

ABSTRACT

The rare earths form series of compounds which are known for several elements but end abruptly or undergo a change of structure at some member of the series. The diantimonides are one such series. Sb-Sb repulsion becomes stronger as the rare earth size decreases and the previously known series ended at Sm. It was felt that high pressure would overcome the Sb-Sb repulsion and allow bonding to form stable or metastable compounds not possible by ordinary techniques.

Synthesis studies were carried out on mixtures of antimony with all the rare earths except Pm and with Sc and Y. The known diantimonide series was extended two elements to GdSb₂ and TbSb₂. A new orthorhombic structure was found in the series for GdSb₂, TbSb₂, DySb₂, HoSb₂, ErSb₂, TmSb₂ and YSb₂. Attempts to synthesize diantimonides of Sc, La, Ce, Eu and Lu were not successful.

Reaction products for one to two molar mixtures of rare earth to antimony were determined for all the elements studied as a function of pressure and temperature up to 70 kilobars and 1800 °C. Products were identified by their X ray diffraction patterns. Only Sb plus the rare earth oxide were found for La, Ce and Eu. The oxygen apparently