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# The Preparation and Nonstoichiometry of Samarium Hexaboride\*

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## Abstract

Samarium hexaboride was prepared by the borothermal reaction;  $2 \text{Sm}_2\text{O}_3 + (6+4x)\text{B} = 4\text{SmB}_x + 3 \text{B}_2\text{O}_2$ . The residual oxygen content amounted to less than 0.03 w/o under optimum reaction conditions heating at 1650°C for 2 hr under a high vacuum. It was found by X-ray intensity and density measurements that the samarium hexaboride stayed stable over a large nonstoichiometric region from  $\text{Sm}_{0.68}\text{B}_6$  to  $\text{SmB}_6$ . These extensive nonstoichiometric properties of samarium hexaboride can be explained in terms of the required electron numbers of the  $\text{SmB}_6$  network in hexaboride.

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