

## Geochemical and Mineralogical Characterisation of the Dulaan Khar Uul Pb-Zn-Ag Deposit in Western Mongolia

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In this study, we focus on the Dulaan Khar VMS deposit in the Mongol-Altai belt. Four orebodies show lenses and veins and are stratabound by the early to middle Devonian Dulaankhar formation that consists of rhyolite tuff, flows, tuffaceous sandstone, rhyolite, and dacite porphyry subvolcanic bodies and andesite and diabase dikes. The  $\delta^{34}\text{S}$  values of sulfide minerals of the Dulaan Khar Uul deposit range between +4.3‰ and +5.6‰.

Geochemical data of least-altered mafic and felsic volcanic rocks from the Dulaan Khar deposits show clear compositionally bimodal characteristics ranging from 43.7 to 52.3%  $\text{SiO}_2$ , and from 55.1 to 80.9%  $\text{SiO}_2$ . The Th/Yb vs. Nb/Yb diagram distinguishes oceanic arc from active continental magmas. All the samples plot within the active continental magma. Samples from the Dulaan Khar Uul deposit show a marked bimodal trend and consist of basalt and rhyodacite. In the Th/Yb vs. Nb/Yb diagram, samples of the Dulaan Khar Uul deposit are plotted outside the diagonal MORB-OIB array, on a vector at a steep angle but closer to E-MORB for all samples, and may be related to the variable fractionation processes and variable crustal contamination. All least-altered felsic rock samples are plotted on FII and FIIIa affinities field of Leshner et al., considered to have much higher mineralization potential.

The mineral composition of the deposit ore is characterized by mainly sphalerite and galenite with pyrite, a slight amount of chalcopyrite, and occasionally tennantite, marcasite, ilmenite, cerussite, smithsonite, hematite, malachite, arsenopyrite, siderite, gold, etc. Two types of sphalerite are identified: (Zn, Fe)S, marmatite with iron and native zinc sulfide cleiophane.

The geochemical characteristics of whole rocks from the Dulaan Khar Uul deposit may be related to amalgamation being dominated by advancing rifting, which was favorable for the formation and/or preservation of VMS deposits.