Mica

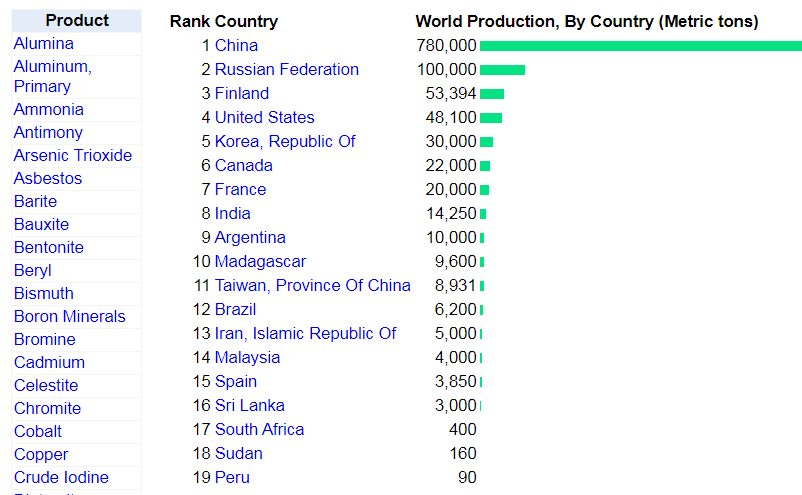
Mica is a mineral name given to a group of minerals that are physically and chemically similar. They are all silicate minerals, known as sheet silicates because they form in distinct layers colors- purple, rosy, silver, gray, dark, green, brown, black, yellowish-brown, and green-white.

Occurrence and production

Mica is widely distributed and occurs in igneous metamorphic and sedimentary regimes, large crystal of mica used for various applications are typically mined from granite pegmatite.

The British geological survey reported that as of 2005, kodem district in Jharkhand state in India had the largest deposits of mica, mica with almost a third of the global share closely followed by the US, South Korea and Canada.

Mica production by Country (Metric tons)



Properties and Uses

The mica group represents 37 phyllosilicate minerals that have a layered or platy texture. The commercially important micas are muscovite and phlogopite, which are used in a variety of applications.

The crystalline structure of mica forms layers that can be split or delaminated into thin sheets are chemically inert, dielectric, elastic, flexibility, hydrophilic, insulating, lightweight, platy, reflective, refractive, resilient and range in opacity from transparent to opaque.

**Ground mica:** - used in the well drilling industry as an additive to drilling fluids. The coarsely ground mica flakes help prevent the loss of circulation by sealing porous sections of the drill hole.

The plastic industry: - used dry ground mica as an extreme and filler, especially in parts for automobiles as lightweight insulation to suppress sound and vibration. Mica used in plastic automobile fascia and fenders as a reinforcing properties and increased dimensional stability, stiffness and strength.

Mica-reinforced plastics also have high-heat dimensional stability; reduce war page and the best surface properties of any filled plastics composite.

**Dry ground mica:** - is used in the production of rolled roofing and asphalt shingles, where it serves as a surface coating to prevent sticking of adjacent surfaces.

The coating isn’t absorbed by freshly manufactured roofing because micas platy structure is unaffected by the acid in asphalt or by weather conditions.

Mica is also used in decorative coatings on welding rods, in some special greases, and as coatings for core and mold release compounds, facing agents, and mold washes in founding applications.

**Wet ground mica:** - which retains the brilliance of its cleavage faces, is used primarily in pearlescent paints by the automotive industry. Many metallic looking pigments are composed of a substrate of mica coated with another mineral, usually titanium dioxide (TiO2).

In the cosmetics industry, its reflective and refractive properties make mica and important ingredients in blushes, eye-liner, eye-shadow, foundation, hair and body glitter, lipstick, lip gloss, mascara, moisturizing lotions and nail polish. Some brands of toothpaste include powdered white mica, this acts as a mild abrasive to aid polishing of the tooth surface and also adds a cosmetically pleasing, glittering shimmer to the paste.

Mica is also used as an insulator in concrete block and home attics and can be concrete into walls (usually in retrofitting uninsulated open top walls). Dry ground phlogopite mica is used in automotive brake linings and clutch plates to reduce noise and vibrations (asbestos substitute) as sound-absorbing insulation for coatings and polymer systems; polymers are also use to add to enhance the strength and its usage, especially, it increases strength and stiffness and to improve stability to heat, chemicals and ultraviolet (UV) radiation; in heat shields and temperature insulation; in industrial coating additive to decrease the permeability of moisture and hydrocarbons; and in polar polymer formulations increase the strength of epoxies, nylo0ns and polyesters.

Health Impact

Mica dust in the work place is regarded as a hazardous substance for respiratory exposure above certain concentrations.

The occupational safety and health administration (OSHA) has set the legal limit (permissible exposure limit) for mica exposure in the workplace as 20mppcf (million particles per cubic foot) over an 8-hour work-day.

Medicine

Ayurveda, the Hindu system of ancient medicine prevalent in India, includes the purification and processing of mica in preparing Abhraka bhasma, which is employed in treating disease of respiratory and digestive tracts.

Indian companies which are involved in its extraction and purification

1:- **Kudremukh** is a flagship company under the Ministry of Steel, Government of India, formed in 1976. It is the country’s prestigious Export Oriented Unit, with iron ore mining, filtration technology and production of high quality pellets.

The company has a major pelltization complex located in Mangalore, the coastal city of Karnataka. There, the annual capacity of the plant is around 3.5 million tons of iron ore pellets.

2:- **Bharat Aluminum Company**, a subsidiary of Vedanta Resources, Bharat has the distinction (one of many) of being the first to have Captive Power Plant. BALCO has two Bauxite mines in Chhattisgarh state – one at Mainpat with a capacity of 7, 50,000 TPA and the other at Bodai Daldali (Kawardha) with a capacity of 12,50,000 TPA.

BALCO is playing a crucial role in introducing Aluminum as a potential alternative to other metals like Steel in construction, and Copper in power transmission industry, and was the first to produce alloy rods for conductors used across the industry.

## 3: - Gujarat Mineral Development Corporation Ltd

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3:- **Gujarat Mineral Development Corporation limited** - Incorporated in 1963 to develop major mineral resources in India, with a Silica Sand quarrying plant for crushing and screening of Silica Sand required the Glass Industry. Fast forward nine years and the company was granted a Lignite Mining Lease at Panandhro, Dist. Kutch. It started its Lignite mining operation which gave an opportunity for GMDC to develop its first Lignite mine to cater the fuel demand of the Industries in the State.

As recent as 2015, the company announced a Lignite Mine of 1 mMT per annum capacity at Umarsar, Dist. Kutch. With six operating Lignite mines in the State, the GMDC became the largest merchant seller of lignite in the country.  GMDC has also set up a 1.5 million TPA Pyrite Removal Plant at Bhavnagar Lignite Project on Built on Operate (BOO) basis for removal of Pyrite nodules.

4:- **Hindustan Copper** - Incorporated under the administrative control of the Ministry of Mines, Hindustan Copper Ltd is the nation’s only vertically integrated copper producing company. Hindustan manufactures copper from the stage of mining to beneficiation, smelting, refining and casting of refined copper metal it downstream.

The bulk of the operations are spread across India, Khetri Copper Complex (KCC) at Khetrinagar, Rajasthan, with the Indian Copper Complex (ICC) at Ghatsila, Jharkhand, Malanjkhand Copper, Project (MCP) at Malanjkhand, Madhya Pradesh,  Taloja Copper Project (TCP) at Taloja, Maharashtra.

5:- **Rajasthan State Mines and Minerals Limited** - One of the premier public sector enterprises of the government of Rajasthan, with a primary focus in mining and marketing of industrial minerals.  The company has a number of mining operations focusing on phosphate, lignite, limestone and gypsum.

The major activity of RSMML is the mining of Rockphosphate ore, with one of the largest mines in the country at Jhamarkotra. Jhamarkortra is a major player in contributing 98 percent of rock phosphate production in India.

The company also owns and operates a number of Lignite deposits, with the Giral mine producing around 12, 00,000 MT per year.

6:- **National Aluminum Company Limited** - Hindalco Industries Limited is the metals flagship company of the Aditya Birla Group and just so happens to be an industry leader in aluminum and copper. A turnover of a small sum of US$17 billion makes Hindalco the world’s largest aluminum rolling company and one of the primary producers of Aluminum in Asia.

Hindalco has operations in aluminum, and copper, with a world class copper smelter that stands as one of the world’s largest custom smelters at a single location.

Looking at the company’s aluminum smelting operations, and there are many (Uttar Pradesh, Odisha, Madhya Pradesh) produce a combined 1.3 million tones of primary aluminum per year.

7:- **National Mineral Development Corporation India** - Incorporated in 1958 as a Government of India fully owned public enterprise. Under the administrative control of the Ministry of Steel, Government of India, the NMDC is India's single largest iron ore producer, presently producing about 30 million tons of iron ore from 3 fully mechanized mines.

The NMDC is actively involved in the exploration of a wide range of minerals including iron ore, copper, rock phosphate, lime stone, dolomite, gypsum, betonies, magnetite, diamond, tin, tungsten, graphite, beach sands etc.

NMDC is presently producing about 20 million tons of iron ore from its Bailadila sector mines and 10 million tons from Donimalai sector mines.

Methods of Extraction

**Mica mining methods:** - This section describes the methods for mining the two main grades of mica: sheet mica and scrap mica. The reason for describing these methods is to ascertain risk levels related to the mining of this different mica grades. Since certain industries use only one grade of mica, it is important and relevant to understand these different methods in order draw links between mining methods and industries, and to exclude certain industries from particular mica mining methods.

**Mining of sheet mica:** - Sheet muscovite is obtained from coarse-grained igneous rocks called pegmatite. Pegmatites also contain feldspar, quartz, and various accessory minerals. Sheet mica can be recovered by both deep shaft mining and open-pit surface mining, but the latter is only possible in the case of semi-hard pegmatite ore. It is typical in sheet mining that when a pocket of mica is found in a pegmatite, extreme care is exercised in its removal in order to minimize damage to the crystals and to keep the sheets intact. If small explosives and drilling are used, care must be taken to avoid penetrating the mica pocket. The charge needs to be just sufficient to shake the mica free from the host rock. Next, the mica is hand-picked and placed in boxes or bags for transport to the location where it will be graded, split and cut to various specified sizes for sale. This process of assessing, grading, splitting, cutting and trimming is done by hand. This means that sheet mining is always a labor-intensive process, and therefore not considered economical in countries where labor costs are higher than the relative value of the mica. This is particularly true when other countries with good sheet mica deposits have much lower labor costs. Sheet mica is considerably less abundant than flake or scrap mica. The costs involved in locating the vein, and the unpredictable quality and quantity of the mica once the vein has been located and worked, make it an economically risky mining procedure. Therefore, although the United States has sheet mica resources, the country imports most of its sheet mica, and sheet mica production there has declined to almost nil due to the high costs of mining and labor.

**Mining of scrap mica:** - Scrap mica is produced either in the course of mining sheet mica, or is recovered as a by-product or co-product from the mining of other naturally occurring minerals including feldspar, quartz and kaolin (a clay-like material). In the first case, scrap mica is basically a by-product of the sheet mica mining. The waste (the scrap mica), as part of the process of sheet mining, results as scrap mica to crude of approximately 60 to 90 percent. Another source gives a far lower percentage, indicating that a good quality mica deposit may result in 10 per cent commercially useful mica sheets while the rest can be sold as scrap mica. When the quality of a mica deposit is low, the total output from a mine may be sold as scrap mica. India has vast resources and deposits of sheet mica. Therefore, practically all of the country's scrap mica is derived from its sheet mica production. The best quality of scrap mica is considered to be the by-product of sheet mining. Although the US has sheet mica resources, the majority of scrap mica produced in the US is recovered as a by-product or co-product of domestic feldspar and kaolin beneficiations obtained from open quarries as well as from other micaceous rocks. This quality of this scrap mica is considered to be far inferior to the Indian grade and quality, and is only suitable for use as a raw material by the ground mica industry. Scrap mica that is a by-product of sheet mining is said to possess the essential quality for use in reconstituted mica paper, mica flakes and powder for the pearlescent pigment and cosmetic industries. In particular, ‘factory’ scrap is considered to be the highest grade and quality of scrap mica, and is favored for the manufacturing of mica paper. This type of scrap is obtained during the course of trimming and fabricating sheet mica in the factory with sharp knives, and is also recovered during the cutting and stamping of sheet mica into pieces of specific sizes and shapes.

Conclusions

Datasets vary considerably, and this is indicative of wide gaps in knowledge and lack of oversight and authority connected with mica markets All of the available data on mica production varies considerably, and must be accepted as estimates and indications. At the national level, several countries lack data. The lack of data for China is especially problematic, given that the country not only produces, exports and imports mica, but that it is a manufacturing powerhouse for many mica-containing products including electrical and electronic components and devices, paints, coatings, cosmetics and automobile parts. Mica is an undervalued and underreported commodity this report concludes that mica is a massively undervalued commodity, since it has a much wider use across more industrial sectors than previously understood. In particular, this includes the automotive and electronics sectors. There is virtually no literature or analysis available on the global mica market, and no real interest from financial or commodity markets given the mineral's low profile and the steady, reliable supply of low-cost, high-grade mica from non-western countries. There is also no real authority on the matter, and even geological experts know very little about production figures or mining conditions.