



रत्न परीक्षण प्रयोगशाला

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Gem Testing Laboratory

THE GEM & JEWELLERY EXPORT PROMOTION COUNCIL
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G.T.L. LAB INFORMATION CIRCULAR No. 007

In the month of February '95 we have tested a number of gem stones. A few interesting stones were.

1. Natural Spinel

- Blue Spinel: The colour of these spinels were similar to deep ink blue sapphire, with properties typical for natural spinel; R.I. 1.724; S.G. ranged from 3.65 to 3.70 (hydrostatic); Cobalt spectrum and under magnification silk, crystals and lamellar inclusions were seen.
- Purple-Pink Spinel: Brownish purple-pink, coloured drilled bead of spinel, similar in colour to tourmaline, properties were typical for Natural Spinel, R.I. 1.718, under magnification crystalline inclusions were observed.

2. Spessartite Garnet: Transparent, reddish orange and orangish red coloured faceted stones of spessartite. The properties were typical for the intermediate variety of Almandine-Spessartite Garnet. R.I. 1.776, weak red under U.V. lamp. S.G. 4.04 (hydrostatic) and it shows Almandine-Spessartite spectrum. Under magnification crystalline inclusions were observed.

3. Tanzanite: A variety of Zoisite. Blue with pinkish tinge, transparent, faceted and cabochons. The properties were typical for tanzanite R.I. 1.69 - 1.70, pinkish under U.V. lamp. Stones were fairly clean but some contained crystalline inclusions.

4. Synthetic Emerald: Synthetic Emeralds continued to come in for certification-mainly Hydrothermal Synthetics. The colour of these stones were dark green (over coloured). Almost all were strong red under chelsea filter and varied from inert to red under U.V. lamp. The R.I. and S.G. of these stones were high and similar to natural emerald. Under magnification, fingerprints and angular growth zoning were seen.

WHAT IS PADPARADSHA ?

The name padparadsha meaning the colour of a lotus flower, was first applied to sapphires in 1847. According to gemmological definition it is a harmonious blend of pink and orange colour in sapphire. Corundum has many colour varieties. The red variety,

i.e. Ruby, and all other colours, i.e. Sapphires with the colour prefix before the name, as in Pink Sapphire, Orange Sapphire etc. Some sapphires have a neutral tint combining pink and orange and are known as Padparadsha

The colour tints are determined by the three factors hue, tone and saturation, which in pink and orange are particularly important factors. It is not easy to distinguish between pink and padparadsha or orange and padparadsha, because the red and orange hues are associated side by side. The colour of true padparadsha is a neutral hue between the red and the orange, with a high tone and high to medium saturation. The colour limitations of padparadsha is a very narrow range between the red and orange hues. Sources which have been producing these sapphires are Sri Lanka, Tanzania (Umba Valley) and Malawi. The colour variations are quite distinct from each of these sources and often create confusion in their nomenclature. Since this is a subjective factor, certifying it as such can give rise to controversies.


HEATING OF ORANGE/PINK/YELLOW SAPPHIRES

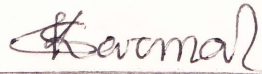
The colour of orange-pink, orange-brown, pinkish-yellow and similarly coloured sapphires, can be enhanced to deeper shades by heat treatment. The principle cause of colour of such sapphires is due to varying amounts of Chromium and Iron in the +3 states. These colouring elements are in the form of oxides or colour centres. The temperature required, ranges from 1500°C to 1800°C (in an ordinary furnace) for such sapphires. All such sapphires are heated in an oxidizing atmosphere for approximately 3 hours.

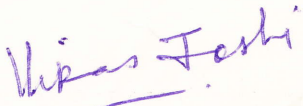
A few examples are as under:-

1. Yellowish-pink sapphires when heated for 3 hours at 1800°C, in oxidizing atmosphere gives medium to intense orange.
2. Orange-yellow sapphires with silk, subjected to 1700°C for about one hour, gives a golden orange colour.
3. Some other coloured sapphires (light blue) also, commonly from Sri Lanka, with silk, in an oxidizing atmosphere, at 1500°C, for 3 hours, changes to orange or golden-orange colour.

Please note: Heating time and temperature may vary according to the type and nature of the colouring element present, i.e. percentage of Chromium/Iron, and whether present as trace element (impurity) or colour centres.


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