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INTERACTION OF ORTHOPYROXENES WITH CARBONATES AT THE EARTH'S CRUST AND MANTLE CONDITIONS

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Experimental study of the interaction between natural powdered Opx (50 and 80 wt. %) and carbonates Na_2CO_3, $MgCO_3$, $CaCO_3$ (50 and 20 wt. %) in homogeneous mixture has been performed at 100 MPa and 5.5 GPa within temperature range 900 - 1500 °C (runs duration 1 -7 hours), using two types of the unique high pressure apparatus. The weight loss of the samples as proxy for CO_2 loss was measured in the each experimental run. The run products after isobaric quenching were examined by electron-microprobe analyses. It was shown that the interaction between Opx and carbonates is consisted of the following reactions:

$Mg_2Si_2O_6$ (Opx) + Na_2CO_3 = Mg_2SiO_4 (Ol) + (Sil+Carb) + $_{melt}$ $_{melt}$

+ Na_2CO_3 + CO_2 (1)
$_{melt}$

(The weight loss for such runs is from 2 to 7 wt. %; liquid immiscibility between sodium carbonate melt and carbonated silicate melts was observed).

$Mg_2Si_2O_6$ (Opx) + $MgCO_3$ = Mg_2SiO_4 (Ol) + (Sil+Carb) + $MgCO_3$ + CO_2 (2)

(The weight loss for such runs is from 5 to 29 wt. %)

$Mg_2Si_2O_6$ (Opx) + $4CaCO_3$ = $2Ca_2SiO_4$ + $2MgO$ + $4CO_2$ (3)

(The weight loss for such runs is from 3 to 16 wt. %)

The experiments confirm that the interaction between Opx and carbonates causes gradual SiO_2 enrichment of initial carbonatite melt, as previously suggested, and produce fluid CO_2 after experiments since the CO_2 is partly dissolved in the evolved melt and partly exsolved from samples at the Earth's crust and mantle *P-T* conditions.

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