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Preliminary data on sulfides from mantle xenoliths from Wilcza Góra and Krzeniów basanites (SW Poland)

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The basanites from Krzeniów (19.57 Ma) and Wilcza Góra (20.07 Ma; K-Ar ages by Birkenmajer et al. 2007 Ann. Soc. Geol. Polon.) in SW Poland belong to the Lower Silesian part of the Cenozoic Central European Volcanic Province (CEVP). Both basanites are rich in mantle xenoliths, predominantly of harzburgitic composition. The Krzeniów harzburgites are anhydrous, whereas those from Wilcza Góra contain small amounts of amphibole.
Sulfides occur in those harzburgites as:
(1) rare, small (<15 μm in diameter) singular grains, enclosed in silicate phases. They have mostly composition of pentlandite (Ni 25.2 - 32.5, Fe 20.3 – 27.0 mole %, atomic metal/sulfur ratio = 1,11). Locally, pentlandite is associated with Ni-pyrrhotite (up to 6,76 mole% of Ni) within the same grain. The grains of pentlandite/Ni-pyrrhotite are anhedral, rounded and elongated. Anhedral millerite grains (Fe $\sim$ 2.39 mole %, metal/sulfur ratio = 0.98) are subordinate.
(2) small (< 5 μm in diameter) grains enclosed in silicates, forming sulfide inclusion trails located close to grain margins. These sulfides have the composition of pentlandite (21.5 mole% Fe, 30.8 mole% Ni). Grains are anhedral, oval. Only two analyses were not contaminated due to small size of this kind of sulfides.
(3) blebs associated with fine-grained intergranular aggregates of silicate minerals. The aggregates carry majority of sulfides. The sulfide blebs are relatively large (up to 300 μm across) and occur as single grains or in aggregates. Their grains are heterogeneous and consist of various phases. In Krzeniów aggregates consist of clinopyroxene+ olivine$\pm$ spinel$\pm$ glass$\pm$ feldspar$\pm$ sulfides (pentlandite and Ni-pyrrhotite). Pentlandite contains up to 1.25 mole% of Cu. Sulfides occur in the marginal parts of fine-grained aggregates. One of the pentlandite grains exhibits broad variation of Fe (4.6 to 20.3) and Ni (32.5 to 46.0 mole %).
In xenoliths from Wilcza Góra,3 kinds of fine-grained intergranular aggregates occur: (A) originated by amphibole breakdown, consisting of spinel+ clinopyroxene$\pm$ glass, with no sulfides; (B) originated by decompression melting of clinopyroxene with or without external melt supply; those aggregates consist of clinopyroxene+ spinel+ glass+ sulfides (pentlandite+Ni-pyrrhotite and chalcopyrite+pentlandite). Pentlandite forms irregular domains within grain and/or rim around grain cores, composed by Ni-pyrrhotite and pentlandite intergrowths. Pentlandite contains from 20.9 to 25.8 mole % Fe and 25.9 to 30.6 mole%, whereas Ni-pyrrhotite contains from 1.7 to 12.7 mole % of Ni. Moreover, pentlandite occurs as monophase grains and in polyphase ones with chalcopyrite. The latter forms domains in or rims around polyphase grains. Chalcopyrite contains small amounts of Ni (0.4 to 1.2 mole %) and has metal/sulfur ratio = 0.96-0.98; (C) related to external melt infiltration, consisting of clinopyroxene+ spinel+ feldspar+ sulfides. This type of aggregates contains anhedral, rounded, randomly distributed pentlandite+Ni-pyrrhotite polyphase grains. Pentlandite forms irregular domains within one grain and/or rim around grain core, composed by Ni-pyrrotite and pentlandite intergrowths. Pentlandite Fe content varies from 24.0 to 25.4 mole%, whereas that of Ni from 26.4 to 28.2 mole %, respectively. Ni-pyrrhotite contains 2.6 to 18.3 mole % Ni.
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