

# LAB INFORMATION CIRCULAR (L.I.C.)

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## Lighting..... Buying , Selling OR Testing.....

Gemmologist , GTL

**The light source you use could well make a major difference to your purchase , sale or simply your perception of the colour of the stone.**

In recent times there has been a renewed interest in the light source being used while buying, selling and in certification.

How many times have you thought "**There's no use showing the goods here this is a Buying light source and not a Selling one**". Many an office is fitted with lights which may be simulated daylight lamps, fluorescent lights or even natural daylight. But which lighting is considered Correct.

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## GTL Activities.....

### Educational

All new educational courses being conducted will remain closed during the months of April, May and June 2001. Courses currently in progress will continue.

Admissions for the following courses are open :

- **Diploma in Gem Identification** - 3 1/2 months  
Fees :Rs.15,000/- (Nationality - Indian),  
US\$ 350 (Others)  
Next Batch commences in July 2001
- **Diploma in Gem Identification - Correspondence**  
Fees : Rs.15,000/- (India) ; Rs.30,000/- (Foreign)  
US\$ 350 (India) US\$ 650 (Foreign)
- **Certificate Course in Gem Identification - 3 months**  
Fees : 15,000/- (Indian) US\$ 350 (Foreign)
- **Masters Diploma in Gem Identification - 5 months**  
Fees : Rs.35,000/-
- **Short Courses** are conducted as per individual requirements.

### Schedule for the year 2001 - 2002 :

- **Diploma Course in Gem Identification :**  
23<sup>rd</sup>.Batch : 9<sup>th</sup>.July 2001  
24<sup>th</sup>. Batch : 3<sup>rd</sup>.December 2001
- **Master's Diploma in Gem Identification :**  
4<sup>th</sup>. batch : 1<sup>st</sup>. July 2001  
5<sup>th</sup>.Batch : 1<sup>st</sup>. January 2002
- **Correspondence / Certificate and Short courses**  
: as per demand

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## Lighting (contd.).....

A number of different factors should be considered while **deciding the most practical light source**.

- The concept of colourless and coloured stones.
- In coloured stones which specific stone are you looking at - ruby, emerald or amethyst?
- The appearance of different qualities of a gemstone under various lighting and the degree of light reflections from the stone.
- Are you using natural daylight - if so, then which part of the world are you in, what time of day is it, which season is it .....
- This brings up the question of the feasibility of a uniform system of lighting - especially between buyer and seller.
- An understanding of the variations in the visual appearance of a coloured gemstone in different lighting will lead to a better understanding of why certain qualities of gemstones sell in certain countries and not in others.
- Of prime importance is also the quality of lighting being used in laboratories.
- Do all labs maintain a standardised lighting for grading of diamonds, observing the percentage of colour change in alexandrite or even simply the perception of colour?
- This is especially important when it comes to grading of stones - diamonds or coloured stones - the problem of consistency in reports.
- A factor which no doubt plays a role is the mental and physical status of the individual person, which if unstable would affect perception even with accurate lighting.
- Currently available are a number of different daylight lamps of different intensities and claiming uniform lighting systems - some with single tubes, some double, some have adjustable temperatures.

## The Traders Viewpoint .....

- First and foremost understand the appearance of the stone in which you deal - in various lighting.
- The most important lighting is that of North light. This has been a factor for most jewellers looking at stones in the Northern hemisphere.
- When the skies are cloudy only then we would resort to daylight lamps. But we would trust only north light first.
- To maintain a steady and consistent parameter, most offices have developed and are using a standard temperature lighting. This does away with the problems of an unsteady light source such as daylight.
- As far as labs are concerned there should be a better understanding - one lab to another. This would prevent contradictory lab reports.
- Each trader has a different idea about the quality of light to be used, so how will one be able to judge the Correct light source.
- In the final analysis we will trust good, moderate north light, not too sunny, not too cloudy, just right.....

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**Would you take a few minutes of your time to let us know your opinions in this connection. Thanking you in advance.**

- What do you feel about this issue?
- What stand do you think the laboratories in India should take?
- Do you think it is practical to consider a single uniform light source with the quality of light tubes available?
- Kindly write to us at:  
GEM TESTING LABORATORY,  
RAJASTHAN CHAMBER BHAWAN,  
M.I. ROAD, JAIPUR 302003  
Email us at : [gtljpr@jp1.dot.net.in](mailto:gtljpr@jp1.dot.net.in)

## March 5<sup>th</sup>. 2001..... The GTL Annual Award Function

The Awards function for the presentation of certificates to successful candidates is being held on 5<sup>th</sup>. March 2001 at the Rajasthan Chamber Bhawan.

- Shri. Navrattan Kothari is the Chief Guest.
- Shri. Nawal Kishore Tatiwala, the First student from GTL is the Guest of Honour.
- Shri. Vimal Chand Surana, Regional Convener will deliver the Welcome address.
- Shri. Rashmikant Durlabhji, Convener GTL will deliver the Closing Address.

### Successful candidates who will be receiving their Certificates

#### 20<sup>th</sup>. Batch

Yogesh Bhargav	1st. Overall
Gagan Choudhary	1st. In Practicals
Dheeraj Gupta	
Love Agarwal	
I. Madhavi	
Prateek Garg	
Rahul Vasant Gala	
Rohan Tak	

#### 21<sup>st</sup>. Batch

Garima Kala	1st. Overall
Palki Jain	1 <sup>st</sup> . Practicals
Alok Kumar	
Anil Kumar	
Archana Chouhan	
Arshad Bhatti	
Prabha Sharma	

#### 22<sup>nd</sup>. Batch

Apurva Agarwal	1 <sup>st</sup> . Overall
Oliver Pieper	1 <sup>st</sup> . Practicals
Amita Jain	
Namita Bhargav	
Dinesh Kumar Soni	
Nitin Bhansal	
Rajiv Nagpal	
Umangdeep Singh Khurana	

#### Correspondence Candidates

Sangeeta Atrawalkar  
Paula Rossi  
Hema Malani  
Kusum Kumari Chauhan

## Masters Diploma in Gem Identification

### Batch I

	Theory	Practicals
Manish Kumar	A	A
Mustaqeem Khan	A	A
Rishi Pathak	A	C

### Batch II

	Theory	Practicals
Gagan Choudhary	A	A
Rahul Vasant Gala	A	A
Yogesh Bhargav	A	A

### Certificate course

Smt. Kaushalya Singh  
Smt. Kiran Periwal  
Smt. Sejal Durlabhji

### Field Visits :

The 22<sup>th</sup>. Batch of Diploma students visited the garnet deposits at Tonk in February. They were able to see the style of mining and the rough which was both gem quality and abrasive quality.

### Trade Awards

Successful candidates for the awards initiated for students of GTL are :

**GJEPC Award** for the Best Overall student in Each batch :

- Ms. Garima Kala 21<sup>st</sup>. Batch
- Mr. Apurva Agarwal 22<sup>nd</sup>. Batch

**Durlabhji Education Trust Award** for the Best Student for the Year 2000 - 2001

- Ms. Hema Malani

**Bhuramal Rajmal Surana Award** for the Best Student in Practicals for the year 2000 - 2001

- Mr. Gagan Choudhary

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.

## GTL COMES OF AGE

### FTIR SPECTROSCOPE INSTALLED AND IN USE

The FTIR spectroscope which was installed one year ago is currently being utilised for testing and teaching.

- Students of the Diploma Course in gem Identification have to compulsorily take the spectra for three stones as part of their curriculum.
- Students of the Masters Diploma have to compulsorily take the spectra and identify the qualifying peaks for a minimum of 25 stones belonging to a particular species. They also have to study and analyse spectras of the stone species selected for their Project Specialisation.
- The FTIR database for macro samples of gem species has been concluded and has proved useful in certification in the past months.
- FTIR database of powder samples is currently being done and by October 2001 GTL hopes to provide this testing facility as per market demand.
- FTIR database for fillers in gemstones has been prepared and GTL intends to offer this facility within the next few months.

## SOME UPDATES FROM VARIOUS PUBLICATIONS

**1. D-limonene** : A new immersion liquid, is a slightly oily yellowish liquid. S.G. 0.838 to 0.843 and R.I. 1.47. It is recommended where sensitivity to, and /or the potential toxicity of commonly used high R.I. liquids prevent their safe use in gem testing.

**2. A glass imitation of blue chalcedony** - R.I. - 1.54, S.G. 2.57, Hardness - 5. Magnification: devitrification effect seen. Infrared spectra is distinct.

**3. Gem quality uvarovite:** from Tibet- is one of the varieties in the 'ugandrite' series of the garnet group. Bright green to emerald-green in colour. H= 7.15 S.G.-3.74, R.I.- 1.83, C.F.-red

**4. Synthetic Fresnoite** - Czochralski grown; colour -orange R.I. 1.765-1.770; Uniaxial negative Hardness-3-4; Magnification - rounded gas bubbles.

**5. The Brewster - Angle Meter:** A refractometer which covers a range of refractive indices of gemstones from 1.43 to 3.3. Useful for high R.I. stones.

**6. Zachery-treated turquoise** - This process effectively improves the stones ability to take a good polish and may or may not improve the color. It basically decreases the porosity of the gemstone. This enhancement can be identified only through chemical analysis (EDXRF or EPMA techniques).

**7. Synthetic Andalusite** - About 1mm size synthetic Andalusite are synthesized by the hydrothermal process. This however is currently a pure research application and has no commercial implications to the gem trade.

## Stone News - what's moving these days

### *Some interesting stones through GTL.....*

**Apatite - greenish yellow** : A very pleasant greenish yellow colour, most with parallel inclusions reddish and black flakes, and good cat's eye varieties. Transparent varieties have also been certified. In most cases because of the hexagonal formation it was being thought of as a beryl. For those who wish to check for themselves, apatite sinks in bromoform liquid while beryl floats, also a known beryl will easily scratch an apatite whose hardness is only 5.

**Osumilite** : A very attractive highly pleochroic blue gemstone has been certified at GTL with the help of Dr. Hanni. This stone looks like a blue sapphire though is much lighter and has distinctly different properties.

**Fluorite** : There has been a spate of emerald green, aquamarine blue and tourmaline deep blue coloured fluorite in the past few months. All are easily identified and the trader may try a quick hardness test on rough stones (H = 4).



# IDENTIFICATION OF EMERALDS FROM DIFFERENT SOURCES WITH THE HELP OF 10X LENS

By Mustaqeem Khan, M.D.G.I..(GTL, Jaipur)

**About the Author :** The author has done the Master's Diploma in Gemmology from the Gem Testing Laboratory, Jaipur. Currently he is working as Asst. Gemmologist at GTL, Jaipur.

**INTRODUCTION :** Today when the demand of origin is becoming a necessity. Everybody in the Gemmological world is crying for sophisticated advance technology viz. LRS, FTIR, UV-VIS etc. My aim is to present one of the simplest and easiest method for determining the source of emerald and that is logic, eyes and 10X.

The identification of origin of emerald is totally related to its geological environmental conditions. Geological environment includes the type of rocks, associated minerals and conditions, which are specific in the particular geological location. All these conditions provide some specific features to its material, which becomes the indication of the particular source.

**GEOLOGY OF EMERALD DEPOSITS:** There are three main types of geological emerald deposits.

- Deposits associated with acid magmatism : They are numerous and are characterised by reaction zones and metasomatic exchanges between differentiated leucogranites or pegmatites with mafic or ultramafic wall rocks. Phlogopites represent the characteristic gangue mineral.
- Deposits associated with regional shear zones :Phlogopite, talc, carbonate ,fuschite, tourmaline are the most prominent indicator mineral in these deposits.
- Deposits confined to black shales : The biggest deposits are that of Muzo and Coscuez for instance, which are currently almost exhausted.

These geological environments occur in various **geographical locations**. In this paper it is my aim to present emeralds from a few specific locations only . namely Colombian, Brazil, Zambian, Sandwana, Madagascar. Emeralds from each of these sources have some characteristic features like visual colour, pleochroism, internal features etc. which helps in determining their origin.

**METHODOLOGY:** For this paper , I have studied about 50 samples rough & cut from each source. Properties of emeralds were initially examined with standard gemmological instruments to define their characteristic features.

Microphotography for internal features was done using a NIKON-F-18 camera on an Eickhorst immersion scope using various lights . subsequently all samples were examined with a 10x lens alone.

**DISCUSSION:** Specific features such as visual colour, Pleochroism, internal features can be utilised for determining to some extent the origin.

	BRAZIL	COLOMBIAN	ZAMBIAN	SANDWANA	MADAGASCAR
VISUAL COLOUR	Light to medium green	Muzo: more e yellowish chivor: bluish green	Bluish green blue tinge is more	Saturated colours ranging from medium to dark green	Moderate to highly saturated bluish green to green
MAGNIFICATION	Two & three phase, fine acicular growth tubes flakes & booklets of biotite mica crystals of dolomite & calcite.	Jagged-three phase two phase & other fluid inclusion chivor :pyrite muzo: calcite cubic crystals which is probably sodium chloride contained in a flat cavity having spiky or jagged outlines with tail like appendages.	Limonite filled tubes, crystal inclusion magnetite, rutile, muscovite, hematite, phase fluid inclusion black biotite as small specks and dots.	Tremolite tubes or fibres often curved fibres, colour zoning, garnet crystals with a yellow halos fluid and phase inclusions.	Rain inclusion zoning jagged inclusion.
PLEOCHROISM	WEAK very slightly yellowish green to bluish green	S-TO-M muzo: yellowish green to green chivor: bluish green to green	STRONG bluish green & yellow bluish green	STRONG yellowish green to bluish green	S-TO-M bluish green to yellowish green 90degree to c"axis.

## THE ROLE OF FTIR SPECTROSCOPY IN GEM IDENTIFICATION

By Manish Kumar , M.D.G.I. (GTL,Jaipur)

**AUTHOR:-** The author holds a 'Master's diploma in gem identification' from GTL , Jaipur .. Currently he is working as an "Assistant Gemmologist" at GTL, JAIPUR .

**INTRODUCTION:-** In the past fifty years Gemmology as a Science is gradually gaining credibility. Initially, classical gem instruments like the polariscope, refractometer , microscope etc. have been the mainstay of most laboratories. Today , with the improvements in the quality of synthetics and enhancements, the problems associated with identification have also increased. It is in this situation that so - called advanced instruments are gaining ground. At GTL, we have the FTIR spectroscopy.

FTIR (Fourier Transform Infrared Spectroscopy) measures the interaction of infra-red radiation with experimental samples. It measures the frequency and intensity of radiation that are transmitted through the sample. It studies the structural vibrations in the molecular and atomic groups of gemstones.

FTIR plays an important role in routine gem identification and improves the quality and degree of accuracy of certification mainly by the following :

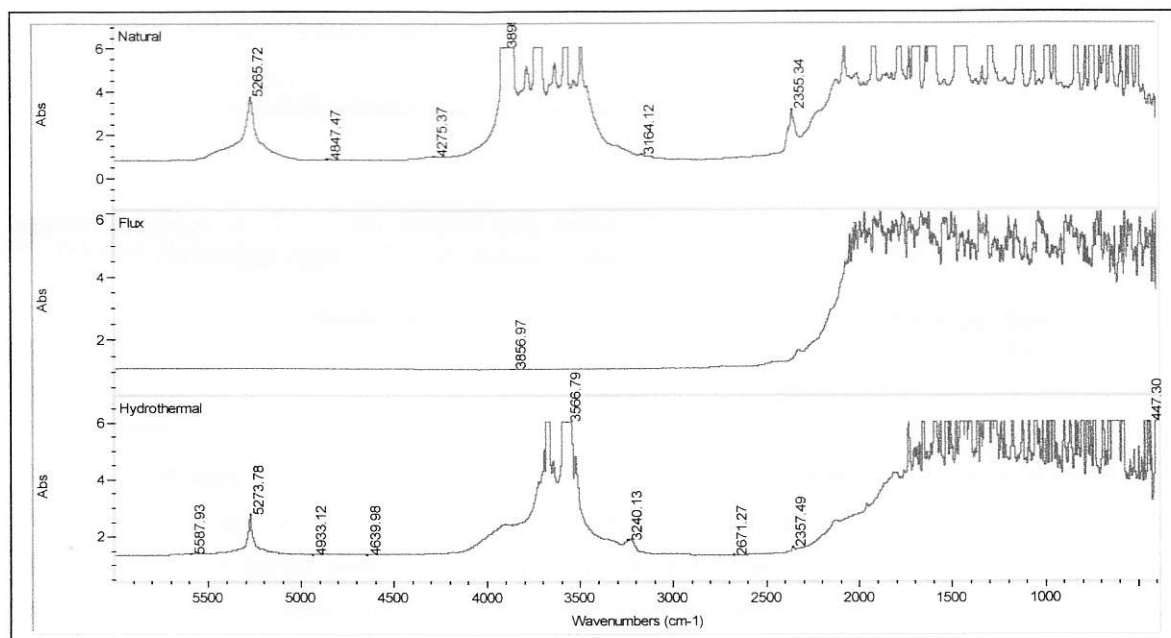
- Identification of stone by spectrum.
- Differentiating Natural from Synthetic.

Confirming the test done by classical instruments.

**METHOD:-** We have been working continuously on the FTIR for the last one year and have created a database of spectrums for almost all gemstones . Parameters have been maintained constant for easy comparison and analysis. Broad outline of parameters maintained is as follows :

Range: 500cm-1 to 6000cm-1	Absorption mode.
Number of sample scans : 200	Number of background scans : 200
Resolution : 2.000	Sample gain : 0.6329

EMERALDS :



**Conclusion :** This is just one example of the clear distinction between natural and synthetic stones. In the paper presented at the Indian Gemmological Conference a number of different stones were examined. For lack of space only one example is cited.

## GTL ian's CORNER

### Introducing the GTL identity cards.....

We are introducing the identity cards for the benefit of the ex-students who would like to take advantage of the rebate in Testing Charges. Effective 1<sup>st</sup>. May 2001 those who wish to avail the discounted 'member charges' must produce their identity cards while depositing the stone for testing.

- The cards are available at GTL during office hours at a fee of Rs.10/- per card.
- The GTL ian's are requested to fill in the same alongwith a photograph and get your signature attested at GTL.
- Please note we will NOT consider any rebate without the Identity card after 1<sup>st</sup>. May 2001.
- Outstation students may please note that the cards will not be mailed to them. They will have to collect the same from GTL and get their signature attested.
- This card will be valid for the individual student only and cannot be passed around.
- You are requested not to give your cards to anyone else. In such cases the privileges of the identity card will be withdrawn at the discretion of GTL.
- Thank you for your co-operation.

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### CLASSROOM HOWLER'S

- During a practical session at GTL, one student was asked "What is the characteristic inclusion in an Amethyst?" Prompt came the reply "Oh, a zebra crossing ma'am!!!!!!!!!!!!!!!!!!!!!!"
- ♦ In a recent diploma exam, one answer was the absolute .....Q.What is the difference between a natural diamond and a synthetic diamond? Ans. One is SR and the other is Biaxial!!!!!!!!!!!!!!!!!!!!!!!!!!!!

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**A POINT TO NOTE :** In a recent practical exam at GTL , one batch of students indulged in copying. It is to the credit of the standards we wish to inculcate and uphold, one student visited us, apologised and requested that the Diploma not be to given . Thank you for your honesty and we appreciate your principles but we were fully aware that the batch had copied. Further, you, the student who spoke have passed purely on your own merit and we wish you all success. To all the others in that batch , we bear no malice. You are but Students..... You are always welcome at GTL.

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