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Geologic Features and Fluid Inclusion Study of the Mandula Exploration Area in Mongolia

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1 Geologic Features of the Exploration area

Mandula exploration area is located in South Gobi Mandula Sumu in the south central of Mongolia. The strata are mainly composed of Mesoproterozoic dolomite, containing abundant stromatolites. A large area of Devonian granites, granodiorites and alkali granites are exposed in the South of the prospecting area, and mainly distributed along the NW trend fault. The Hercynian and Indosinian tectonic-magmatic activity was considered as the major factor of the large-scale mineralization (Badarch et al., 2002; Nie et al., 2010).

A large area of silicified alteration belt including malachite, azurite and chalcocite is exposed in the upper Proterozoic dolomite on the surface of ore field. Cu-bearing minerals are closely associated with quartz vein in space. Malachite-bearing quartz vein cut in the dolomite and grew along the fault fissures.

2 Fluid Inclusion Study

The fluid inclusions in the quartz may contain the characteristics of original ore-forming fluid. According to the occurrence, the fluid inclusions are divided into early and late stages. There are mainly two types of fluid inclusions, i.e.CO_2-H_2O (C-type) and NaCl-H_2O (W-type) fluid inclusions with minor daughter mineral-bearing multiphase inclusion (S-type) in the early stage. The homogeneous temperatures and salinities of these fluid inclusions vary from 195℃ to 384℃ and from 2.77 wt% to 21.37 wt% NaCl equivalent, respectively, which reflect the characteristics of original ore-forming fluid. Only NaCl-H_2O (W-type) fluid inclusions are found in the late stage, with homogeneous temperatures of 95~213℃ and salinities of 1.27 wt% to 12.63 wt% NaCl equivalent.

The calculated homogeneous pressure of the early stage C-type inclusion is concentrated between 114.2~142.5 MPa, suggesting the trapping pressures of inclusions are higher than 142.5 Mpa, corresponding to a depth of 5.7 km.

3 Discussion

The fluid inclusions result indicate that the ore fluid evolved from medium-high temperature, medium salinity and rich CO_2 in the early stage to low temperature, low salinity and poor CO_2 in the late stage. Combined with the geologic feature of Cu-bearing silicified alteration belt and mineral assemblage characteristics, the ore fluid may be magmatic fluid and the ore-forming depth is more than 5.7 km.

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