

Phase relations in the systems CaAl_2O_4 - MgAl_2O_4 and CaAl_2O_4 - NaAlSiO_4

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Phase relations in the systems CaAl_2O_4 - MgAl_2O_4 and CaAl_2O_4 - NaAlSiO_4 were examined at pressures of 8-23GPa and temperatures of 1200C by using 6-8 multi-anvil apparatus.

In the CaAl_2O_4 - MgAl_2O_4 system, CaFe_2O_4 -type solid solution had a narrow compositional range and a hexagonal phase was formed above 15GPa. The hexagonal phase had a composition of approximately $\text{CaMg}_2\text{Al}_6\text{O}_{12}$. In the CaAl_2O_4 - NaAlSiO_4 system, NaAlSiO_4 with CaFe_2O_4 structure was formed above 19GPa by the reaction $\text{NaAlSi}_2\text{O}_6 + \text{NaAlO}_2 \Rightarrow \text{NaAlSiO}_4$. When the CaAl_2O_4 : NaAlSiO_4 ratio was 1:1, $\text{Ca}_3\text{Al}_2\text{Si}_3\text{O}_{12}$ (garnet) was formed and it decomposed at 23GPa. In the ratio was 2:1, $\text{Ca}_2\text{AlSiO}_{5.5}$ (perovskite), Al_2O_3 and NaAlO_2 transformed to an unknown phase at about 17GPa.