Fluid inclusion and genesis of Yukarıgöçek amethyst vein system, Bigadiç-Balıkesir (NW Turkey); relationship to the granite

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Amethyst crystals are exists as a vein system in the ophiolitic rocks in the Yukarıgöçek (Bigadiç-Balıkesir), NW Turkey. Upper Cretaceous age ophiolitic rocks consist of generally serpantinite and metabazite which including high Fe2O3 content (8-9%wt). These rocks cuy by Musalar pluton. The pluton has granite and granodioritic composition and contains 5-10 cm in size and rounded in shape mafic microgranular enclaves. The Musalar pluton show madium-grained, poikilitic textures, and contain plagioglase, orthoclase, quartz, biotite, hornblende. Geochemically, major and trace element variations diagrams can be attributed to the importance of fractional crystallisation which was mainly controlled by plagioclase and hornblende. Primitive mantle normalized spider diagrams of granitic samples exhibit significant enrichments in large-ion lithophile elements (LILEs); as well as depletion of high field strength elements (HFSE). Chondrite-normalized rare-earth element patterns of the pluton and ophiolitic rocks samples are concave upwards with low- to-medium enrichment. The Musalar pluton has high-K series and characterised by a calc-alkaline granodiorite-series trend. It is I-type and has volcanic-arc granitoids. Pluton is peraluminous with ratio of A/CNK > 1.

The amethyst crystals size are between 0.3-1.5 cm, and have lilac colors. The amethyst crystals settled into the cracks in the ophiolitic rocks. Analysis of fluid inclusions vein amethyst showed that average homogenization temperatures (Th) range from 232 to 278 °C (mean 260 °C). In cracks amethyst crystals were formed during hydrothermal stage, depending on to the emplacemet of pluton.

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