

# KYANITE - PROPERTIES AND INDIAN OCCURRENCES

Kyanite which is an aluminium silicate with chemical formula  $Al_2SiO_5$ , belong to the Sillimanite group of minerals *high alumina refractories*. Especially, raw Kyanite is extensively used for making high alumina *insulation Refractory Bricks*, comprising Sillimanite, Kyanite, Andalusite, Dumortierite and Topaz. Kyanite is an important raw material for

Apart from refractory industry kyanite particularly its blue variety, is also used as gem stone. The kyanite gem stone is believed to possess certain metaphysical properties with its ability to keep the mind calm and anxiety under control. The name Kyanite was derived from the Greek word Kyanos which means blue.

## Mineralogy of Kyanite

Kyanite is found as subhedral and tabular to elongated, thin, bladed crystals having blue or light-green colour in the form of crystalline aggregates in schists, gneisses, granite pegmatite and occasionally in eclogites. The crystal system is Triclinic; optically kyanite is colourless and feebly pleochroic from pale-blue to colourless with one set of perfect cleavage, first and second order interference colour (yellow, grey and blue). The distinguishing features of kyanite are its higher refractive index than those of Sillimanite and Andalusite while birefringence is lower. The oblique extinction angle up to  $32^\circ$  together with the biaxial interference, negative optic sign, and large optic axial angle are also distinctive for kyanite. Its hardness varies from 4 to 7 (Moh's scale) and specific gravity is around 3.6-3.7.

## Indian Occurrences

In the Indian subcontinent very good gem quality kyanite is found Nepal.

Kyanite is formed at medium temperatures and high pressures in a regionally metamorphosed sequence of rocks and is found associated with minerals like - muscovite, quartz, garnet, staurolite and rutile. Kyanite is also found as detrital mineral. For the Use of Kyanite in Refractory Industry the Directorate General of Technical Development (DGTD) has recommended the following specification:

	Grade-I	Grade-II	Grade-III
Al <sub>2</sub> O <sub>3</sub> (min)	58%	54%	46-48%
Fe <sub>2</sub> O <sub>3</sub> (max)	1.5%	1.5%	2%
PCE (min)	37 (Orton)	37 (Orton)	

Recoverable reserves of medium to high grade kyanite in India and the current trend of production-utilization causes serious concern because of dwindling availability of this mineral in India. During 1960's the hard, massive, lumpy variety of kyanite with Alumina content more than 61% and Iron content around 0.8% of *Lapsa Buru mines in Kharswan* (Bihar) was the largest deposit in the world. Today the source has dried up. Only poorer quality is now available which can not be used as such. Deposits of kyanite available in a few other places some of which are being mined and supplied at present are -

**Chemical Compositions of Indian Kyanite deposits:**

	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	TiO <sub>2</sub>	CaO	MgO	Na <sub>2</sub> O + K <sub>2</sub> O	LOI
Lapsa Buru (Bihar)	34.8	61.1	0.5 - 1.3	--	0.2 - 0.3	0.2	--	0.5
Singhbhum (Jharkhand)	46.5	45.97	0.5	1.5	--	--	--	1.1
Kudineerkati (Karnataka)	40.32	58.15	1.7	Tr.	0.52	--	--	1.32
Sulia (Karnataka)	32.8	61	1.85	2.7	--	--	--	1.65
Purulia (West Bengal)	38.8	46.65	2	Tr.	--	--	--	1.65
Khammam (A.P.)	51.92	27	11.25	--	--	--	--	--

Source : <http://viewforyou.blogspot.in/2009/02/kyanite-mineralogy-and-indian.html>