

For a 1 to 3 molar mixture of Gd plus Sb the same high pressure orthorhombic structure was observed at these conditions along with excess antimony lines. Again there was no change in lattice parameters. This shows that the phase is indeed a compound and not a solid solution.

Metallographic studies were made to help identify the phases. Polished surfaces of antimony and gadolinium which had been pressed to 50 kilobars and 1000 °C are shown in Figures 12 and 13. The high pressure orthorhombic product is shown in Figure 14 at magnification of 100X and in Figure 15 at 500X. Figure 16 shows a polished surface of the LaSb₂ type GdSb₂. There is apparently unreacted Sb and Gd in this sample as shown by the light and dark minor constituents. Figure 17 shows a polished surface of the GdSb plus unknown products, type I, reaction region. There are at least three phases present in this sample. From the X ray diffraction intensity data the major phase is probably GdSb.

An electron beam microprobe analysis of the surface shown in Figures 14 and 15 was performed by Advanced Metals Research Corporation of Burlington, Massachusetts. They reported that the globular particles (marked G) in Figure 15 contain 58.7 ± 2 per cent Sb and 41.3 ± 2 per cent Gd. Theoretical for GdSb₂ is 60.76 per cent Sb and 39.24 per cent Gd which is within their experimental error. The darker phase (marked D) in Figure 15 was shown to be pure Gd and the lighter phase between the globular particles is