



CLINOPYROXENE AND PEROVSKITE PARTITION COEFFICIENTS IN KAMAFUGITIC ROCKS

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A LAM-ICP-MS study has been carried out on clinopyroxene and perovskite in kamafugitic rocks of the Alto Paranaíba Igneous Province (Brazil) in order to determine partition coefficients of 22 trace elements. Clinopyroxene ranges from diopside to salite; few Na-rich samples plot between diopside and augite fields. The phenocrysts are zoned with cores richer in Fe^{2+} (> 0.1 a.p.f.u.) and poorer in Ti (< 0.02 a.p.f.u.), compared to rims richer in Ca (> 0.9 a.p.f.u.), Mg (> 0.8 a.p.f.u.) and Ti (0.025 - 0.8 a.p.f.u.). Groundmass clinopyroxene is chemically similar to phenocryst rims. Trace elements contents allow to distinguish two types of clinopyroxene: the first type ($\text{Mg\#}=0.44$ - 0.74) is rich in Y (av. $\text{Y}=83$ ppm), HREE (av. $\text{La/Yb}=4$) and poor in Sr (av. $\text{Sr}=280$ ppm) and Ti (av. $\text{Ti}=4000$ ppm) showing Eu negative anomaly. The second type ($\text{Mg\#}=0.83$ - 0.88) is rich in Sr (av. $\text{Sr}=740$ ppm) and in LREE (av. $\text{La/Yb}=28$). Due to the absence of glass in groundmass, mass-balance calculations have been performed in order to determine the trace elements composition of melts in equilibrium with the phases. Average calculated clinopyroxene/melt partition coefficients ($\text{DZr}=0.167$; $\text{DHf}=0.222$; $\text{DSr}=0.169$; $\text{DNb}=0.009$; $\text{DTa}=0.005$; $\text{DTi}=0.200$; $\text{DY}=0.690$; $\text{DLa}=0.060$; $\text{DCe}=0.120$; $\text{DNd}=0.205$; $\text{DSm}=0.358$; $\text{DYb}=0.994$) agree well with results from previous studies on similar rocks.

Perovskite shows an ideal molecular formula CaTiO_3 (93-96 wt%), with variable Ce_2O_3 (0.21-2.74 wt%), Nb_2O_5 (0.17-0.40 wt%), Na_2O (0.40-0.95 wt%) and SrO (0.25-0.95 wt%). Perovskites are zoned, with cores richer in REE and poorer in CaO and SrO than the rims (average contents for cores: $\text{La}=0.86$ wt%, $\text{Ce}=2.34$ wt%,

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CaO=36 wt%, SrO=0.30 wt%; rims: La=0.37 wt%, Ce=0.82 wt%, CaO=40 wt%, SrO=0.50 wt%). Perovskite/melt partition coefficients have been determined on potassic ultramafic rocks for the first time. Zr, Hf, and Sr are incompatible or slightly compatible ($D_{Zr}=0.31-1.16$; $D_{Hf}=0.39-2.10$; $D_{Sr}=1.12-1.94$); Nb, Ta, Ti, Y and REE are highly compatible ($D_{Nb}=9-19$; $D_{Ta}=15-23$; $D_{Ti}=9-11$; $D_Y=5-10$; $D_{La}=13-21$; $D_{Ce}=26-36$; $D_{Nd}=11-24$; $D_{Sm}=13-24$). LREE are more compatible than the HREE ($D_{La}/D_{Yb}=4-6$). In spite of the high compatibility of HFSE and REE in the perovskite, the presence of this mineral as minor phase does not influence the partitioning of those elements in coexisting clinopyroxene.