Estimation of crystallization temperature of automorph quartz crystals from the Qohrud area, Kashan, using TitaniQ thermometer

M.R. Rezapour¹, M. Moazzen¹, R. Hajialioghli¹, V. Simmonds²

¹- Department of Earth Sciences, Faculty of Natural Sciences, University of Tabriz, Iran
²- Research Institute for Fundamental Sciences (RIFS), University of Tabriz

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Abstract: The Qohrud granitoid is a part of the Urmia-Dokhtar magmatic assemblage. The main rock types are Miocene granite and tonalite. The hydrothermal activities were effective due to intrusion. Hydrothermal activities were more intense in the southern part of the pluton. This has produced relatively large automorph quartz crystals. The alteration of the granitoid wall rocks was accompanied with alteration of K-feldspar, plagioclase and biotite, which has released Sr, K, Rb and to the lesser amounts Al from the mineral structures into the hydrothermal fluid. ICP-MS analysis of quartz samples reveals increase in concentration of some elements including Li (10.33 ppm), Al (6900 ppm), K (9600 ppm) and considerably two elements Rb (1.2 ppm) and Sr (3.35 ppm), along with positive anomaly of HREE in comparison to LREE that all indicate an hydrothermal origin for the studied quartz crystals. Using Ti content of quartz or TitaniQ thermometer gives temperatures of 307 to 547°C with an average of 371°C for crystallization of the quartz crystals. This temperature is in good agreement with temperatures calculated by fluid inclusions (306 to 550°C).

Keywords: Hydrothermal quartz; Ti in quartz thermometry; Qohrud; Kashan.

*Corresponding author, Tel: 04133393922, Fax: 04133356027, E-mail: moazzen@tabrizu.ac.ir