

Assessment of Geuda Heat Treatment Using Gas-fired and Electric Furnaces

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“Geuda” (Al₂O₃) a variety of corundum gems, has the potential of converting into Blue Sapphires through heat treatment since it contains Fe and Ti as impurities. With high temperatures, Al, Fe, Ti atoms inside the “Geuda” get into excited state provides possibilities to make [FeTi]⁺⁶ complex that produces blue colour. Sri Lankan gem industry commonly adapts gas-fired furnaces for heat treating Geuda, yet recently introduced electric furnaces have also shown suitable because gas furnaces are superior to electric ones in achieving the desired colour in finished gems. However, proper investigation hasn’t been done to select the most suitable heating method. This study, the color development of Geuda is investigated under different heat treatment of gas furnace, electric furnace, separately and combination of them. In addition, soaking time and heat regimes are also used to investigate the colour development. Eighteen Geuda Samples were collected from Ratnapura, Niwithigala, Lunugala and Ambalangoda areas and were cut into three equal size pieces, separately. Two pieces were heat treated while keeping the other pieces as the control. Eighteen samples were treated using the gas furnace at 1750 °C for 30 min. Also, electric furnace was used to treat the samples under different temperatures such as 1300 °C, 1500 °C and 1750 °C, separately and 18 samples were treated in each temperature while changing the soaking time such as 3, 7 and 30 days, respectively. Similarly, treated pieces under gas furnace were again treated using the electric furnace under the above conditions. Finally, color changes were analyzed using the GIA color grading system. Color of the samples treated in gas furnace at 1750 °C for 30 min is enhanced than that of the samples treated in electric furnace at 1300°C and 1500 °C temperatures. However, significant colour enhancement is obtained for the samples treated at 1750 °C for 30 days under electric furnace. The best color change is obtained for the samples treated at 1750 °C for 30 days under combine heat treatment method.

Keywords: Geuda heat treatment, Gas furnace, Electric furnace, Colour enhancement