Th_3P_4 type structure. In 1967 Gambino reported that this structure was stable for elements La to Dy but rare earths heavier than Dy would not form R_4Sb_3 type compounds (17).

A study specifically on rare earth diantimonides was reported by Wang and Steinfink in 1967 (1). They prepared $LaSb_2$, $CeSb_2$, $NdSb_2$, $SmSb_2$, and $YbSb_2$. They attempted to synthesize $GdSb_2$, $DySb_2$, $HoSb_2$, and $ErSb_2$ but were not successful. They did not work with Pr, Eu, Tb, Tm, or Lu. Through single crystal X ray diffraction work the compounds prepared were shown to have an orthorhombic structure which they call the $LaSb_2$ type structure. By detailed analysis of the cell structure they found the structure has a very short Sb-Sb bond and postulated that as the rare earth size decreases it forces the critical Sb-Sb distance to become shorter and Sb-Sb repulsion finally causes the structure to become unstable at Gd.

It seemed reasonable to expect that very high pressure would force the antimony atoms closer together and allow bonding to take place which could result in a stable or at least metastable compound. This was the genesis of the present work.

Rare Earth Sesquisulfides

Studies of the crystal chemistry of the rare earth metal sulfides have shown that the lighter elements from La to Dy have sesquisulfides with a Th_3P_4 type cubic