

EXPERIMENTAL STUDY OF CLINOPYROXENES IN THE SYSTEM $\text{CaMgSi}_2\text{O}_6$ - $\text{NaAlSi}_2\text{O}_6$ - KAlSi_2O_6 AT PRESSURES 5-7 GPa

Safonov O.G., Perchuk L.L., Litvin Yu.A.

(Institute of Experimental Mineralogy, Chernogolovka, Russia)

In order to evaluate a role of pressure and jadeite content on solubility of the KAlSi_2O_6 end-member in clinopyroxenes, omphacites with varying concentrations of Na_2O and K_2O were synthesized from gel mixtures of $\text{CaMgSi}_2\text{O}_6$ (*Di*), $\text{NaAlSi}_2\text{O}_6$ (*Jd*) и KAlSi_2O_6 (*Lc*) using the “anvil-with-hole” high-pressure assembly (see table).

Mixture (mol. %)			T, °C	P, GPa	Time, min	Run products *	K ₂ O in <i>Cpx</i> (wt. %)
<i>Di</i>	<i>Jd</i>	<i>Lc</i>					
0	40	60	1200	7	450	<i>KCpx</i>	0.13 - 0.54
8	32	60	1300	7	360	<i>KCpx</i>	0.51 - 1.09
20	20	60	1300	7	360	<i>KCpx</i> , $\text{K}_2\text{Si}_4\text{O}_9$	1.30 - 2.27
32	8	60	1300	7	360	<i>KCpx</i> , <i>Grt</i>	1.73 - 2.35
20	20	60	1150	6	450	<i>KCpx</i> , <i>Grt</i>	0.38 - 0.71
32	8	60	1170	6	400	<i>KCpx</i>	0.83 - 1.78
0	40	60	1000	5	780	<i>KCpx</i>	< 0.04
8	32	60	1100	5	430	<i>KCpx</i>	0.03 - 0.07
20	20	60	1100	5	430	<i>KCpx</i>	0.22 - 0.41
32	8	60	1100	5	430	<i>KCpx</i>	0.55 - 0.71
40	0	60	1100	5	430	<i>KCpx</i>	1.72 - 2.41

* all samples contain either glass or quenching products

Following regularities in the K substitution in omphacite are found.

1) K and Na contents in omphacites *irregularly* increase with increasing pressure; the most rapid increase of the K content occurs in the interval of 6-7 GPa.

2) A distinct *negative* correlation of K and Na in *Cpx* is observed at each pressure. Na-free *Cpx* are the best hosts for K.

3) The isomorphic mechanism $\text{Na} \leftrightarrow \text{K}$ is predominant in K-bearing omphacites. A role of the isomorphism $\text{CaMg} \leftrightarrow \text{KAl}$ increases with a decrease of the jadeite content.

K-bearing omphacites coexist with melts, which contains 15-21 wt. % of K_2O , 54-63 wt. % of SiO_2 and 19-22 wt. % of Al_2O_3 at low concentrations of Na_2O independently on the sodium content in the starting charge. Experiments demonstrate that K-bearing omphacites from mantle eclogites can be produced from deep-seated melts enriched both in K and Na. Crystallization of omphacites from such melts is an effective mechanism for formation of *ultra-potassic* melts.

Study is supported by the Russian Foundation for Basic Research: projects 01-05-64775, 03-05-06289 and 02-05-64684, the Program for Young Scientists of RAS: project № 323, Science Support Foundation (a program for young scientists) and European Academia Foundation.

Electronic Scientific Information Journal “Herald of the Department of Earth Sciences RAS” № 1(21) 2003
 Informational Bulletin of the Annual Seminar of Experimental Mineralogy, Petrology and Geochemistry – 2003
 URL: http://www.scgis.ru/russian/cp1251/h_dggms/1-2003/informbul-1_2003/term-10e.pdf
 Published on July 15, 2003

© Department of the Earth Sciences RAS, 1997-2003
 All rights reserved