

NEUTRON IRRADIATED TOPAZ

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Topaz consists mainly of SiO₂, Al₂O₃ and variable amounts of F and OH group. Irradiation of topaz in the Egyptian research reactor (ETRR-2) by neutrons changes its cloudy white color to a reddish pink which could be changed to blue by heating.

Nuclear reactions inside the irradiated stones produce radioisotopes, therefore stones have to be stored in a storage for a period of time to reduce the residual radioactivity aiming to reach the safety level of transportation.

The storage time of the stones is dependent on trace element concentrations connected with their life-times in topaz. Therefore, inspection of the trace elements in the stones and their half-live times are essential before irradiation.

Laser Ablation Inductively Coupled Plasma Mass spectrometer (LA-ICPMS) Energy Dispersive X-rays (EDS), and Neutron Activation Analysis (NAA) are used in the investigation.

Ramman studies of irradiated and unirradiated stones at different temperatures and irradiation times showed a relation between the absorption of 3600cm⁻¹ peak corresponding to (OH) stretching modes of vibration with the color changes.