Genesis of djerfisherite in kimberlite-hosted mantle xenoliths

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Djerfisherite (Dj), K-Cl-bearing sulfide, is widespread in kimberlite-hosted mantle xenoliths and as inclusions in diamonds. This sulfide was considered as a potential source of K and Cl in the sub-continental lithospheric mantle (SCLM) [1], and therefore understanding of its genesis is valuable. There are two basic hypothesis of Dj origin in mantle xenoliths [2]: mantle metasomatism *in situ* and kimberlitic metasomatism during transport of the xenoliths to the surface. Dj is stable at 1 atm [3] but its stability at a higher pressure is unknown. We for the first time tested high-pressure stability of natural Dj, $K_{6.15}(Fe_{16.29}Cu_{7.80}Ni_{0.05})S_{26.06}Cl_{0.94}$, in multianvill experiments at 3 GPa and 800-1200 ºC. Run temperatures are between continental geotherm and the temperature of ascending kimberlitic magma, i.e. they match real mantle conditions.

At 3 GPa Dj was not found among the run products. At 600 and 800 ºC it decomposes to KCl, intermediate solid solution and Cl-free K-sulfide (in wt%: K 12.1-12.6, Fe 16.2-18.6, Cu 38.5-41.0, S 30.0-30.2). At 1200 ºC K-phases are absent among the run products and the system undergoes partial melting.

Dj is not stable at pressures greater than 3 GPa, therefore, it can not be a storage for K and Cl in the diamond- and garnet-facies mantle. Dj formation in mantle xenoliths is most likely related to infiltration of kimberlite melt into the xenoliths during ascent. This finding supports the idea that Dj may serve as an indicator of chlorine enrichment of kimberlite melt.

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