THE GEM & JEWELLERY EXPORT PROMOTION COUNCIL

GEM TESTING LABORATORY
Information Circular

Volume 43 January 2006

Gem Testing Laboratory wishes all the readers of L.I.C. a Very Happy and a Prosperous 2006

Gemstones from Nepal!

Nepal - the birthplace of the founder of Buddhism- Siddartha Gautama is also the birthplace of number of gemstones of varying colours and qualities. Few of the gemstones found in the region include aquamarine, almandine garnet, danburite, epidote, diopside, kyanite, iolite, feldspar, andalusite, hematite, hambergite, pyrite, ruby, sapphire, quartz, sphalerite, spinel, sodalite, topaz, tourmaline, and zircon.

Nepal is a small landlocked rocky mountainous country situated along the Himalayan mountain chain in southern Asia, surrounded by Tibet in the north and India in south, east and west. The country is known for having the highest elevation of any country in the world. In all, seven out of eight highest peaks in the world can be found in Nepal, including the Mount Everest.

The major gemstones reported in the isolated locations of Nepal are ruby, sapphire, kyanite, tourmaline and garnet. The deposits of ruby and sapphire have been discovered in Ganesh Himal area of the Dhading district in east-central Nepal, 68 km north- northwest of the capital city of Kathmandu, and 40 km west of Trisuli Bazar.

The Chumar and Ruyil deposits lie in the northern Dhading district, Bagmati zone, in central Nepal. The Chumar deposit lies at an altitude of 3800 meters; it is approximately 1.2 km south of the Mandtra Danda mountain peak, near the Tamang village of Burang. The Ruyil deposit lies at about 6 km northeast of Chumar, at an elevation of about 4200 meters.

The colour range of rubies vary from pure red to pink to a purplish pink with strong violet coloured zones sometimes making them bi-coloured. Along with the ruby deposits, fancy coloured sapphires have also been discovered in Nepal.

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IN THIS ISSUE....

"Paraiba" Tourmaline electric and elusive!!

Unusually vivid 'neon' blue, green- blue, green and violet coloured tourmalines from northeastern Brazil are renowned in the gem trade as "Paraiba" tourmalines.

Members of the gem trade typically use the terms 'neon' or 'electric' preferring bright, saturated greenish blue or violetish blue to blue and to a lesser extent, 'purer' greens.

The term 'Paraiba' is derived from the location Paraiba in northeastern Brazil, from where it was discovered and currently mined.

Tourmaline is the world's most colourful gemstone but, with the discovery of Paraiba deposit in Brazil in 1982, no tourmaline had ever shown the sizzling shades mentioned above. In fact, this colour is not seen with any gemstone consistently.

Tourmaline- the multi- coloured gemstone family shows practically all the colours of rainbow. The elements like iron, manganese, chromium and vanadium gives these rainbow colours to tourmaline, but the rare 'Paraiba' tourmaline is coloured by the element copper, which was never found in tourmaline, before the discovery of the deposit in 1982.

In addition, it often also contains the traces of manganese; the combination of these two elements- copper and manganese give rise to a wide range of beautiful and fascinating colours in Paraiba tourmalines: emerald green, turquoise to sky blue, sapphire blue, indigo blue, dark purple to red.

Higher concentrations of copper gives much desired brilliant blues, while purple and red are produced by manganese.

Since the initial discovery of this beautiful tourmaline, production has been sporadic and has not kept up with the strong market demand, but a recent report states that the steps have been taken to regulate the supply to the world market.

Mining is currently taking place at the Mina da Batalha and Sao Jose da Batalha in Paraiba state. Other locations being Mulungu and Altos dos Quintos mines in Rio Grande do Norte state in Brazil.

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Nepal....Continued from page 1

Kyanite is another important gem found along with rubies and sapphires at Ganesh Himal. The stones discovered here have an intense blue colour with high degree of transparency.

Aquamarine of varying shades and qualities from light blue to dark blue, opaque to transparent have been discovered from Nepal. The principal mines are around Hyakule, Sankhuwa Sabha district, Kosi Zone, near the towns of Chainpur and Kandbari and east of Arun River on the west slope of Jaljale Himal.

Tourmaline and almandine garnet are the other major gemstones being mined in Nepal.

Abrasive quality garnets are supplied in huge quantities from Sankhuwa while transparent crystals of various colours of tourmaline is being mined at Hyakule and Phakuwa region. Other deposits are at Langtang valley and Naje in Manang district.

The major recorded deposits are as follows :

Ruby, Sapphire : Gandaki- Ganesh Himal (Dhading), Ruyil, Chumar

Tourmaline : Hyakule, Phakuwa, Langtong Valley, Naje (Manang district), Sankhuwa Sabha- Taplejug, TopkeGola, Suketh, Jajarkot

Garnet : Sankhuwa (Sabha district)

Aquamarine, Beryl : Hyakule, Phakuwa (Sankhuwa Sabha district), Sankhuwa Sabha- Taplejug, TopkeGola, Khaptod

Other stones are found along with the above-mentioned gems.

Map showing major gem producing regions in Nepal.

Although Nepal has limited industrial development and relatively meager mineral wealth, it is blessed with a broad range of minerals mentioned in paragraph 1.

Gems have been recovered in Nepal since 1934, when tourmaline and aquamarine were first discovered there, while rubies and sapphires were discovered much later in the early 1980s.

Research indicates that larger reserves of number of gemstones are yet to be discovered including rubies and fancy coloured sapphires.

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Paraiba Tourmaline....Continued from page 1

Some tourmalines of the same colours coloured by copper are also been discovered from Nigeria but slightly lighter in shade and in much lesser quantities.

The gemological properties of the Paraiba tourmalines are more or less similar to other tourmalines, with a little difference lying in the presence of some metallic flakes of copper as inclusions.

Treatments...

Heating is the most common technique applied on this gem variety. The treatment is carried out in a simple electric furnace without any atmosphere controls at the temperature ranging from 480° to 620°C. In general, the following colour changes can be achieved with heat treatment:

- Purplish red to 'emerald' green
- Purple to light purple
- Greenish blue to 'neon turquoise blue'
- Violet violetish blue to light blue neon blue
- Dark blue to neon blue

The Paraiba tourmaline is also imitated by a number of gemstones. Few of them with the separation are as follows :

Property	Tourmaline	Apatite	Beryl	Glass
Crystal System	Trigonal, striated prisms	Hexagonal	Hexagonal	Amorphous
Optic Character	Anisotropic Uniaxial	Anisotropic Uniaxial	Anisotropic Uniaxial	Isotropic
RI.	1.624-1.644 D. R. 0.020	1.640-1.645 D.R. 0.005	1.570-1.580 D.R.0.008	1.50-1.90
S.G.	3.06-3.10	3.15-3.23	2.71	2.45-4.5
Inclusions	Trichites, liquid Inclusions copper flakes, etc	Black needles, cleavage cracks discs, etc	Rain inclusions, iridescent films, etc	Gas bubbles, swirl marks
Spectrum	Copper spectrum in violet-blue region, some absorption in yellow	Series of lines in yellow region at 580nm, lines at 540 &520nm.	Not characteristic	None

Over the past decade, these 'Paraiba' tourmalines have enjoyed a strong demand due to their bright, saturated colours. The exceptionally vivid nature of 'Paraiba' tourmaline can only be appreciated after the stone has been cut. When it is facetted, a unique fire and brilliance is displayed, which makes the stone to glow.

The beauty and vividness of colour shown by Paraiba tourmalines acquired a considerable popularity within a short period of time and today these stones belong to the most coveted and expensive gems of the world.

Heat Treated Yellow Sapphires - Then and Now

By Chaman Golecha, Executive (Technical & Training)

The trade had known the heat treatment of corundum for many years now and has witnessed transformation in the technique of treatment over the years resulting in changes in the colour shades and quality of treated stones.

One of the major changes witnessed by all dealing / working with stones, especially yellow sapphires, is the change of colour shade from yellow to brownish/ orangish yellow- the sapphires that are better known as Bangkok treated!

The basic reason for these changes is the change in the technique of treatment. Previously, the stones were heated without any additive but now what are known as 'Bangkok' treated is heated along with some additive thereby changing the colour shade.

The exact causes and the mechanism of the treatments have started to unfold only recently.

To understand the colour enhancement technique, it is necessary to understand the cause of colour in natural yellow sapphire, which has a pale colour.

Colour in Untreated Natural Yellow Sapphires

Natural Yellow coloration in sapphires is caused by two main mechanisms/groups: The first group has its colour caused by the presence of iron in specific states and position in the lattice. Very high amounts of iron is required for this mechanism of coloration and sapphires from only few sources like Australia, Thailand, North Madagascar, Tanzania, etc have that much iron content.

The second group of natural yellow sapphires has its colour caused by the "colour centers" which involves some defects in the crystal lattice. Such sapphires originate from sources like Sri Lanka. This second group can be further subdivided into two on the basis of the colour stability.

The first sub-group has its colour caused by irradiation, which is unstable. It disappears on the exposure to heat/light easily. The second sub-group has its colour stable up to about 500°-600°C. In this case the yellow colour is stabilized by the presence of various divalent cations like iron or magnesium or trivalent cations like chromium or iron or by several di- and tri-valent cations.

Presence of Magnesium is very important in the stability of the yellow colour. The essential conditions required to develop a stable colour center include: Presence of Magnesium (Mg) and Iron (Fe), Mg being in excess of Titanium in the structure, presence of high amount of oxygen in the formation atmosphere and high formation temperatures.

Yellow colouration by the Irradiation Treatment:

Yellow colour can be obtained from Colourless sapphires by the irradiation of the stones using various rays. The colours produced are slight to deep yellow caused by temporary colour centers. Such colour centers are easily destroyed by low temperatures and so are quite unstable

Yellow Colouration by 'only' Heat Treatment:

Near colourless or pale coloured yellow sapphires can be darkened by the use of heat. This involves exposing the sapphires to high temperature, causing the formation of "Temporary colour centers" which gives a yellow colour to the stone. The colours fade very easily under the exposure of sunlight (for around five days) or under lamplight (for some hours). The colour is unstable as the temporary colour centers are destroyed easily because of the absence of appropriate stabilizing agents. Even today such treatments are performed, especially in Sri-Lanka that fades even in routine usage over a period of around 2-3 years.

Yellow Colouration by Heat Treatment with additive:

The corundum is heated at elevated temperatures of around 1800°C along with some additives like Beryllium, Magnesium or even lithium for the period varies from 2 hours to 200 hours.

The use of chemicals in conjunction with high temperature introduces the foreign substance/element in to the structure of stone to modify colour, also known as Diffusion. The sapphires thus receive constituents from outside enables the creation of a new colour or colour component.

The diffused elements (Mg and Beryllium) play a major role in stabilizing the colour centers, even a stable yellow colour can be formed if the conditions are ideal. The atoms of Mg or Be are very small, therefore they penetrate till the core of the crystal producing a uniform colouration.

The basic difference lies between the two techniques is the end result, where one has got a purer yellow colour, while one has a brownish component. But, this colour shade cannot be taken as a conclusive differentiating point as simple heating has produced the similar shade earlier.

Identification of heated sapphires can be made on the presence of internal features like dotted/ diffused silk, burst halos, healed fingerprints, melted crystals and the use of sophisticated analytical equipment like Laser Induced Breakdown Spectroscopy (LIBS) or Laser Ablation-Inductively Coupled Plasma- Mass Spectroscopy (LA-ICP-MS) in order to detect the presence of Beryllium or Magnesium thereby identify the treatment conclusively.

Jaipur Jewellry Show 2005....
.....The mystique of colours

The Jaipur Jewellery Show in its third year yet again pointed the importance of Jaipur in the International Gem Trade. The show was held from 23rd to 26th December 2005 at the RajMahal Palace, Jaipur.

Mr.Schitzer, the president of World Federation of Diamond Bourses, inaugurated the show where a number of distinguished personalities from the trade were also present.

The show was scintillated with well over two hundred and fifty booths, where coloured stones and diamond jewellery, loose cut and polished gemstones, bead strings, in fancy colours, rough gemstones, machinery and equipment were on a display.

The 23rd evening was followed by The Fashion Show, being attended by distinguished personalities like the Honorable Chief Minister of Rajasthan, Smt. Vasundhara Raje, other politicians, and the local and international members of the trade. The show highlighted the use of coloured gems in the jewellery being the latest trend where the tradition meets the modern era.

The major highlight of the Jaipur Jewellery Show was "The Navaratna" section, which showcased the nine major stones in India. Apart from this, the colours and varieties of pearls, the range of coloured gemstones of all kinds, jewellery ranging from the old Victorian to latest fashion became the center of attraction.

The numbers of booths were studded with blue topaz, fancy coloured sapphires, emeralds, rubies, quartz that justifies the importance of Jaipur as the gem city in the world gem market.

Gem Testing Laboratory, Jaipur also took an active participation in the show by way of giving gem testing facility free of cost during the show for all the four days.

A number of people were benefited by the facility, which included traders, the buyers during the show and the direct consumers including shocked housewives, who were wearing synthetic stones as natural for many years. There was a great response towards the testing facility, which can be judged by the number of stone being tested during the show that was well over 500.

Overall the show was a grand success as the Gem Testing Laboratory is concerned with more people showing interest in the Testing/ learning part of the Gem Trade.

Just in the third year, Jaipur Jewellery Show has gained a lot in the national and international gem market and proved the importance of Jaipur in the field of coloured stone. And next year, the show has been scheduled from 22nd to 25th December 2006.

Talent that made us proud!!
The creation of History
First Indian to chieve Anderson Bank Prize

Gem Testing Laboratory, Jaipur has been conducting the Gemmology Diploma examinations on behalf of Gem A, UK for the past fourteen years. The examinations are conducted twice a year in January and in June. A number of candidates appear every year through the center.

In the June 2005 Diploma Examination (FGA) conducted by Gemmological Association of Great Britain, Mr. Chaman Golecha and Gem Testing Laboratory has created a history by winning the highest and most prestigious prize of the Gemmological Association.

The Anderson Bank Prize for non-trade candidate. He has secured the highest marks in the world in Diploma Examinations.

This is the first time in the history of Gemmological Association that an Indian has won this prestigious award. Mr. Golecha has been awarded on 31st October 2005 in London in the Goldsmith Hall studded with all the eminent gemmologists of the world.

Mr. Golecha has done Master's Diploma in Gem Identification from Gem Testing Laboratory and then appeared for the Gem A's Diploma Examination (FGA). He has also received GJEPC award for the best candidate in the Master's Diploma Batch No. 9.

Gem Testing Laboratory shares the privilege in creating the history, which has been made by Mr. Golecha. We wish him all the very best and hope he will make a valuable contribution to the Gem and Jewellery Trade.

Towards this direction, Gem Testing Laboratory has appointed him as Executive, Technical and Training, where he will be handling t he basic activities at GTL.

Continued from page 2.... Nepal.....

Looking at Nepal's mineral wealth, it can become one of the important supplier in the world market but the isolated locations, high altitudes, harsh seasonal weather conditions and other difficulties have contributed to the sporadic mining activities and relatively small amounts of gem material produced to date.

To take the exploration of these deposits to its full potential, modernized mining equipment and techniques will be necessary, where the local government and the multinational companies involved in mining and exploration will play the most important role.

Some Interesting Stones Through GTL....

Blue Opal from Peru : Opal, generally known for its play of colour in white and / or black background. Orange coloured variety Fire opal is other known gem, but opal in blue colour? This blue opal was recently certified at GTL, supposed to be originated from Peru, the source not known for many gemstones.

The gemological properties for the blue opal were consistent with the other opal except the specific gravity of 1.67 as compared to 1.90 to 2.20 for others. Refractive Index measured at 1.47, strong ADR/SR effect under cross-polars and white cloudy crystalline aggregates under magnification.

The stone was also checked for any artificial colouration, but no features were observed under ultra violet fluorescence, visible spectrum and Chelsea filter. Looking at the reactions under these instruments, the stone was concluded as naturally coloured.

Pezzottaite : A pinkish red coloured material led to certain controversies amongst major gemologists/ mineralogists. The visual appearance of the material is very similar to pink / red beryl and tourmaline.

The controversy was surrounded regarding the naming of this mineral, as the composition is similar to that of Beryl, with a difference lying in the percentage of 'cesium'. This high percentage of cesium changes the hexagonal structure of beryl to trigonal thereby changing the name to 'Pezzottaite' (refer LIC, Volume 39, October 2004)

Recently, we got a chance to examine and certify this gem. The properties had an exact match with the properties listed in the literature. The properties of Pezzottaite are very close to beryl and tourmaline, which make them a very close simulant.

Following are the properties:

Property	Pezzottaite	Beryl	Tourmaline
Composition	Beryllium Aluminium Silicate	Beryllium Aluminium Silicate	A Complex Silicate
R. I.	1.608-1.616	1.590-1.600	1.620-1.640
Birefringence	0.008	0.008	0.020
Optic Character	U -	U -	U -
S. G.	3.04-3.10	2.80	3.05
Magnification	Crystals, Rods.	Rain, Tubes	Trichites, Tubes, Doubling

On comparing the properties of the three materials - Pezzottaite, Red beryl and Tourmaline, It is very difficult to differentiate between these materials visually, but if the given tests are done with a care, these can be separated.

The stone have a very characteristic refractive index varying from 1.0 to1.60 to 1.62 with birefringence of 0.008. The only other stone is Topaz, which is biaxial as compared to Pezzottaite that is Uniaxial.

Dyed Augelite : A purple coloured bead was deposited at GTL for certification, which was sold as Charoite. On the initial glimpse the stone appeared Charoite with wavy fibrous sheen like patches.

But when the stone was examined using strong fiber optic light under microscope, clusters of short fibres or flakes were observed in random orientations. These fibers/ flakes were colourless / white on a white background with purple colour concentrations on the edges or surface of the clusters. This confirmed the artificial colouration of the material.

The detailed examination of the structure led us to conclude that this material cannot be Charoite, which has streak of fibres giving sheen, which was absent in the examined material.

The refractive index was measured at 1.57, and specific gravity at 2.70. Natural Augelite is colourless to yellowish in colour with no absorption spectrum, but this material exhibited strong absorption in green and yellow regions due to the presence of colouring pigment used. The stone also appeared patchy orange red in long wave and short wave ultra violet fluorescence- confirming artificial colouration with dyes.

The properties of this stone were also compared with Saussurite, another lesser-known mineral. The difference lies in the specific gravity and the structure. The SG measures at 2.65, and it exhibits a moss like pattern in yellow to green colours.

Mookaite : Also known as 'Mookite' was not submitted for certification but few samples have been donated to the GTL. Visually, this material looks like a rock in various colours of brown, cream, yellow, black, purple and red. It has been described as chert, opal and chalcedony, because of the appearance.

The term 'Mookaite' is an unofficial, local name for a silicified porcelanite, which forms, in the weathering profile of a geological formation known as 'Windalia Radiolarite' (WR).

Windalia Radiolarite has been classified as a shallow marine deposit in onshore areas and is known to have been associated with a major flooding of the Australian continent by sea, which is the only source for this rock till date.

Mookaite is a unique rock type; it consists largely of microscopic organisms known as Radiolarians, which possess an unusual skeletal structure made up of opaline silica. These organisms were deposited as sediments along with remains of other sea creatures, with the time these sediments solidified as rock by silica, carried in ground water.

The donated samples exhibited refractive index at 1.54, while specific gravity varied between 2.40 2.60, hardness between 4 and 7. All these properties depend on the degree of silicification. Mookaite has no cleavage, breaks with a smooth, conchoidal fracture.

GTL...Results...

Following candidates have been declared successful in the Gem Identification Courses.

Diploma in Gem Identification - Batch no. 34

1. Darricau Olivia - 1st Overall
2. Hari Shankar Lal - 1st Practical
3. Aditya Gupta
4. Kie Ay Tjiam
5. Varun Khandelwal
6. Sameer Sharma
7. Shagun Gupta
8. Shalabh Tak
9. Yeshu Sablania
10. M. Thongminlun Haokip
11. Edmund Thurm

Diploma in Gem Identification - Batch no. 35

1. Pankaj Ladha - 1st Overall
2. Arpit Jain - 1st Practical
3. Jatin Jain
4. Mohit Prasad
5. Narendra Jhanwar
6. Karan Khanuja
7. Narendra Singh
8. Sayed Imran Khan
9. Siddarth Jain
10. Voila Kapoor

Correspondence Course in Gem Identification

1. Namit Kocher
2. Deepa Ravindranath

Certificate Course in Gem Identification

1. Anup Kasera
2. Tanmay Jindel
3. Naresh Kumar Soni
4. Anand Modhani
5. Rajive Soral
6. T.R. Bharat Kumar
7. Sanjeev Bhandari
8. Ashish Saboo
9. Jitendra Singh Naruka
10. Gautam Totuka
11. Mohit Tambi

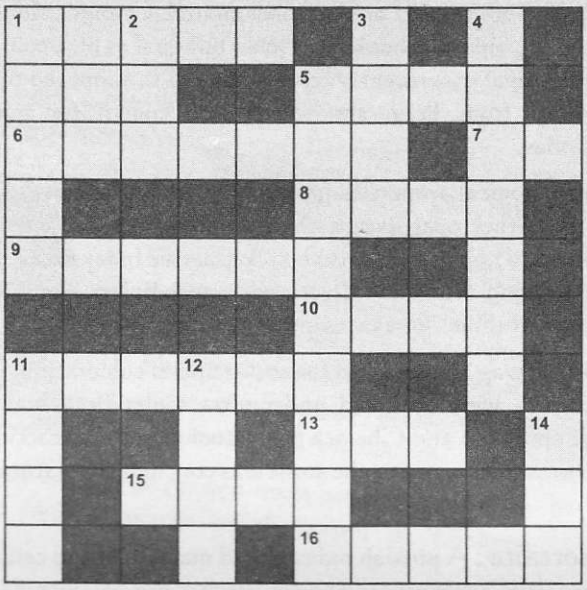
Masters' Diploma in Gem Identification

1. Mohit Challani
2. Gomita Sachdeva
3. Veeravalli Suresh

CONGRATULATIONS TO ALL OUR STUDENTS AND WE WISH THEM ALL THE VERY BEST IN ALL THEIR FUTURE ENDEAVOURS. WE HOPE THEY WILL MAKE A VALUABLE CONTRIBUTION TO THE GEM & JEWELLERY TRADE

GTLians' Corner.....

Cross word



HINTS

Across

1. a flat gem with carving above the girdle edge (5)
5. a common mineral inclusion in corundum resembling dense woven fabric (4)
6. a part of rough left on the cut diamond (7)
7. chemical symbol for the element commonly used for coating in aqua aura (2)
8. a noble gas commonly used for production of lasers (4)
9. repairing of cracks or fissures in a stone after its formation (6)
10. flame fusion and czochralski process are the types of this type of growth (4)
11. a component of lapis lazuli (6)
13. an acronym used for a leading world wide body involved in the development of the coloured gemstone industry (3)
15. name given to yellow/ brown diamonds with high concentration of nitrogen (4)
16. a name of ruby deposit in Nepal (5)

DOWN

1. a type of pearl with flame like surface features (5)
2. term used to describe the dull appearance of nephrite jade (3)
3. term used for treated diamonds irradiated with neutrons (4)
4. a radioactive gem (7)
5. the effect visible in synthetic sapphires when viewed under cross polars along optic axis direction (9)
11. a cloudy zone formed around a radioactive mineral inclusion (4)
12. a Chinese term for flat disk like carvingwith a hole in it (4)
14. a material commonly used as a filler in emeralds (3)

ANSWERS

Across: 1. cameo; 5. silk; 6. natural; 7. au; 8. neon; 9. healed; 10. melt; 11. hauyne; 13. ICA; 15. cape; 15. ruyil

Down: 1. conch; 2. mat; 3. pile; 4. ekanite; 5. sandmeier; 11. halo; 12. yuan; 14. oil.

GTL.... A Look At The Activities...

Testing and course fees at GTL have been revised, which will be effective from January 1st and April 1st 2006 respectively. The revised fees are as follows :

Testing (Fees w.e.f January 1, 2006)

S.No	Category	Fees in Rupees Member	Non-member	*On - Request* Specific category
1.	**a) Single Stone (Regular)** For any single stone - (Natural / Synthetic) other than Natural Ruby / Sapphire	300/- per stone	400/- per stone	• Filler identification 500/- (members) 700/-(non-member)
	b) Natural - Ruby/ Sapphire	500/-	700/-	
2.	**On-The-Spot (O.T.S.)** Single Stone (Regular) For any single stone- (Natural / Synthetic) other than the Ruby / Sapphire)	500/-	700/-	N.A.
3.	**Packet - Lot of similar coloured stones**			
	a. 5 to 9 stones	150/- per stone	200/- per stone	
	b. Over 100 pieces ,upto 499 pieces	5000/- per hundred	Valid for single stone variety eg. emerald , ruby, garnet etc.	
	c. 500 pieces and above ,	20,000/- for first 500		
	For every additional 100 pieces	2000/- per hundred		
4.	**Bead Strings** (all colours, Minimum 10.00cms.)	250/- rate per 2.5Cms	300/- rate per 2.5Cms	
5.	**Complete unit of jewellery with a minimum of five stones** (all colours)	200/- (rate per stone)	250/- (rate per stone)	

Note: Additional 10.2% service tax to be paid on testing fees under all categories.

Courses (Fees w.e.f April 1, 2006)

S.No.	Course	Course Fees (in Rs.)	Caution Deposit (in Rs.)	Total (in Rs.)
1.	Diploma in Gem Identification (Regular)	15,000	3,000	18,000
2.	Diploma in Gem Identification (Correspondence)	17,000	3,000	20,000
3.	Certificate Course in Gem Identification	13,000	3,000	16,000
4.	Master's Diploma in Gem Identification	35,000	5,000	40,000
5.	Short Courses			
	a. Navratna / 15 days	8,000	2,000	10,000
	b. 5 days	4,000	2,000	6,000

What's running these days: - Trend.... Blue Topaz

At the recent Jaipur Jewellery Show in December 2005, a number of booths were flooded with blue topaz in the shades ranging from electric blue to inky blue. The colour shades displayed at the show were obviously were not natural, all these fancy colour shades are a result of some sort of treatment. These shades can be produced either by much commonly known treatment on topaz - irradiation and is also produced by diffusion.

Colourless or brown colours produce blue colour of topaz by irradiation with gamma rays, high-energy electrons, neutrons and their combinations, which are more or less stable under normal conditions. In certain cases a combination of irradiation and heat is used to get the blue colour of topaz; heating removes the brown component. There are a number of fancy terms being used to describe different colours of blue topaz like; Cobalt blue, London blue, American blue, California blue, Super blue and Swiss blue.

Blue topaz is also produced by coating / diffusion process where a thin layer of cobalt is induced in to the stone. The penetration of colour causing impurity cobalt is very less and lies just below or on the surface. The colour is stable but may be removed by chipping, re-polishing or re-cutting.

The identification of irradiated topaz can be made on the visual colour shades, which are not found naturally; while diffusion treated topaz can be detected by observing the stone immersed in a heavy liquid under a strong diffused light; colour concentration along the girdle edge and or facet edges will be seen. Due to the presence of cobalt as colouring agent, the stone will appear red under Chelsea filter and will exhibit the cobalt spectrum at 540, 580, 630 nm.

Being inexpensive blue topaz is also imitated by a number of gemstones; few of them include synthetic spinel, glass, synthetic quartz, and apatite. Synthetic spinel and glass can be differentiated from topaz on the basis of optic character and /or pleochroism; synthetic quartz is identified by a lower heft- lower specific gravity of 2.65, and apatite by optic figure and lower lustre.

Stone	Optic Character	RI	SG	Inclusions / Other Features
Irradiated Topaz	DR, Biaxial positive	1.609-1.638 0.008	3.51-3.56	Cleavage cracks, non-miscible liquids, phase, fingerprints.
Diffusion Treated Topaz	DR, Biaxial positive	1.609-1.638 0.008	3.51-3.56	Cleavage cracks, non-miscible liquids, phase, fingerprints, colour concentration along girdle/ facet edge,. patchy colouration, Bands at around 540, 580, 630 nm
Synthetic Spinel	ADR	1.730	3.61	Gas Bubbles Bands at 540, 580, 630 nm UV Fluorescence : Red in LW, Chalky in SW
Glass	SR	1.45-1.60 SR	2.40-2.80	Gas Bubbles, Swirls, UV Fluorescence : Chalky in SW
Synthetic Quartz	DR, Uniaxial positive	1.544-1.553 0.009	2.65	Bread Crumb, Spicules, Seed Plate
Apatite	DR, Uniaxial negative	1.640-1.645 0.005	3.15-3.23	Black Canals, cleavage cracks, fingerprints

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