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Isotope geochemistry of hydrothermal alteration in East of Esfahan, Central Iran

Sedigheh Taghipour (1) and Batoul Taghipour (2)

(1) (mobarakeh_t@yahoo.com), Tehran university, Tehran, Iran, (2) taghipour@shirazu.ac.ir, Faculty of sciences, Shiraz University,Iran

In the Cenozoic magmatic belt of Central Iran, the Eocene volcanics and pyroclastics from the East of Esfahan underwent extensive hydrothermal alteration. The Eocene volcanics composed mostly of andesite lava and tuffs have been altered. The survey area is laterally zoned from an inner quartz-sericite alteration zone to an outer propylitic zone. Quartz-sericite alteration is predominant (>95%), but smaller zones of alunite-jarosite and silicified zones are present and superimposed onto a quartz-sericite alteration. In the quartz-sericite zone all altered rocks are light grayish to whitish in color and porphyritic with aphanitic groundmass.
Concentrations of alunite and jarosite veinlets and stockworks are dispersed irregularly in this zone. Alunite and jarosite occur also as coatings on fractured rocks. All types of alunite occurrences are brick-red, cream, white and buff in colors, while jarosite is brown to rusty in colors. To verify, chemical composition of alunite and jarosite were identified by X-ray diffraction in mineral assemblages. Major alteration zones show inclusions of propylite, quartz sericite, advanced argillic and silicified zones. These alunites are mainly porcelaneous and their compositions show a solid solution between alunite and jarosite. In alteration zones, the mineral assemblage is characterized by alunite-jarosite + quartz + sericite + alkali feldspars + chlorite $\pm$ turquoise $\pm$ barite $\pm$ iron oxides. There are numerous alunite and jarosite occurrences, mainly as veinlets, in parts of the advanced argillic zone. Alunite 18O and D values range from -1.76 to 8.81%■ and from -52.86 to -129.26%■ respectively. Field observations, mineralogical evidence and results from light element stable isotope data (18O, D and 34S); indicate that in this area alunitization is supergene in origin.