The Leucite-Nepheline-Diopside and Kalsilite-Nepheline-Diopside phase diagrams at 4GPa under dry conditions.

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We have experimentally investigated the Leucite – Nepheline – Diopside and Kalsilite – Nepheline – Diopside phase diagrams, both at 4GPa (~120km deep) and dry condition, under temperatures up to 1400°C to better discriminate the influence of sodium and potassium in the mantle. The experiments were run in a 1000tonf hydraulic press with toroidal chambers, and the products were analyzed by XRD, EPMA and EDS techniques. In the Lct-Nph-Di phase diagram we determined two eutectic points: a) the Kls+Nph+Di, in equilibrium with a $Lct_{62}Nph_{29}Di_{9}$ liquid, at 1000°C; and b) the Kls+Sa+Di, in equilibrium with a $Lct_{76}Nph_{22}Di_{2}$ liquid, at 1200°C. A point at $Lct_{62}Nph_{21}Di_{17}$ works as a high thermal point where diopside is in equilibrium with kalsilite. In the Kls-Nph-Di phase diagram an eutectic point was well defined at $Ks_{47}Ne_{42}Di_{21}$ in equilibrium with Ks+Ne+Di liquid, at 1100°C, in the presence of spinel. Another eutectic point must occur closer to the kalsilite vertices and a high thermal point must be close to $Ks_{36}Ne_{46}Di_{18}$. Our data also wollastonite filed stability close to the potassic vertice. Although we have silica-undersaturated compositions in all analysed liquid, our results show that K_2O/Na_2O and CaO/Na_2O ratios are in a good correlation with silica (SiO_2), which corroborate to the conclusion of Conceição and Green (2000 and 2004) that potassium increases the silica activity in the mantle.

[1]Conceição, R.V.; Green, D.H. (2000). G3, #2000GC00071. [2] Conceição, R.V.; Green, D.H. (2004). Lithos 72:209-229