

GEM TESTING LABORATORY

LAB

INFORMATION

CIRCULAR

RAJASTHAN CHAMBER BHAWAN, M. I. ROAD, JAIPUR-302 003

Phone : 2568221, 2573565, Fax : 91-141-2567921

e-mail : gtljpr_jp1@sancharnet.in

Website : www.gjepc.org

LAB INFORMATION CIRCULAR

Gemological Seminar Held at GTL...

A gemological seminar was held at GTL on the occasion of 33rd Foundation Day on 12th of August 2004. The basic idea behind having a seminar was to give a brief overview with the latest developments in the Gem and Jewellery Industry. The seminar included all the aspects of the industry right from the cutting and faceting, sorting and valuation, technical advancements in gem identification, trends....

Several topics were covered like Faceting and Polishing equipment and Concave cutting, Latest trends in gem and jewellery, New / latest techniques in gem identification, Healing properties of gemstones, Importance of lighting in buying and selling gemstones, New deposits at Andhra Pradesh, Marketing Strategy in Jaipur Market, Latest Synthetics and Treatments, Unusual stones tested at GTL and New Discoveries throughout the globe.

The speakers from trade were invited to give talks on their subjects like Faceting Equipments, Healing properties of gemstones and Marketing Strategy in Jaipur Market.

Continued to page 3...

Inside The Issue....

1. Gemological Seminar held at GTL...
2. Lemon Topaz or Quartz??
3. Stone News Trends- Pinks...
4. GTL Results
5. New Discoveries through out the Globe.

Lemon Topaz or Quartz??

There are regular enquiries when a lemon coloured stone is certified as a Citrine or Natural Quartz. The depositor questions, "Is this Citrine? But, we have purchased this stone as Lemon Topaz"

The answer to this is "Yes, it is a Citrine, not Topaz, market considers a greenish yellow or lemon coloured quartz as Lemon Topaz."

Technically, this is wrong as these are two distinct species there is nothing which is common to both except the visual colour / shade.

Quartz is pure Silica, while Topaz is Hydroxyl Fluorosilicate of Aluminium. Both the materials are available in number of colours, but here we are concerned only with lemon shade of both the species.

The lemon or greenish yellow shade is due to colour centers/ defect holes produced by heat and /or irradiation methods.

Irradiation causes colourless quartz to turn into greenish yellow while heating a smoky quartz produces this shade.

The composition of quartz is SiO_2 ; one silica to every two oxygen atoms/ ions, with some impurities like aluminium, helium, hydrogen or any other alkali element. The irradiation of colourless quartz produces smoky colour, which ranges from gray, brown, yellow, green and the combinations.

The brown / smoky colour is due to a defect hole (an electron is missing) on one of the four oxygen ions next to an aluminium ion that replaces silica. When aluminium replaces silica, one positive charge is missing results in the electrical imbalance of the crystal.

This imbalance is restored by one Hydrogen ion, available for each aluminium ion and is located in some open spaces

Continued to page 6...

Mr. Nawal Kishore Tatiwala, Dr. K.K. Bhatia, Mr. S.N. Johari, Ms. Sonal Singhi, Mr. Mustaqeem Khan, Mrs. Meenu Vyas, Mr. Mohammad Ikramuddin, Ms. Priyanka Bhargava, Mr. V. Suresh and Mr. Gulshan Verma gave the talks.

Following are the abstracts of the topics presented at the seminar.

Faceting Techniques and Equipment



Mr. S.N. Johari of M/s Anand Engineering Works, Jaipur gave a talk on the techniques and steps involved in the cutting and faceting of gemstones. The use of advanced technology over the one used traditionally has number of advantages in terms of quality, quantity and the cost.

The steps include slicing of rough > pre-forming > faceting and polishing. He gave more importance to the newly developed Concave Cutting, which enhances the life and brilliance of a stone as compared to a traditionally cut stone. The cut includes curved concave facets as compared to the flat facets. The emphasis was laid on the need for latest technology in the gemstone processing, so as to compete in the international market by reducing the labour, time and cost.

A comparison was made between the older and the present technique and the changes required in order to cope up with the international standards.

Latest Trends in Gem and Jewellery



Ms. Sonal Singhi Instructor, JPDC, Jaipur gave a talk on latest trends in the gem and jewellery industry with emphasis on the creativity. She unveiled the latest designs that are being appreciated amongst the consumers, especially on Rings, Necklaces and...

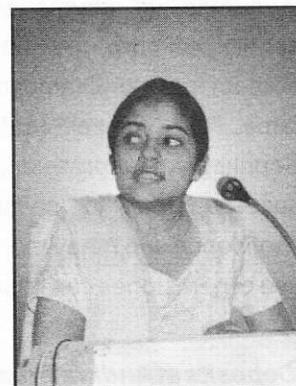
She emphasized the use of technology in designing an article. The use of fancy coloured gemstones adds a flavour to the jewellery piece being designed.

She compared a continuous change in the trend. Different metals like gold/ silver, gold/ platinum are being used in the same article to give a traditional - designer look-like current hot selling item "Victorian Jewellery"

She gave a success mantra for a Jewellery designer "Innovation - Creativity - Technology". All these mixes must be in a right proportion to get success in designing an article.

Latest Techniques in Gem Testing

Ms. Priyanka Bhargava, a student of Masters' Diploma course spoke on the use of advanced techniques in the gemstone industry. The techniques included LA-ICP-MS (Laser Ablation-Inductively Coupled - Plasma Mass Spectroscopy) and LIBS (Laser Induced Breakdown Spectroscopy).



Both these techniques of spectroscopy helps to detect lighter elements like beryllium being used for treating corundum.

A number of other instruments or techniques were introduced to the audience. Some of them include: X-ray Fingerprinting / Topography for diamond analyses, Diamond spotter to detect Type II a diamonds. Diamond-sure and Diamond-view to identify synthetic diamonds which are quite difficult to identify with the conventional methods.

Some Portable instruments like Ultraviolet light, Light Emitting Diodes (LED) is of great importance as a field gemologist/geologist is concerned.

The drawback of all these techniques is the high cost therefore only few labs can have access to them but due to the fact that everyday a newer synthetic or a treated stone is arriving to the market these are required in order to correctly identify the material.

Healing Properties of Gems



Dr. K.K. Bhatia gave another use of gemstones except for adornment. This use is the healing up of different diseases by gemstones. In India, most of the people wear gemstones either for astrological or healing purposes.

A number of stones are being used for healing / astrological purposes right from the ancient periods. Few of them include- Diamond for a happy marriage life and fame, Ruby for self confidence and good luck, Yellow Sapphire for depression, Blue Sapphire for fame and success, Pearl for calmness and patience, Coral for confidence and many more ... The proper knowledge and use of gemstones can improve our lives.

Deposits at Andhra Pradesh



Mr. V. Suresh, a student of Masters' Diploma gave information of stones being currently mined in Andhra Pradesh. There are a number of new deposits have been discovered in the last two years in Andhra-Pradesh. The major and the largest deposits are situated in the Araku Valley with scattered deposits at

Khammam, Warangal and Vishakhapatnam.

A number of stones have been found / discovered in the region. Some includes Alexandrite with strong colour change, Chrysoberyl cat's eye - yellowish green to bluish green, Ruby - transparent to opaque- reddish pink to red to blackish red. Other stones - Diamond, spinel, pyrope-almandine garnet, hessonite garnet, amethyst, aventurine quartz, tourmaline, iolite and a lot more...

Mr. Gulshan Verma, a student of Masters' Diploma explained the importance of lighting being used for buying and selling gemstones. He emphasized the role of light in deciding the quality of a gem in terms of colour.



The use of different types of light affects the body colour differently like natural light or an artificial light.

While using Natural light certain factors are considered sunlight or skylight north skylight or south skylight the time of the day, climate, position from the equator, position of viewing, etc. These are different factors, which are to be kept in mind while judging the quality but these factors does not give constant results. Therefore, one has to switch over to artificial lights.

There are different types of artificial light / lamp - daylight, incandescent, fluorescent, etc. Out of all these standard daylight should be used to obtain constant results. The factors considered to opt for a preferable light source are temperature and colour rendering ability of a lamp.

The best light used for judging quality is preferred as Natural north daylight with the position / time considered as neutral.

Marketing Strategy in Jaipur Market

Mr. Nawal Kishore Tatiwala, first student of GTL and a GTL working committee member gave the evolution of gemstone market in Jaipur with a regular progress being made by the traders in terms of dealing in the international and domestic market.



The things and psychology of traders has changed a lot, especially in the last two decades. He explained how deals are finalised in the market - rough and cut. The criterion for rough and cut stones is slightly different.

In case of cut and polished stones, the seller has to go to the buyer while in case of rough stones a buyer has to visit the seller. There are regular auctions being held from last 50 years within the city or outside, these auctions are held by the miners or the agents appointed by them or the dealers and the interested buyers are collected together at a single place for purchases by way of offering sealed tenders.

Unusual Stones Tested at GTL



Mrs. Meenu Vyas, Asst. Director, GTL narrowed down some unusual stones tested at GTL during the last few months. Some unusual stones included were- Synthetic Forsterite, Maw-Sit Sit, Barite, Aragonite, Topaz cat's eye, Colour Changing Fluorite, Glasses of different patterns / phenomena like colour changing, coloured swirls or parti-colouration and a quartz crystal with a moving bubble. Following are the properties of the mentioned stones: *Synthetic Forsterite* - Blue colour, strong pleochroism RI: 1.640- 1.673, Birefringence 0.033, SG- 3.23, Dotted inclusions under magnification. *Maw Sit-Sit*- Black / Green mottled structure, *Barite*- Blue / colourless body, RI: 1.636 1.648, SG- 4.30- 4.60, *Aragonite* - Gray / Brown colour, RI: 1.48- 1.64, SG: 2.71, fibrous structure.

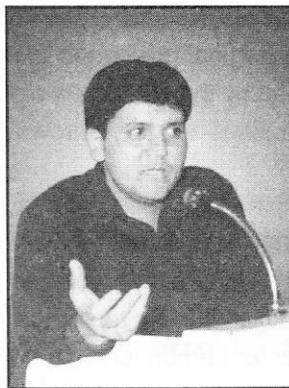
Topaz cat's eye- gray colour with fine sharp eye, RI: 1.63(spot), SG: 3.54, cleavage perpendicular to the direction of fibers. *Colour changing fluorite*- Green in Daylight to Purplish blue in incandescent light, other features that of a fluorite. A quartz crystal had a two phase inclusion liquid and gas. The gas bubble in the phase inclusion was changing its position as the stone was turned / viewed in different directions.



New Discoveries throughout the Globe

Mr. Mohammed Ikramuddin, ex-student, GTL narrated the discoveries done in the recent times throughout the world on gemstones and their deposits. Details of the discoveries made are given on page 7.

Latest Synthetics and Treatments



Mr. Mustaqeem Khan, Asst. Director, GTL presented the new developments in the field of synthetics and treatments, which causes a lot of problems to the world gem market. The new synthetic developed is a **Synthetic Diamond by Chemical Vapour Deposition (CVD)**.

The method involves passing a mixture of Hydrogen & Methane- through High Temperature, Low Pressure. The Reactants transport through the chamber by Diffusion & Convection and then passes through a substrate and get deposit to form a Diamond. Flat and platy crystals are produced by this technique. Identification is very difficult but some pinpoints can be seen in planes under a higher magnification. *Diamond View* and *Diamond Sure* can make conclusive identification.

Recently, **synthetic red beryl** has been synthesized by hydrothermal technique that can be identified by the presence of chevron growth pattern characteristic for the process.

There is still a lot of controversy amongst the traders / gemologists on the Beryllium treated corundum. The identification is still very difficult or almost impossible by standard techniques except few features visible on a standard magnification. Blue spots/ halos give a conclusive identification of the treatment; another feature is the colour rim. If the halo / rim is not visible, conclusive identification can be made on **Laser Breakdown Mass Spectroscopy (LIBS) or Laser Ablation Inductively Coupled Plasma- Mass Spectroscopy (LA-ICP-MS)**

Rubies are now filled with the similar material that is used for filling diamonds, therefore it shows similar features like colour flashes- violet/ pink/ blue along the filled areas.

A new iridescent coating is now being used on several stones like topaz, tourmaline...

Lemon Topaz or Quartz... continued from page 1

in the crystal. When colourless quartz is irradiated, one of the paired electrons ejects from its original position in the oxygen atom, this electron is trapped by the Hydrogen ion producing a colour- center that results in gray- brown smoky quartz.

There are a number of colour centers produced this way; the greenish-yellow colour is also a result of a colour center of unknown nature, which can occur by itself even in the path of turning colourless quartz to Lemon Quartz or smoky. This "greenish yellow" colour can also be due to a combination of two or more colour centers.

When smoky quartz is heated, it turns back to the original state. i.e. colourless, by destroying the colour centers/ defect holes. The temperature requires varies from 180° C to 300°C and the duration from weeks to minutes depending upon the specimen.

On heating for 2 to 4 hrs. at 140°C to 280°C, smoky quartz turns to greenish yellow shade. This colour is stable under normal conditions, can be returned to smoky on re-irradiation.

The separation....

Both the materials can be easily differentiated on the basis of Heft, Quartz is much lighter as compared to Topaz; SG of quartz is 2.65, while that of Topaz is 3.54. Topaz has a better life because of higher RI of 1.620- 1.630, while quartz is comparatively duller with RI of 1.540 1.550.

When viewing the stones under a 10x or a higher magnification, Quartz commonly exhibits brown or yellow colour bands in rhombohedron orientation, 2 or multiphase inclusions, liquid fingerprints, needles, crystals, etc.

Topaz exhibits cleavage planes (a flat break inside or on the surface) one of the most important and conclusive differentiating feature, non-miscible liquid inclusions, iron stained cracks, etc.

The term "lemon topaz" should not be used for "citrine or lemon coloured quartz" as is just a misnomer.

Both are two distinct species therefore both should be named differently rather as one.

GTL Results

Diploma 31st Batch: March 2004 June 2004

1. N. Swetha 1st Overall
2. Anup Kadel 1st Practical
3. Seikhlen Haokip
4. Shobhit Agarwal
5. Sukesh Luhadia
6. Anil Kasliwal
7. Sapna Ahuja
8. Seema Kothiyal
9. Sameer Agarwal
10. Vishesh Tak
11. Nayma Ameen

Certificate Course in Gem Identification

1. Aishwarya Rathore
2. Rajyashree Rathore
3. Aditi Sand

Diploma in Gemmology Gem A (U.K.)

1. Amita Goyal - Diploma
2. Puru Agarwal - Diploma
3. Amrinder Singh - Diploma
4. Pooja Tripathi - Foundation
5. Sanjeev Gogna - Foundation

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

Our Grateful Thanks

We are highly obliged to **Shri. Rahimullah Khan**, (Ms. Vaibhav Gems Ltd.), **Shri. Satish Saklecha** **Shri. S.K. Ajmera**, **Shri. Rajesh Ajmera**, (Amrapali) and **Shri Vijay Chordia** (Valentine Jewels), for providing In House Training for students of the Master's Diploma. Their continued support and encouragement is deeply appreciated.

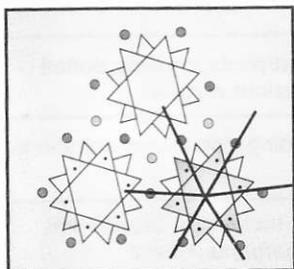
NEW DISCOVERIES THROUGHOUT THE GLOBE.

There is a regular hunt for gemstones and their deposits in every part of the globe. As a result some new mineral is encountered every time and if they have *Beauty, Rarity and Durability* as essential features- can be considered as gemstones. Therefore, every now and then a new gem material is encountered in routine. Some of the newly discovered materials or deposits are as follows:

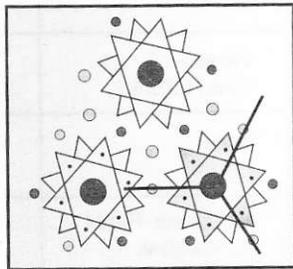
Pezzottaite: A pinkish red coloured material led to certain controversies amongst major gemologists/ mineralogists. The visual appearance of the material is very similar to **red beryl and tourmaline.**

The controversy was on the naming of the material as this is a *Beryllium Aluminium Silicate with traces of Cesium*, same as the composition of Red Beryl, therefore can be considered as a Cs- rich beryl rather than "Pezzottaite".

Few gemologists like Dr. Hanni of SSEF proved it as another mineral because of the difference in the structure of Pezzottaite and that of Beryl. The structure of beryl has hexagonal symmetry, while Pezzottaite have trigonal.



Structure of Beryl



Structure of Pezzottaite

On the basis of structure, Pezzottaite is differentiated from Beryl and a different name is assigned. It is very difficult to separate this material from Red Beryl as the properties are very close to each other. Pezzottaite also acts as a close simulant for pink tourmaline because of 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	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.

Pouderettite: Another Pinkish to Purplish Red gem material as a good simulant for Tourmaline, Beryl, or even Pezzottaite. R. I.: 1.511 - 1.521, SG: 2.50 - 2.70, strong pleochroism as Purple Pink/ Colourless/ Light Brown, absorption band centered at 530 nm.

Herderite: A yellow-green material with RI 1.580 - 1.609, Birefringence 0.029, SG: 3.04, absorption bands at 580 and 585 nm and strong trichroism with yellow/ yellowish green / greenish yellow. The material can be mistaken for beryl because of the similar RI range but careful inspection can differentiate; Beryl is uniaxial and a lower birefringence of 0.008, while Herderite is Biaxial with higher birefringence of 0.029.

Afghanite: A blue to colourless material; colour is due to the presence of blue coloured crystals of Lazulite. RI: 1.522- 1.528, Birefringence: 0.006, SG: 2.52- 2.56, Bright Orange fluorescence under long wave UV. The material is discovered in Badakshan Province in Afghanistan the name derived from. Some material has also been encountered in Madagascar.

Fancy Coloured Labradorite: Some fancy coloured Labradorite feldspars have been discovered from Congo in Central Africa. These colours include Red, Green and Yellow. The cause of Red colour is due to the presence of copper particles, while that of Green is due to the charge transfer involving copper.

Euclase: Greenish Blue- Bluish Green stones very similar visual to Aquamarines; RI: 1.650 - 1.670, Birefringence: 0.020, SG: 3.24 - 3.27, absorption band at 455 and 468 nm. These properties are very similar to a common stone Sillimanite. The two materials can be differentiated on the basis of spectrum, sillimanite has a band at 441 and 462 nm.

Some other discovered materials include; *Colour Changing Apatite, Blue Opal from Peru, Zircon with Play of Colour, Emerald - Alexandrite intergrowth, Ruby in Fuchsite, New Burmese Ruby deposit at Loi Hpaleng in Shan State, and Fancy coloured sapphires from Madagascar.*

What's running these days: - Trend...Pinks...

The Pink is hot these days!!!

Pink coloured gemstones are highly demanded these days in the gemstone market; this colour is the latest trend throughout the globe. The colour is demanded in transparent like tourmaline to translucent material like chalcedony. At GTL, during the last six months there are a number of pink stones have been certified. Some of the gemstones found in pink or purple pink colour are Rose Quartz, Dyed Chalcedony, Morganite, Tourmaline, Kunzite, Spinel, Sapphire, Cubic Zirconia and Glass. These stones are only few to name as these are encountered commonly, some others stones to name in this category are Natural Zircon, Fluorite, YAG, GGG, Scapolite, Topaz and Rhodolite Garnet.

All these gemstones also act as a simulant for each other; therefore individual identification is necessary as there are a lot of price variations amongst these. Out of the listed stones Cubic Zirconia can easily be identified by high life, fire and heft, while Kunzite by its strong pleochroism with a strong purple/ violet as one of the pleochroic colours and two directions of distinct cleavage. Tourmaline having similar body but pleochroic colours as pink and yellowish pink exhibits doubling and trichites as characteristic inclusions; Rose Quartz can be identified by its characteristic body colour with a slight haze due to fine dust of rutile or sillimanite; Spinel and Sapphire can be differentiated by moderate to high heft, luster and inclusions as well. The properties of the commonly available materials are given in the following table.

Stone	Optic Character	RI	SG	Pleochroism	Inclusions
Rose Quartz	DR Uniaxial	1.54 - 1.55; 0.010	2.65 0.010	Weak - Pink / L.Pink	Fingerprints, crystals, dotted inclusions of rutile.
Dyed Chalcedony	AGG	1.54	2.58 - 2.65	None	Banding, colour concentrations
Morganite	DR Uniaxial	1.59 - 1.60; 0.010	2.75 - 2.80	Moderate- Pink / Yellow Pink	Rain Inclusions, Liquid Films. Fingerprints, Phase
Tourmaline	DR Uniaxial	1.62 - 1.64; 0.020	3.01 - 3.05	Strong Pink / Yellow Pink	Trichites, Doubling, Colour Zoning, 'C' axis absorption
Kunzite	DR Biaxial	1.66 - 1.68; 0.013	3.18	Colourless / Pink/ Violet	2 directions Cleavage, crystalline fingerprints, 'C' axis absorption.
Spinel	SR	1.72	3.61	None	Crystalline fingerprint, cleavage cracks
Sapphire	DR Uniaxial	1.76 - 1.77; 0.010	4.00	Pink / Purple Pink	Fingerprints, 3 directional silk. zoning, crystals.
Pyrope Almandine Garnet	SR	1.74 - 1.76; No birefringence	3.70 - 3.90	None	Silk, fingerprints, crystals
Cubic Zirconia	SR	Over range	5.50 - 6.20	None	Unmelted zirconium powder, generally clean
Glass	SR	1.44 - 1.90	2.50 - 4.50	None	Gas bubbles, Swirl marks, devitrification

CONTACT PERSONS :

Mustaqeem Khan - Asst. Director • Gagan Choudhary - Asst. Director
 Meenu Brijesh Vyas - Asst. Director • Radhamani Amma - Asst. (Co-ordn & Info.)
 Ph. : 0141-2568221, 2573565 • Email: gtljpr_jp1@sancharnet.in