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Reequilibration Processes In Magnetite From Haobugao Fe-Zn Skarn Deposit

Xiangdong Wang and Xinbiao Lv

The Haobugao Fe-Zn skarn deposit is located in the southern part of the Da Hinggan Mountains, eastern Inner Mongolia, China. It belongs to the northeastern part of the Huanggang-Ganzhuermiao Sn-polymetallic metallogenic province(Zhang et al.,1994;Sun et al.,2001; Wang et al.,2001). The deposit is occurred in the outer contact zone of the late Yanshanian period Wulanba intrusion and Dashizhai Formation. Skarnization is the most important alteration type for the deposit. Orebody are layered and stratoid occurred in the roof and bottom plate of marble stratum of Dashizhai Formation and interlaminar fracture. As a whole, the Fe-Zn polymetallic ore body has characteristics of Fe-Cu-Zn-Pb vertical zoning from deep to shallow.

The texture for magnetite from Haobugao Fe ore-bodies show that the magnetite has reequilibrated by dissolution and reprecipitation(DRP), oxy-exsolution(OE). (1)Oxy-exsolution process: the exsolution lamellae of magnetite(Mag-1, Mag-2, Mag-3 and Mag-4) include ulvöspinel and tinstone. The orientated exsolution lamellae of ulvöspinel mainly distribute in Mag-1, but the tinstone exsolution lamellaes are widespread in Mag-2, Mag-3 and Mag-4. (2)Dissolution and reprecipitation process: Mag-1 and Mag-4 show light rims (Mag-5); Mag-4(showing typical growth zonation) are replaced by the Mag-1, whereas the Mag-1 are replaced by Mag-2 which are cut by irregular magnetite(Mag-3). So, five generation of magnetite can be recognized.

The properties of hydrothermal fluids, such as temperature, salinity, pressure, and fO_2, are important in driving the dissolution of primary magnetite (cf. Whitney et al., 1985; Hemley and Hunt, 1992). These externally derived fluids contributed to an increase in salinity and Cl- contents of the ore-forming fluids, enhancing Fe solubility and consequently leading to disequilibrium between the precipitated magnetite and the evolving fluids (Hu et al., 2015). Local variations in the physiochemical conditions of the fluids, such as a decrease in pressure or fO_2, may also contribute to the dissolution of magnetite (Whitney et al., 1985; Hemley and Hunt, 1992). In addition, the reequilibration of magnetite must have resulted in an increase in the extent of grain boundaries (by the oxy-exsolution processes) and effective porosity (by the DRP processes), both of which are favorable for fluid infiltration that further promotes the dissolution and re-precipitation of magnetite.

References

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