

Mineralogical, textural, geochemical and thermometric characteristics of Central Anatolian fluorites (Turkey): Tracing the origin of post-magmatic fluids

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In this study, we investigate the spatial distribution of fluorite veins in Central Anatolia with emphasis on mineralogical, textural, geochemical and thermometric variations. The studied fluorite mineralizations (Kaman, Akçakent, Pöhrenk and Şefaatlı mineralizations from west to east) are located on northern part of Kırşehir Massif which is a part of Central Anatolian Crystalline Complex that is bordered by the İzmir-Ankara-Erzincan Suture Zone. The Kaman, Akçakent and Şefaatlı fluorite deposits are formed in association with magmatic rocks such as syenite and monzonite / monzodiorite in composition which are of Upper Cretaceous age. Fluorite in these deposits occurs as purple- and green-colored stockwork veins and/or disseminations along fault/fracture systems and is accompanied by quartz and rare pyrite. The Pöhrenk ore, however, is precipitated as space filling-breccia type within karstic voids of Eocene limestones and marl levels. The silicification/carbonatization and barite occurrences are found as the main alteration and secondary products of mineralization. Thickness of fluorite veins is between 2 and 30 cm. Σ REE contents of host rocks and fluorite veins are in the range of 2-806 ppm and 20-390 ppm, respectively. In element variation diagrams constructed for both host rocks and fluorite mineralizations, LREE concentrations are found to be greater than HREEs. REE contents of green-colored fluorites are about 10-fold higher than those of purple-colored ones. Negative Ce and Eu anomalies indicate high oxygen fugacity for the mineralizing fluids. Fluid inclusion studies indicated three different types of inclusions: 1) two-phase (liquid-vapor) primary and secondary inclusions, 2) single-phase (liquid) primary and secondary inclusions and 3) two-phase (liquid-vapor) and single-phase (liquid) pseudo-secondary inclusions. Results of homogenization temperatures from a number of about 200 measurements chiefly on fluorite and less often quartz and barite crystals point to a temperature range of 90-210°C and a salinity range of 0.2 to 23.0 NaCl equivalent wt%. Our ongoing survey which has been further focused on the time of mineralization and Sr-Nd isotope compositions of fluorites and host rocks as well as stable isotope systematics of accessory minerals will lead to a better understanding of the origin of mineralizing fluids that precipitated Central Anatolian fluorites.