

Sulfide mineral paragenesis of the Hugo Dummett porphyry Cu-Au deposit, Oyu Tolgoi, South Mongolia

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Mineralogical studies of ore minerals have been conducted for the Hugo Dummett porphyry copper deposit. The Hugo Dummett deposits contain 1.08% copper (1.16 billion tonnes in total) and 0.23 g/t gold. Copper-gold mineralizations at this deposit are centered on a high-grade copper (typically 2.5%) and gold (0.5 g/t) zone of intense quartz stockwork veining. The high grade copper and gold zone is mainly within the Late Devonian quartz monzodiorite intrusions and augite basalt, also locally occurs in dacitic rocks. Intense quartz veining forms a lens up to 100 m wide hosted by augite basalt and partly by quartz monzodiorite.

Hugo Dummett porphyry copper-gold deposits are characterized by three mineralized stages based on our study: (1) early stage (2) middle stage and (3) late stage. The main copper-gold mineralization occurs in the early and middle stages, which is related to the quartz monzodiorite and dacitic rocks. Pyrite, chalcopyrite and bornite were continuously crystallized from early to late stage. The early stage of pyrite, chalcopyrite, bornite, molybdenite and sphalerite were replaced by middle stage of minerals. The middle stage minerals are sphalerite, tennantite, tetrahedrite, chalcocite, covellite, eugenite, galena, electrum, and gold, those are dominantly occur in the quartz monzodiorite. Additional pyrite, bornite and chalcopyrite were also deposited during this stage. In the late stage, pyrite, chalcopyrite and bornite are dominantly occurs as veins, veinlets and fracture filling in the quartz.

The bornite, chalcopyrite, pyrite, sphalerite, tetrahedrite, tennantite, enargite, chalcocite, covellite, molybdenite, gold and eugenite occur as main ore minerals. All ore minerals were deposited in the temperature increasing condition with time. Eugenite is determined for the first time in the Hugo Dummett deposit.