

POTASSIUM-BEARING CLINOPYROXENE AS AN INDICATOR OF THE MANTLE ULTRA-POTASSIC MELTS: REVIEW OF NATURAL AND EXPERIMENTAL DATA

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Financial support by RFBR (grants NN 01-05-64775 and 00-15-98519),
the Program of expertise for young scientists of RAS (grant N 323)

Herald of the Earth Sciences Department RAS, № 1(20)'2002

URL: http://www.scgis.ru/russian/cp1251/h_dgggms/1-2002/informbul-1.htm#faza-7.engl

Clinopyroxene containing up to 1.7 wt. % K_2O (*KCpx*) is found as inclusions in diamonds [1, 3] and eclogitic nodules from kimberlites and lamproites, as well as in garnets of garnet-clinopyroxene and carbonate-silicate rocks of the Kokchetav Complex (N. Kazakhstan) [2]. *KCpx* associated with high-pressure phases (Na-bearing majoritic garnet, ferropericalse, coesite etc.) [3] and inclusions of ultra-potassic fluids and melts [4], as well as experiments on the *KCpx* synthesis in the systems of diverse bulk composition [5] show that, this mineral is able to crystallize at $P > 5$ GPa under conditions of high potassium activity (concentration) in mantle liquids. On the basis of published data on the *KCpx* equilibria with aluminosilicate and carbonate-silicate melts, we propose an empirical model for thermodynamic description for regularities of potassium substitution in *KCpx* in dependence on P , T , SiO_2 and K_2O contents in the melt and the *KCpx* composition for $T=1100-1900^\circ C$ and $P=1.5-11$ ГПа. The proposed equation allows estimation of pressure for the *KCpx* crystallization from the melt of given composition with an accuracy of ± 0.91 GPa. The model predicts high solubility of the $KAlSi_2O_6$ end member in *KCpx* (up to 25 mol. %) at $P > 5$ GPa. That fact implies that *KCpx* is the important container for potassium in the deep mantle.

References

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