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First record of K-cymrite in North Qaidam UHP eclogite, Western China

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Abstract

Inclusions of polycrystalline K-feldspar aggregates after K-cymrite ($KAlSi_3O_8 \cdot nH_2O$) were discovered in garnet from a Dulan eclogite in the Qaidam ultrahigh-pressure (UHP) terrane, western China. The eclogite consists of garnet ($Alm_{56}Grs_{23}Prp_{20}Sps_{01}$), omphacite ($Jd_{35}Aeg_{6}Aug_{59}$), and minor rutile and apatite. The 20 to 200 μm inclusions vary in shape from prismatic, hexagonal to rounded, and exhibit palisade and mosaic textures. Host garnets show radial fractures, similar to those surrounding quartz pseudomorphs after coesite. Some inclusions consist of almost end-member K-feldspar ($Or_{99-100}Ab_{0-1}$) polycrystalline aggregates, whereas others are composed of >90 vol% K-feldspar ($Or_{96-99}Ab_{1-4}$) with minor secondary albite occurring along the margins of the inclusions. Raman spectra of K-feldspar crystalline aggregates vary slightly reflecting various degrees of Si-Al ordering, and show a Raman peak at ~390–395 cm^{-1}, typical for cymrite structure. These characteristics of the K-feldspar polycrystalline inclusions imply the presence of former K-cymrite in the Dulan eclogite formed at >3 GPa at ~720 °C. The occurrence of K-cymrite in UHP eclogite is significant because of its potential as an important carrier of crustal K and H_2O to the upper mantle.

Keywords: K-cymrite, K-feldspar, inclusion, eclogite, Raman spectrum, North Qaidam UHP terrane