

TITLE: Porcellanite-CaO High-Temperature solid state reaction

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Trinidad porcellanite, occurring in outcrops mostly in the south-west of the island, is known to be pozzolanic. Further, at sufficient high temperatures, leucite ($K[AlSi_2O_6]$), a constituent mineral, yields mullite ($3Al_2O_3 \cdot 2SiO_2$) due to thermo-chemical transformation. Consequently, reaction of the porcellanite with CaO should yield ceramic phases comprised of compounds with potentially desirable characteristics. This project utilized x-ray diffraction (XRD) and scanning electron microscope (SEM) to study thermo-chemical and thermo-physical characteristic in powder mixtures originally containing 10- 90 percent by weight of one in the other of the porcellanite and marl, used as the source of CaO.

After firing at 1200 °C, XRD analysis revealed the presence of reaction products $3CaO \cdot Al_2SiO_2$ (C_3S_2), $3CaO \cdot Al_2 \cdot 2SiO_2$ (C_3AS_2) and $2CaO \cdot Al_2O_3 \cdot SiO_2$ (C_2AS). Further, SEM revealed that the C_3S_2 (molten at 1200 °C) forms a bonding matrix for the other reaction products and unreacted free silica, mullite and free lime, retained in certain compositions.