

Characteristics of Trace Elements in Quartz from No.3 Pegmatite, Koktokay area, Xinjiang Autonomous Region, China and implication for Magmatic-Hydrothermal Evolution

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Abstract: Study on trace metal composition in quartz from different textural zones of No. 3 pegmatite Koktokay area, Xinjiang Autonomous Region, China was conducted by using LA-ICP-MS technology. Results show that quartz from different textural zones are characterized by high Li, Al, P and Ca concentrations, low Be, B, Na, K, Fe, Mn, Ti and Ge concentrations, in which Al, Li and P are varied over large ranges of 49~438 ppm, 12~438 ppm and 11~97 ppm, respectively and overlapped in different textural zones. The Ge/Ti, Ge/Be, Al/Ti ratios are varied over large ranges of 1~159, 5~824 and 43~159, respectively and have large overlap in different textural zones. The $Al^{3+} + Li^{+} \rightarrow Si^{4+} + \square$ is the main substitution way, probably controlled overwhelmingly by growth speed of quartz. The magmatic quartz from No. 3 pegmatite Koktokay area formed at the temperatures of 698~588 °C and 500~327 °C based on the calculation of TiO_2 solubility and TitaniQ thermometer in quartz, respectively. The former is close to the eutectic temperature of granite, but the latter gives a significantly low crystallization temperature of quartz in pegmatite, indicating that application of TitaniQ thermometer in pegmatite system is limited.

Keywords: Trace elements; Ti-thermometer; Magmatic-hydrothermal evolution; Quartz; Koktokay; No.3 pegmatite.