were combined in a crucible and heated until the iron melted and absorbed the carbon in this process. Porus of Taxila (326 BCE) offered Alexander the Great two-and-a-half tonnes of Wootz steel, according to a Roman historian named Quintus Curtius. Wootz steel is predominantly made of iron with a high carbon content (1.0–1.9%).
- According to literary records, Indian Wootz steel from the southern Indian subcontinent was sold to Europe, China, and the Arab world. It gained popularity in the Middle East, where it was given the name Damascus Steel. Michael Faraday attempted but failed, to reproduce this steel by alloying iron with various metals, including noble metals.
- Porous iron blocks are generated when iron ore is converted to solid-state using charcoal. As a result, sponge iron blocks are also known as reduced iron blocks. Only when the porosity has been removed by hot forging can any useful product be made from this material. Wrought iron is the result of this process. The world-famous Iron Pillar is an intriguing example of wrought iron manufactured in ancient India. Apart from iron, the wrought iron of the pillar contains 0.15% carbon, 0.05% silicon, 0.05% manganese, 0.25% phosphorus, 0.005% nickel, 0.03% copper, and 0.02% nitrogen.