

*SULFIDE MELT INCLUSIONS AS EVIDENCE FOR THE EXISTENCE OF
A SULFIDE PARTIAL MELT AT BROKEN HILL, AUSTRALIA*

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Abstract

Polyphase sulfide melt inclusions are hosted within garnetite rocks and quartz veins in garnetite surrounding droppers and large masses of the orebody at Broken Hill, Australia, and record the presence of a former sulfide melt. Sulfide melt inclusions are either primary or occur along healed fractures in both garnets and quartz veins. Common daughter minerals in the inclusions are galena, sphalerite, arsenopyrite, chalcopyrite, tetrahedrite-tennantite, and minor amounts of argentite, bornite, dyscrasite (Ag_3Sb), and gudmundite (FeSbS). The inclusions exhibit a strong enrichment in low-melting-point chalcophile elements compared to the main orebody. Experimental reequilibration of sulfide melt inclusions shows homogenous melt at temperatures as low as $720^\circ \pm 10^\circ\text{C}$ and 5 kbars, well below that of peak metamorphism at Broken Hill ($800^\circ \pm 10^\circ\text{C}$ and 5 kbars). Thus, these inclusions are interpreted to represent a trapped sulfide melt formed during peak metamorphism at Broken Hill, Australia.

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