RAUD Hélène (2018): Mineralogical and stable isotope study of Omitiomire copper deposit, Namibia

Abstract

The Omitiomire Cu deposit in the Ekuja Dome of the Damara Belt in Namibia is hosted by an anastomosing, low-angle Pan-African (ca. 520 Ma, Miller 1983, 2008; Gray et al. 2008). Shear zone system developed around an older (ca. 1100–1060 Ma, Steven et al. 2000; Maiden et al., 2014), late Mesoproterozoic intrusive breccia between a suite of mafic rocks (originally lava flows) and later felsic gneisses. High-grade ore copper is formed along contacts between tectonically interleaved biotite-epidote schists and felsic gneisses, and is in contact with metabasite. Alteration and mineralization are associated with elevated concentrations of K2O, and Cu and a loss of Na2O, CaO, and MgO. Oxygen isotope fractionation for quartz-biotite, quartz-feldspar, and quartz-amphibole mineral pairs give temperatures of between 500 and 650 °C during peak of metamorphism. Mineral separates from amphibole-biotite gneisses and mineralized schists have similar ranges in δ18O values of about 1.2 to 2 ‰ relative to VSMOW.

Coexisting minerals are arranged in an order of increasing δ18O values from biotite, to epidote, amphibole, and quartz, suggesting that the mineral within the rocks equilibrated at the given metamorphic temperatures of 500 to 650°C. Similarly, H-isotope results for mineral separates from biotite-epidote schists and amphibole gneisses do not show any reversals for D/H fractionations, with δD values of between −46 and −82 ‰, typical of metamorphic-magmatic rocks.

The homogeneous and low δ34S values (−6.2 to −4.5‰ CDT) are compatible with a local redistribution of sulfur from magmatic rocks and interaction with sulfur derived from metamorphic fluids during Kuiseb schist alteration.

The relatively low fluid/rock ratios and elevated Cu values within amphibolite such as a metabasalt or a meta andesite point to a local redistribution of Cu mineralization.

The magmatic origin of a copper enriched metabasite with hydrothermal alteration seem to be related to a metamorphosed Volcanic Mafic sulfide (Large et al., 1992).