

# SINGULARITIES OF MINERAL COMPOSITIONS DEEP-SEATED QUARTZ-BEARING PARAGENESISES. EXPERIMENTAL RESEARCH

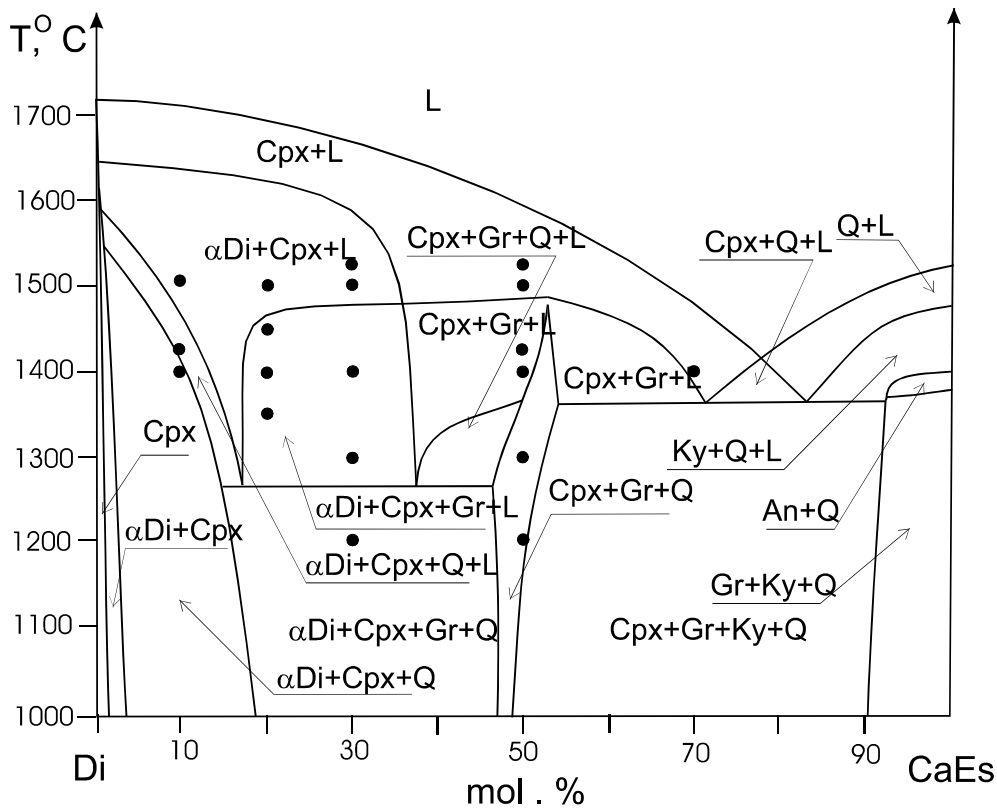
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Compositions of the nonstoichiometric clinopyroxene for a long time are interested as the possible basis for geothermobarometer and in connection with a problem of the eclogite barrier [1-6, 8-9]. However a data of different contributors on this problem are extremely inconsistent. In this connection it is carried out researches in sections Di-CaTs, CaTs-CaEs at the interval pressures 20-30 kbar. In outcome it is fixed, that in section diopside «calcium - molecule Eskola" at pressures from 20 up to 30 kbar is present new, earlier not diagnosed phase. Its composition is close to stoichiometric diopside, and contains up to 5 molecular percents of enstsite component. Besides at composition of this phase there is some excess of silicon, in relation to section diopside - enstatite. Quantity of exuberant silicon close to accuracy of the analysis on the electron-probe microanalyzer, but in all analyses this deviation exists. At the same time, this phase does not contain an alumina (0 % according to the analysis on a microprobe), but it is high content alumina in system. According to X-ray diffraction studies this phase (further:  $\alpha$ -diopside) is not quenched, and turns in diopside clinopyroxene. The optical study of microsections shows, that the new phase ( $\alpha$ -diopside) is always submitted large (in two, three times are larger than grains of other phases) the grains, having section close to rhombic across lengthening and it is improper pole form - in section along lengthening. The grains of  $\alpha$ -diopside have the polysynthetic twins.



Secretion of  $\alpha$ -diopside as the new phase which are not belonging to series of clinopyroxene solid solutions, educe the phase diagram of section diopside-"calcium molecule Eskola"- "calcium-Tschermakite clinopyroxene" ( $\text{CaMgSi}_2\text{O}_6$ - $\text{CaAl}_2\text{SiO}_6$ - $\text{CaAl}_{0.5}\text{Si}_2\text{O}_6$ ) in correspondence with rules of phases, that is a straight thermodynamic existence proof of  $\alpha$ -diopside as a self-contained phase.

Anomalously low temperatures of melting, with appearance of eutectic  $L = (\alpha\text{-Di}) + \text{Cpx} + \text{Qz} + \text{Gr}$ , have the result to serious petrological to corollaries. In particular, the connection is looked through, permitting to explain scales trap magmatism. This situation requires further theoretical and experimental research.

In connection with detection of a new phase -  $\alpha$ -diopside the new version of the phase diagram of section diopside «calcium molecule Eskola" is offered.

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## References

1. Zharikov V.A., Ishbulatov R.A., Litvin Ju.A. Problem of an origin of magmas of island arches in light of pilot researches at high pressure. In: Problems of petrology of the Earth's crust and the upper mantle. Ed.: Dobretsov N.L., etc. Issue 403, "Science", Novosibirsk 1978, PP. 8-18.
2. Ishbulatov R.A., Chudinovskih L.T., Malinovskaya E.K. Experimental research of dissolubility component of  $\text{Ca}_{0.5}\text{AlSi}_2\text{O}_6$  in clinopyroxenes at pressures from 14 up to 70 kbar. XIII Cong. Int. Min. Assoc. IMA, Varna, 19-25 Sept. 1982, ser. B, 1986. PP. 351-357.
3. Ishbulatov R.A. Experimental research of melting of rocks of sodium-calcium series at pressures 25-45 kbarp. Sketches on physical-chemical petrology. M.: Nauka, 1977. V. 6. PP. 97-167.
4. Malinovskaja E.K., Doroshev A.M., Bulatov V.K., Braj G. Clinopyroxenes of series  $\text{CaMgSi}_2\text{O}_6$ - $\text{CaAl}_2\text{SiO}_6$ - $\text{Ca}_{0.5}\text{AlSi}_2\text{O}_6$  in association with an anorthite, crystal, coesite and garnet. – Geochemistry, 1991, N 2. PP. 216-226.
5. Hanuhova L.T., Zharikov V.A., Ishbulatov R.A., Litvin Ju.A. The silicon in solid solutions clinopyroxenes high-pressure under data of experimental study of system  $\text{CaMgSi}_2\text{O}_6$ - $\text{CaAl}_2\text{SiO}_6$ - $\text{SiO}_2$  at 35 kbar and 1200 °C. -With Dokl. AS of the USSR, 1976. V. 229. N 1. PP. 182-184.
6. Hanuhova L.T., Experimental research of system  $\text{CaMgSi}_2\text{O}_6$ - $\text{NaAlSi}_2\text{O}_6$ - $\text{CaAl}_2\text{SiO}_6$ - $\text{SiO}_2$  at 35 kbar and 1200 °C. - Ocherki of physical-chemical petrology. M.: Nauka, 1978. V. 8. PP. 155-178.
7. Boyd F.R., England J.K. Effect of pressure on the melting of diopside,  $\text{CaMgSi}_2\text{O}_6$ , and albite,  $\text{NaAlSi}_3\text{O}_8$ , in the range up to 50 kilobars. Journal of Geophysical Research, 1963. V. 68. N 1. PP. 311-323.
8. Gasparik T., Lindsley D.H. Phase equilibrium at high pressure of pyroxenes containing monovalent and trivalent ions. - Rev. Min. Pyrox. Mineral. Soc. Amer., 1980. V. 7. PP. 309-339.
9. Wood B.J., Henderson C.M.B. Compositions and unit-cell parameters of synthetic non-stoichiometric tschermakitic clinopyroxenes. - American Mineralogist, 1978. V. 63. N 1-2. PP. 66-72.

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