



VARIOUS TYPES OF RUDRAKSHA BEADS, THEIR BENEFITS AND FTIR SPECTRA

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ABSTRACT:

The word rudraksha, originated from two Sanskrit words Rudra & Aksha, (Rudra means Lord Shiva, Aksha means Eye). The rudraksha bead is the dried fruit of the tree *Elaeocarpus Ganitrus*. Rudraksha farming is a difficult process due to the slow sprouting from the beads. Depending on the humidity of the soil, it usually takes 1-2 years for a tree to sprout. Rudraksha is grown in subtropical climatic regions with temperature ranges of 25-30 degree centigrade. The tree starts giving fruit after 7 years. A single Rudraksha tree bears beads in all different faces or mukhis at the same time. The higher mukhis or faces are very rare. Most common Rudraksha bead is the five faceted. The environment and location of Rudraksha trees plays a major role in the bead formation and the type of bead formed. Rudraksha beads do possess powerful electromagnetic, paramagnetic and inductive properties. The healing powers of the Rudraksha bead are derived from such properties.

This study attempts to guide the reader between the various types of Rudraksha Beads and their benefits. Paper also deals with FTIR spectra of Rudraksha Bead.

FTIR can be routinely used to identify the functional groups and identification/quality control of raw material/finished products. FTIR spectra of Rudraksha Bead is obtained at room temperature by using an FTIR Spectrophotometer - Perkin Elmer - Spectrum RX-IFTIR. The spectra is collected in a range from 450 to 4000 cm^{-1} .

Interpretation of FTIR Spectra of Rudraksha Bead shows presence of various functional groups such as

Alkane - CH_3 - C Methyl, CH_3 - (C= O), - CH_2 - Methylene, CH_2 - (C= O), - CH_2 - (C = N), >CH , Ethyl, n-propyl;

Alkene - Vinyl - $\text{CH}=\text{CH}_2$, $>\text{C}=\text{CH}_2$

Alcohols - Secondary CH-OH

Acids - Carboxylic acids COOH


Esters - Formates H-CO-O-R, Acetates - CH_2 -CO-O-R, Propionates - CH_2 -CO-O-R, Butyrates an up - CH_2 -CO-O-R,

Acrylates =CH-CO-O-R, Fumarates =CH-CO-O-R, Maleates =CH-CO-O-R, Benzoates, phthalates -CO-O-R;

Aldehydes - Aliphatic Aldehydes - CH_2 -CHO;

Ketones - Aliph. Ketones CH_2 -CO- CH_2 ;

Amides -CO-NH₂;

Anhydrides - Normal anhydrides C-CO-O-CO-C, Cyclic anhydrides 

Key Words: *Elaeocarpus Ganitrus*, Rudraksha Bead, Mukhi, FTIR Spectra

INTRODUCTION

The word rudraksha, originated from two Sanskrit words Rudra & Aksha, (Rudra means Lord Shiva, Aksha means Eye).[1, 2] The rudraksha bead is the dried fruit of the tree *Elaeocarpus Ganitrus*. Rudraksha farming is a difficult process due to the slow sprouting from the beads. Depending on the humidity of the soil, it usually takes 1-2 years for a tree to sprout. Rudraksha is grown in subtropical climatic regions with temperature ranges of 25-30 degree centigrade. The tree starts giving fruit after 7 years. A single Rudraksha tree bears beads in all different faces or mukhis at the

same time. The higher mukhis or faces are very rare. Most common Rudraksha bead is the five faceted. The environment and location of Rudraksha trees plays a major role in the bead formation and the type of bead formed. For example the Himalayan beads seem larger, heavier and more powerful due to the environment they grow in. The seed is produced by several species of large evergreen broad-leaved tree in the genus [Elaeocarpus](#), with [Elaeocarpus ganitrus](#) being the principal species. The Rudraksha fruit is blue, but turns black when dried. The central hard seed may have 1 to 21 faces. The Rudraksha tree found

from sea level up to 3000 meters above. The percentage compositions of the gaseous elements present in a Rudraksha was determined by C-H-N Analyzer and by Gas

chromatography. Rudraksha beads contain 50.031 % carbon, 0.95% nitrogen, 17.897% hydrogen and 30.53% oxygen.



Figure 1. Rudraksha Tree

Rudraksha beads are classified on the basis of the number of mukhis / faces - the clefts and furrows - they have on the surface. Each bead has a different effect, depending on the number of mukhis it has. These are vital from the astrological viewpoint, since it is believed that Rudrakshas of different mukhis please different planets. The scriptures speak of 1 to 38 mukhis, but Rudrakshas of 1 to 13 mukhis are commonly found. 14-21 are rare ones.

Rudrakshas give several beneficial effects to the wearer and at the same time do not have any negative effects. Hence anyone can wear any Rudraksha. No combination is bad while wearing rudraksha, all combinations are good as rudrakshas dont have any negative effects. Many astrologers have also worked on Rudraksha. They suggest 'Mukhi' based on Birth Rashi and Nakshatra. However one could wear according to the needs / desires to be fulfilled.



One Faced

Two Faced

Three Faced

Four Faced

Five Faced

Six Faced

Seven Faced

Eight Faced



Figure 2. Various types of Rudraksha Beads

As scripted in the ancient scriptures, Rudraksha beads do possess powerful electromagnetic, paramagnetic and inductive properties. The healing powers of the Rudraksha bead are derived from such properties. Blood circulation and heart beats automatically induce a magnetic

field around the body and particularly the heart region. Accordingly, a balancing force is exerted on the heart to regulate it if it starts beating above or below normal rates. This action helps to ensure ideal blood circulation in the body. Depending upon the polarity and intensity of the

induced magnetic field, Rudraksha beads transmit subtle electrical and inductive impulses with opposing polarity and intensity. When Rudraksha beads are placed over the heart, they act to stabilize the heart beat. Thus, the stated beneficial effects of the Rudraksha bead have been proved scientifically as well.

According to the Ayurvedic medical system, wearing Rudraksha can have a positive effect on the heart and nerves, and relieve person from stress, anxiety, depression, palpitations and lack of concentration. It is also known for its anti ageing effect, and electromagnetic and inductive properties. People with high blood pressure have been found benefited from the use of Rudraksha seeds.

Elaeocarpus ganitrus grows in the area from the Gangetic plain in the foothills of the Himalayas to Southeast Asia, Nepal, Indonesia, New Guinea to Australia, Guam, and Hawaii.[3] Rudraksha seeds are covered by an outer husk of blue when fully ripe, and for this reason are also known as blueberry beads. The blue colour is not derived from pigment but is structural. It is an evergreen tree that grows quickly. The Rudraksha tree starts bearing fruit in three to four years from germination. As the tree matures, the roots form buttresses, rising up near the trunk and radiating out along the surface of the ground. Rudraksha beads are the material from which *mālās* are made. The term is used both for the berries themselves and as a term for the type of *mālā* made from them.[4] In this sense, a Rudraksha is a rosary, used for repetitive prayer (*japa*), a common aid to worship in Hinduism and other faiths. Rudrakshas are also used for the treatment of various diseases in traditional Indian medicine.[5] A common type has five divisions, and these are considered to be symbolic of the five faces of Shiva. It should only be worn on a black or red string/thread or, rarely, a gold chain.[6, 7] Rudraksha malas have been used by Hindus as rosaries from at least the 10th century [8] for meditation purposes and to sanctify the mind, body and soul.

Biology of rudraksha has been summarized, particularly recent research on the remarkable fruit colour.[9] The brilliant blue of the fruit is caused not by a blue pigment, but by the

structure of the cuticle which reflects blue light; thin pieces of skin are green in transmitted light [10]. Blue fruit colour is normally caused by anthocyanins, modified by their association with metals or other flavonoid pigments [11]. However, no such anthocyanins were extractable in acidic methanol in rudraksha fruits,, suggesting that the basis for colour production may well be structural [12]. Three physical methods produce colour in animals: thin film interference, Tyndall scattering, and diffraction [13]. As for iridescent coloration in leaves [14], the basis of the blue iridescence in rudraksha fruits also appears to be thin film interference. The blue coloration of rudraksha fruits is not reduced by immersion in water; if anything the intensity is enhanced. In *Selaginella willdenowii* and *S. uncinata* blue leaf iridescence was removed by contact with water, suggesting a location at the surface of the upper epidermis [15, 16]. In other iridescent-leaved plants, colour was not affected by contact with water, indicating a location beneath the surface [17, 18].

This review attempts to guide the reader between the various types of Rudraksha Beads and their benefits. Paper also deals with FTIR spectra of Rudraksha Bead.

METHODOLOGY

FTIR Spectrophotometer - Perkin Elmer - Spectrum RX-IFTIR

FTIR can be routinely used to identify the functional groups and identification/quality control of raw material/finished products. Spectrum RX-I offers fast throughput and rapid access to reliable and dependable IR results. High signal to noise ratio makes FTIR more useful for difficult samples. It has resolution of 1 cm^{-1} and scan range of 4000 cm^{-1} to 250 cm^{-1} . In the normal mode around 10 mg sample is required in the form of fine powder. The sample can be analyzed in the form of liquid, solid and thin films also.

Rudraksha Bead is grinded into powder and its FTIR spectra is obtained at room temperature by using an FTIR Spectrophotometer - Perkin Elmer - Spectrum RX-IFTIR. The spectra is collected in a range from 450 to 4000 cm^{-1} .

RESULTS AND DISCUSSION

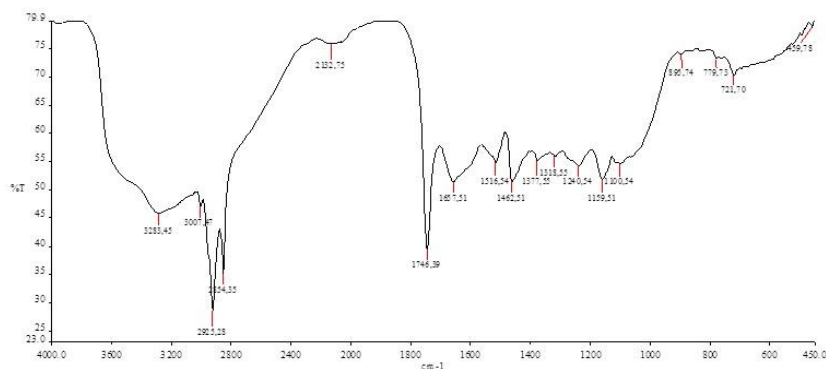




Figure 3. FTIR Spectra of Rudraksha Bead

Figure 3 shows FTIR Spectra of Rudraksha Bead. Interpretation of FTIR Spectra of Rudraksha Bead can be done as follows:

S.N.	Spectral Region Wave number cm^{-1}	Bond causing absorption	Pattern and Intensity of Band
1	3283.45	Alcohols - Secondary CH-OH	Broad and Strong Intensity
2	3007.47	-	Broad and Strong Intensity
3	2925.28	Alkane - CH_3 - C Methyl, CH_3 - (C= O), - CH_2 - Methylene, CH_2 - (C= O), - CH_2 - (C \equiv N), >CH , Ethyl, n-propyl; Alkene - Vinyl - $\text{CH}=\text{CH}_2$, $\text{>C}=\text{CH}_2$	Sharp and Strong Intensity
4	2854.35	Alkane - CH_3 - C Methyl, - CH_2 - Methylene, >CH	Sharp and Strong Intensity
5	2132.75	-	Broad and Moderate Intensity
6	1746.39	Esters - Formates $\text{H}-\text{CO}-\text{O}-\text{R}$, Acetates $-\text{CH}_2-\text{CO}-\text{O}-\text{R}$, Propionates $-\text{CH}_2-\text{CO}-\text{O}-\text{R}$, Butyrates an up $-\text{CH}_2-\text{CO}-\text{O}-\text{R}$, Acrylates $=\text{CH}-\text{CO}-\text{O}-\text{R}$, Fumarates $=\text{CH}-\text{CO}-\text{O}-\text{R}$, Maleates $=\text{CH}-\text{CO}-\text{O}-\text{R}$, Benzoates, phthalates  - $\text{CO}-\text{O}-\text{R}$; Aldehydes - Aliphatic Aldehydes $-\text{CH}_2-\text{CHO}$; Ketones - Aliph. Ketones $\text{CH}_2-\text{CO}-\text{CH}_2$; Anhydrides - Normal anhydrides $\text{C}-\text{CO}-\text{O}-\text{CO}-\text{C}$, Cyclic anhydrides 	Sharp and Strong Intensity
7	1657.51	Amides $-\text{CO}-\text{NH}_2$	Broad and Strong Intensity
8	1516.54	-	Broad and Strong Intensity
9	1462.51	-	Broad and Strong Intensity
10	1377.55	-	Broad and Strong Intensity
11	1318.55	Acids - Carboxylic acids COOH	Broad and Strong Intensity

12	1240.54	Acids – Carboxylic acids COOH	Broad and Strong Intensity
13	1159.51	–	Broad and Strong Intensity
14	1100.54	–	Broad and Strong Intensity
15	895.74	Acids – Carboxylic acids COOH	Broad and Moderate Intensity
16	779.73	–	Broad and Moderate Intensity
17	721.70	–	Broad and Moderate Intensity
18	459.78	–	Broad and Moderate Intensity

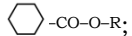
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CONCLUSION

FTIR can be routinely used to identify the functional groups and identification/quality control of raw material/finished products.

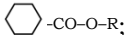
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REFERENCES

1. The translation of rudrākṣa as "Rudra's Teardrops" and definition as berries of *Elaeocarpus ganitrus*: Stutley, p. 119.
2. Stutley, M. (1985). *The Illustrated Dictionary of Hindu Iconography*. New Delhi, India: Munshiram Manoharlal Publishers. ISBN 81-215-1087-2.
3. Koul, M. K. (2001-05-13). "Bond with the beads". *Spectrum*. India: The Tribune.
4. Lee, D. W. (1991). "Ultrastructural Basis and Function of Iridescent Blue Color of Fruits in *Elaeocarpus*". *Nature*. 349 (6306): 260–262. doi:10.1038/349260a0.
5. Das, Subhamoy. "The Holy Rudraksha: Super Seed".
6. For the five-division type as signifying Shiva's five faces and terminology pañcānana, see: Stutley, p. 119.

7. Seetha, K. N. (2008). Power of Rudraksha (4th ed.). Mumbai, India: Jaico Publishing House. ISBN 978-81-7992-844-8.
8. Laatsch, M. (2010). Rudraksha. Die Perlen der shivaitischen Gebetsschnur in altertümlichen und modernen Quellen. Munich: Akademische Verlagsgemeinschaft München. ISBN 978-3-89975-411-7.
9. David W. Lee, The biology of rudraksha, Current Science, Vol. 75, No. 1, 1998
10. Corner, E.J.H., Wayside Trees of Malaya, Government Printing Office, Singapore, 1952, 2nd edn.
11. Brouillard, R., Phytochemistry, 1983, 22, 1311-1323.
12. Lee, D. W., Nature, 1991, 349, 260-262.
13. Fox, D.S., Animal Structural Colors and Biochromes, University of California Press, Berkeley, 1978.
14. Lee, D. W., Am. Sci., 1997, 85, 56-63.
15. Lee, D. W. and Lowry, J.B., Nature, 1975, 254, 50-51.
16. Hebant, C. W. and Lee, D. W., Am. J. Bot., 1984, 71, 216-219.
17. Graham, R. M., Lee, D. W. and Norstog, K., Am. J. Bot., 1993, 80, 198-203.
18. Gould, K. S. and Lee, D. W., Am. J. Bot., 1986, 83, 45-50.

