

Causes of the blue color of gem-quality Be-bearing minerals from Madagascar and Brazil

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Beryllium is a rare element in the continental crust (2,1ppm) [1]. It is concentrated by fractional crystallization during the hydrothermal process at the origin of the pegmatite's formation in which are formed two Be-bearing minerals, beryls ($\text{Be}_3\text{Al}_2\text{Si}_6\text{O}_{18}$) and euclases ($\text{BeAlSiO}_4(\text{OH})$) two cyclosilicates with a similar structure [2], [3]. We focused on lagoon-blue beryls from Madagascar and blue spotted euclases from Brazil. Is lagoon-blue beryls close to emeralds or to aquamarines ?

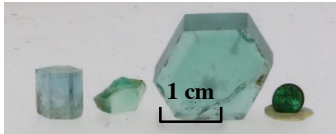


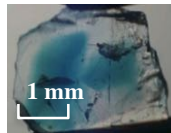
Figure 1 : Picture of (from left to right) Aquamarine, Lagoon-bleu beryls, Emerald

The aim of this optical absorption spectroscopic study is to understand the cause of color of these incredible minerals, to highlight the necessary requirements that lead to the process of coloration and to get information about the formation conditions that prevail in their host pegmatites.

The experimental facilities in our lab allow to obtain precise data by optical absorption spectroscopy using a long continuous range (220 to 3300 nm), micro-spectroscopy, low (-263°C) - or high- (600°C) temperature and polarized spectra, with the possible combination of the different methods.

The analyses show that the cause of color in both minerals are related to the presence of 3d-transition elements that also give different hues. The process of coloration (crystal field transition, intervalence charge transfer, ...), the site occupied and the redox state of the elements could explain the different colors, and will be depicted during this presentation.

Figure 2 : Picture of a spotted blue euclase



References :

- [1] Rudnick and Gao (2003), Rudnick (Ed.), 437-450
- [2] London and Kontak (Eds) (2012), *Elements* 8, 257-294;
- [3] Groat et al. (2008), *Ore Geology Reviews* 34, 1-2: 87-112;