Chemical Composition of Biotite in Cu-Related Intrusions and Alteration Zones of Sarcheshmeh Porphyry Cu-Mo Deposit, Iran

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The Sarcheshmeh deposit is located 65 km southwest of Kerman city, in southeastern Iran. It is known as a typical porphyry Cu-Mo deposit. The Sarcheshmeh deposit contains 1200 million tones of sulfide ores, with an average grade of 0.65 % Cu and 0.03% Mo. The Sarcheshmeh Cu porphyry is located in a NW-SE trending magmatic arc zone which was formed by the subduction and collision of the Arabian Plate beneath Central Iran. The majority of igneous rocks in this zone appear to be a part of extensive volcanism and magmatism started in the Eocene period (50 Ma) and continued to a climax during the middle Eocene for volcanic rocks and Oligo-Miocene for plutonic rocks. Numerous Miocene porphyry stocks and dykes intruded thick sequences of Upper Cretaceous sedimentary and volcanic rocks, Eocene andesitic and dacitic lava and pyroclastic and volcanoclastic rocks in the Sarchesmeh deposit. Mineralization occurs in the Miocene porphyry gronodiorite and Eocene porphyry andesite. The host rocks were extensively altered by hydrothermal fluids. Hydrothermal alteration types are dominantly potassic, propylitic, phyllic, and argillic. High grade ores were formed in the phyllic zone by supergene processes. The chemical composition of biotite in the stocks, dykes and the potassic and phyllic alteration zones has been determined. Altough, F contents and X_{Mg} in biotites from potassic and phyllic zones are higher than those of intrusive rocks. Cl contents of biotite in granitic and granodioritic stocks are higher than those of dykes and alteration zones and similar to granitoids related to ore deposits. Values of the calculated log (fH$_2$O/fHF), log (fH$_2$O//fHCl) and log (fHF/fHCl) of the fluids in equilibrium with the chemical composition of biotites suggesting the fluid composition played some role in incorporation of F and specially Cl in biotite. The Cl intercept values of biotite in the stocks are similar to those of hydrothermal and ore forming systems. The data suggests that the chlorine intercept values tend to be more Cl rich than comparable values from biotites in common igneous rocks. The biotites also show similar and narrow range of F/Cl intercept value correspond to Cl-rich and ore-forming fluids such as those of porphyry copper systems.