

VI. POLYMORPHISM OF RARE EARTH SESQUISULFIDES

The monoclinic form of Dy_2S_3 , Ho_2S_3 , Er_2S_3 , Tm_2S_3 and Y_2S_3 ; orthorhombic Yb_2S_3 and rhombohedral Lu_2S_3 were obtained in 95 to 99 per cent purity from K and K Laboratories of Hollywood, California. X ray diffraction patterns were taken on each of these compounds.

Dy_2S_3 was completely converted to the cubic form in the tetrahedral press at 70 kilobars and 1200 °C; however, Dy_2S_3 was already known in both forms. Monoclinic Ho_2S_3 could not be converted to the cubic form at 70 kilobars and 1700 °C which were the maximum conditions attempted in the tetrahedral press. Subsequent runs made in the cubic press at 77 kilobars and about 2000 °C (estimated by the thickness of coesite and kyanite formed in the pyrophyllite) resulted in complete transition to the Th_3P_4 type cubic structure of Ho_2S_3 , Er_2S_3 , Tm_2S_3 , Yb_2S_3 and Y_2S_3 . Lu_2S_3 was about 50 per cent changed to the cubic form under these conditions. None of these compounds were known in the cubic form before this study. The crystal structures of the rare earth sesquisulfides are summarized in Table 4.

Migration of BN into the sulfides gave an impure sample and density determinations could not be made. The BN also appeared slightly darkened or yellow after the runs