

# RUTILES FROM ECLOGITE XENOLITHS OF "ROBERTS VICTOR" KIMBERLITE PIPE (S. AFRICA)

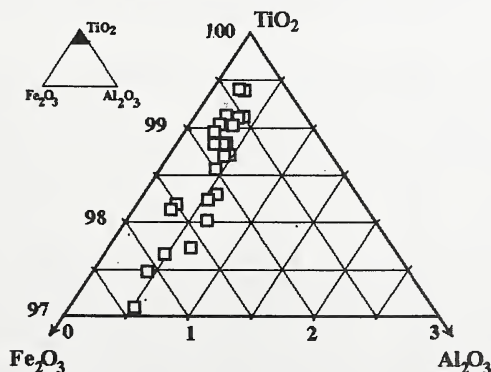
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The available data on impurities in rutiles (Fe, Cr, Al etc.) from various geological environments have demonstrated the compositional features that are important for the geothermobarometry (Sobolev, 1972; Haggerty, 1976; Fett, 1991). The present investigation was based on 27 eclogite xenoliths fragments from "Roberts Victor" kimberlite pipe previously checked on presence of rutile. In all samples the rutile was found in silicate matrix consisted of weathered clinopyroxene and fresh  $\text{Py}_{47}\text{Alm}_{30}\text{Grs}_{23}$  garnet with minor impurities of chromium and titanium (<0.7wt.% oxides in sum). Mostly the accessory rutile forms small xenomorphic grains located on or near garnet-pyroxene boundaries. Sometimes the rutile associate with complex polycrystalline sulfides aggregates.

As the microscope inspection has shown all the rutiles grains from eclogites contain inclusions that are the common features for rutiles from different occurrences (Haggerty, 1976; Wyatt, 1979). The inclusions in rutiles from "Roberts Victor" eclogites can be divided in two types:  
**A-Type** -- elongated grains (up to 40-50 microns in length and about 5 microns thick) form regular geometric structure that is seem to relate with cleavage planes. Microprobe analysis gave the following results:  $\text{TiO}_2$  - about 45 wt.%,  $\text{Al}_2\text{O}_3$  - up to 31 wt.%,  $\text{FeO}$  - up to 20 wt.% and  $\text{MgO}$  - 3-4 wt.%.  
**L-Type** -- small fragments of massive xenomorphic grains and rims located in peripheral parts of rutile particles. Composition evaluated:  $\text{TiO}_2$  - up to 80-85 wt.%,  $\text{FeO}$  - 20-22 wt.% and  $\text{MgO}$  - no more than 1wt.%. Since a luck of data obtained the polyphase content of both type inclusions can not be excluded.

In the composition of the rutiles the main impurities are  $\text{Fe}^{+2,+3}$  and  $\text{Al}_2\text{O}_3$ . In minor quantity the following additional elements were detected:  $\text{Nb}_2\text{O}_5$  (0.02-0.6w.%, average content - 0.25w.%),  $\text{Cr}_2\text{O}_3$  (0.025-0.7 and 0.23w.% accordingly) and Mn, V, Mg (as trace elements). The total sum of



**Fig.1** The composition of the rutiles from "Roberts Victor" eclogites.

impurities in the rutiles falls into the range 3.5-4.0 wt.%. The main features of the rutile composition are displaying on Fig.1. The average  $\text{Al}_2\text{O}_3$  content is about 0.5wt.%, but the amount of iron varies more considerably - from 0.5 to 3 wt.% (calculated as hematite,  $\text{Fe}_2\text{O}_3$ ). The total iron content should be strongly dependent on redox origin conditions since the iron in the rutile structure generally exists in trivalent form (Putnis, 1978; Zhang, 1990). The evaluation of the redox variation range using data for harzburgite assemblage (Babich, 1992) gives the values up to 3.0 relative

log.units (in terms of divergence from QFM buffer) during the rutile origin. The range obtained indi-

