

ments. Samples at the extreme ends of the geotherm differ by 220°C and reflect depth differences of the order of 60km. These results together with those of Koffiefontein and Frank Smith suggest that many megacrysts may have come from widely differing depths and environments in the mantle.

D20

SINGLE-CRYSTAL STRUCTURE REFINEMENTS OF SUPER-SILICIC CLINOPYROXENES FROM THE ZAGADOCHNAYA KIMBERLITE PIPE, YAKUTIA, USSR.

D.C. SMITH, C. DOMENEGHETTI, G. ROSSI, L. UNGARETTI
Labo. Minéralogie, Muséum Hist. Naturelle, 61 rue Buffon, 75005 PARIS, France.

It has often been suggested that supersilicic (cation-deficient) clinopyroxenes contain vacant sites, probably in the form of solid-solution of the CaEs end-member ($\text{Ca}_{0.5}\text{Al}_1\text{Si}_2\text{O}_6$), but full structure refinements by X-ray diffraction have not previously been made. Refinements are now presented for optically-clear supersilicic clinopyroxenes from two grosspyrite nodules from the Zagadochnaya kimberlite pipe.

In sample Zaga/O, both refinements and electron microprobe analysis indicate intergrain inhomogeneity but intragrain homogeneity. The refinements are compatible with vacancies in M2 and with the microprobe analysis (Jd₄₅Di₃₈CaTs₀₇CaEs₁₀), but they do not prove the existence of vacancies in M2. The space group is C2/c such that this is the only confirmed disordered omphacite with around 50 % Jd. This primary clinopyroxene co-existed with garnet, kyanite and corundum, but has been partially replaced by secondary clinopyroxene (Jd₁₇Di₆₆CaTs₁₇), clinoamphibole, plagioclase, quartz and zoisite. This rock thus displays the simultaneous expulsion of excess SiO₂ and breakdown to an amphibolite-facies paragenesis.

Sample Zaga/8 differs in containing secondary clinopyroxene in an exsolution texture. Both samples share some features in common with certain supersilicic clinopyroxenes from the Roberts Victor kimberlite pipe, S. Africa, though direct exsolution of SiO₂ has not been observed in these Zagadochnaya samples.

D21

ON THE CHARACTERISATION AND CREDIBILITY OF SUPERSILICIC, STOICHIOMETRIC, AND SUBSILICIC PYROXENES

D.C. SMITH

Labo. Minéralogie, Muséum Histoire Naturelle, 61 rue Buffon, 75005 PARIS, France.

$X_{n-s} = 100 (S - (N+D)) / (S + (N+D))\%$ in the natural chemical system SAND (where S = Si + Ti, A = Al + Fe³⁺ + Cr - Na - K, N = 2Na + 2K, and D (divalents) = Ca + Mg + Ni + Fe²⁺ + Mn, all in cation proportions) is proposed as a useful indicator of pyroxene non-stoichiometry. The S : A : (N+D) diagram conveniently demonstrates : 1. supersilicic, stoichiometric, or subsilicic pyroxenes for which X_{n-s} is positive, zero or negative, respectively ; 2. the irrelevance of trivalent cations to pyroxene stoichiometry (since their oxides also have 4 cations (C) per 6 oxygens (O), such that X_{n-s} isopleths radiate from the A apex ; 3. that supersilicic pyroxene is most simply considered as a solid solution of stoichiometric pyroxene with SiO₂ rather than with any A-bearing end-member ; 4. the im-

probable existence of subsilicic pyroxene which requires C>4 per O=6 ; 5. the "bimineralic eclogite line" between A and (N+D)₂S₂ upon which lie all stoichiometric pyroxenes and garnets.

All theoretical supersilicic pyroxene end-members (e.g. D_{1.5}AS₂O₆, DA_{1.67}S₂O₆) have no N, since in alkali pyroxene all other cation sites already have the highest-valent cation possible. However, Jd solution aids the stability of M-site vacancies, more so than Di solution, by providing more similarly-charged M-sites and a smaller volume. Exsolution of the excess Si as quartz (e.g. in Norway, Greenland and S. Africa) can create Al(IV) at lower T than if the CaTs proportion was in equilibrium with garnet.

The recent suggestion of O⁻ stability allows the not too remote possibility of new high-density supersilicic "pyroxene" end-members (e.g. AS₂O₅⁻, D_{1.5}S₂O₅⁻) at high P.

Supersilicic pyroxenes are thus to be expected in Na-, Ca-, Al- & Si-rich systems at high P (blueschists, eclogites, experiments).

D22

GARNET AND CPX MEGACRYSTS FROM KASAI.

MVUEMBA NTANDA, H.O.A. MEYER, J. MOREAU.

Département de Géologie, Université de Lubumbashi, Zaïre

Eastern Kasai xeno-tuff breccia kimberlite include a long set of megacrysts: garnet, cpx ilmenite, rutile, kyanite, corundum, zircon and baddeleyite. Neither olivine nor enstatite have been found. We are only concerned with garnet and cpx. About 200 specimen each have been sampled from Mbuji Mayi and Tshibua pipes, eastern Kasai.

All the garnets from Tshibua are Cr pyrope. They tend to have relatively low CaO contents (4.0 wt%) and Cr₂O₃ values in the range 0.95-6.5 wt%. Two Cr pyrope show a particular zonation affecting only octahedral diadochic ions Al³⁺ and Cr³⁺. All the cpx from Tshibua are diopsides. Except for one specimen the Cr₂O₃ contents are below 0.9 wt% and Al₂O₃ values below 1.90 wt%. Na₂O ranges between 1.40 and 2.0 wt%. Garnets and cpx from Tshibua are all ranged in the lherzolitic suite.

Several garnet and cpx megacrysts from Mbuji Mayi resemble those from Tshibua and are ranged in the lherzolitic suite yet an important part of analysed minerals are quite different. Cpx have considerable contents of Na₂O and Al₂O₃ in the ranges 4.0-6.8 and 6.9-11.4 wt% respectively. Cr₂O₃ contents do not exceed 0.2 wt%. These cpx are omphacitic. Some garnets belong to the pyrope-almandine-grossular series. Both these latter minerals have been ranged in an eclogitic suite.

Using enstatite-diopside thermometers, the lherzolitic cpx show a possible equilibration range from 950 to 1350°C. Isotopic ratios ⁸⁷Sr/⁸⁶Sr of cpx are quite different of kimberlitic matrix. Garnet and cpx megacrysts show a reaction rim with the kimberlitic matrix. Thus a xenocrystal origin is proposed for garnet and cpx megacrysts.

D23

MG-ILMENITES IN ALKALI BASALTS FROM THE VOLCANIC HOGGAR AREA

J.M. DAUTRIA, M. GIROD, M. LEBLANC

Département des Sciences de la Terre, U.S.T.L., 34060 Montpellier Cedex, France.