

Sri Lankan Tourmaline's Inclusions and their Behaviors under the Gas Fired Heat Treatment

I.L.C.S. Wickramarathna¹, R.G.C. Jaliya¹, S. Illangasinghe² and P. Francis²

Department of Science and Technology, Uva Wellassa University, Badulla, Sri Lanka

²Gem and Jewellery Research and Training Institute, Ratnapura, Sri Lanka

Sri Lanka is famous for gemstones since ancient times. Among them, Tourmaline plays a major role in a wide range of colours. Gemstones can identify from their physical and optical properties, such as refractive index, UV spectrum and the presence of inclusions. Heat treatment is one of the most common methods to enhance the value of low-quality gem stones. Natural gemstones could differentiate from synthetics or heat treated from inclusions trapped inside and their behavioural changes. Total of thirty brown colour tourmaline samples were collected from Ratnapura area and subjected to heat treatment process under oxidation condition from 650 °C to 900 °C using "Lakmini" furnace and observed under the ×10 to ×40 magnifications before and after the heat treatment. Out of thirty samples, twenty samples contained isolated, transparent tabular shape solid crystals and clustered solid crystals. Greenish black rounded and hexagonal plate-like apatite and bi-phase (liquid-gas) inclusions were noted in three samples. When stones contain a large number of solid inclusions it could be dark, therefore clarity drops in a significant way. Crystal inclusions could help to identify heated gemstones since after the heat treatment, crystal inclusions transformed into cloudy or partially melted sugar like crystals in most instances. Some crystals melted without remaining any clue. Apart from crystal inclusions, cracks were noted in eleven samples. Cracks looked like in continuous path and it was having a high probability to melt. Feather-like trichites observed in ten samples with different shapes and sizes. Trichites in natural stones were having continuous flow but after the heat treatment it appeared as discontinuous flow. Furthermore, tiny trichites fully melted during heat treatment; therefore, trichites also could use to identify unheated tourmaline from the heat treated.

Keywords: Tourmaline, Heat treatment, Inclusions