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Mass changes during hydrothermal alteration/mineralization in the gold-bearing Astaneh granitoid, western Iran

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The Astaneh granitoid massif, located in western Iran, is a part of Sanandaj-Sirjan structural Zone. This body, mainly consist of granodioritic rocks, is widely affected under hydrothermal alteration and four alteration zones including phyllic (sericitic), chloritic, propylitic and argillic zones could be identified in this area. Four main mineralization- related alteration episodes have been studied in terms of mass transfer and element mobility during the hydrothermal evolution of Astaneh deposit. In order to illustrate these changes quantitatively, isocon plots have been applied. Isocon plots illustrate that Al, Ti, Ga and Tm was relatively immobile during alteration and that mass were essentially conserved during alteration. Phyllic alteration was accompanied by the depletion of Na and Fe and the enrichment of Si and Cu. The loss of Na and Fe reflects the sericitization of alkali feldspar and the destruction of ferromagnesian minerals. The addition of Si is consistent with widespread silicification wich is a major feature of phyllic alteration. All of the HFSE (except in Y), were enriched but all REEs were depleted in this zone. The overall obtained results show that major oxides such as SiO2, Al2O3, Fe2O3, MnO, MgO, CaO, Na2O, K2O, P2O5 and TiO2 and also LOI show dissimilar behaviors in the different zones. All of the LFSE, HFSE and FTSM (except in Cu and Mo) were depleted in argillic alteration but show dissimilar behaviors in the other alteration zones. The results shown strong depletion in REE, in particular LREE, in all of the alteration facies (except in chloritic zone), equivalent fresh rocks. In chloritic zone, compared with HREE, the LREE represent more enrichment.