A COMBINATION BETWEEN OPTICAL AND CHEMICAL PROPERTIES OF THE IMPERIAL TOPAZ FROM THE OURO PRETO REGION (MINAS GERAIS STATE, BRAZIL)

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The Ouro Preto region is located in Southeast Minas Gerais state, Brazil, and is geologically related to the Quadrilátero Ferrífero. In the mentioned region, the imperial topaz mineralization occurs in the Piracicaba Group rocks, along the Northeastern area of Dom Bosco Syncline hinge zone. In addition to topaz, quartz, mica, rutile, kaolinite and, rarely, euclase can occur as minerals. Due to the tropical weathering, the imperial topaz-bearing country rocks are intensively altered, originating a brownish clay-like material. In this case, the imperial topaz was studied from the data obtained by optical microscopy (OM), images of scanning electron microscopy associated to cathodoluminescence (SEM-CL) and laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS). The imperial topaz sample was prepared in a thin section according to (001), perpendicular to its *c* axis. The images obtained by OM and SEM-CL showed some similarity. However both obtained images do not totally match. It is also observable a higher growth in the <010> direction and, thus, of *b* parameter of topaz unit cell. In the core, both OM and CL images showed a central rhombic pattern, which grows along the <110> direction. It is also visible some variation of luminescence, which matches the extinction patterns observed in the OM images. Within the core, high luminescence triangle-like areas are visible in its extremities along the <010> direction. This central rhombic pattern around the latter, could be hypothetically caused as by changes in growth environment. These variations of luminescence intensities can possibly imply a crystallization process, in which hypothetically occurred resorption events and growth shifts. According to the data obtained by LA-ICP-MS, the incorporation of trace elements cause a distortion of the mineral lattice and, consequently, affect the luminescence. Based on the values obtained by the correlations of Cr/Cu, Cr/Zn and Cu/Zn, in the hight luminescence areas the combination of Cr^{3+}, Cu^{2+} and Zn^{2+} can be a hypothetical reason of the CL-activation in imperial topaz: $R^2_{(Cu/Cr)}$ = 0.71; $R^2_{(Zn/Cr)}$ = 0.87; $R^2_{(Zn/Cu)}$ = 0.90, in turn, in the low luminescence areas, the observable correlations were: $R^2_{(Cu/Cr)}$ = 0.01; $R^2_{(Zn/Cr)}$ = 0.08; $R^2_{(Zn/Cu)}$ = 0.55. In the rim of the crystal, SEM-CL images showed an almost homogeneous and a very incipient low luminescence. Notwithstanding, OM images of this area showed different extinction patterns aligned in parallel and along the [110] direction. This can be probably related to crystallographic aspects such as a rotation in the *c* axis and, consequently, an inversion between the axis *a* and *b*. Another cause can be related to a topotaxial growth, which could have begun from the border of the central rhombic pattern along the <110> direction, and originated the rim. Moreover, it is important to mention that these extinction patterns can show two crystallization events: the first one is showed by the central rhombic pattern and the second can be observed by the different extinction pattern in the rim.

KEYWORDS: IMPERIAL TOPAZ; OPTICAL PROPERTIES; CATHODOLUMINESCENCE