

each for the other two compounds.

The ionic model proposed for the NaCl-type intermetallic compounds allows one to predict when solid solutions will exist and in which of the elements they will be rich. In the Sn-Te system, NaCl-type compounds rich in Te should be expected because in Sn_{1-x}Te the valency of Te may be balanced by both Sn^{2+} and Sn^{4+} ions. It is unlikely, however, that NaCl-type Sn-Te compounds rich in Sn will exist. Similarly compounds of PbS, PbSe, and PbTe rich in the Group-VI element should be attainable, but not those rich in Pb. The high-pressure NaCl-type CdSe and CdTe phases¹² should not have solid solution ranges because of the single stable valences of the atoms involved. In the Sn-Sb system, solid solutions rich in either constituent should occur as has been reported.⁸ Similarly, in the Sn-As system solid solutions rich in either constituent are to be expected. Although Hägg and Hybinette⁹ did not observe this at atmospheric pressure, we have found that compounds Sn_{1+x}As and Sn_{1-x}As can be made at high pressures and retained metastably at atmospheric pressure. However, they begin to revert to the $\text{Sn}_4\text{As}_3 + \text{SnAs}$ and $\text{SnAs} + \text{As}$ phases, respectively, within a few hours after release of pressure. A test for superconductivity on what was later realized to be a partially reverted specimen indicated that again in this system a decrease in n results in decrease in T_c .

The NaCl-type phases in the In-Te system must therefore also have In-rich phases.⁶ Despite our earlier conclusion¹ to the contrary, such phases, to about $\text{In}_{1.15}\text{Te}$, do exist; they cannot be retained metastably very long, but⁶ again for these, T_c decreases with decreasing n .

Finally, it is worth emphasizing that the NaCl-type structure has now been shown to be favorable to both semiconductivity and superconductivity. If

the carrier concentration is high enough, the compound will be a superconductor. This should be true also for the compounds with the Sn_4As_3 structure and for another related structure, the Bi_2Te_3 structure. If it were possible to obtain, for example, a Ge_2Te_3 with the Bi_2Te_3 structure, it would be a superconductor and have a higher transition temperature than that of Ge_3Te_4 .

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¹⁰Hägg and Hybinette (reference 8) reported that the compound Sn_3As_2 was actually the one that existed but had the Sn_4As_3 structure. We have found that " Sn_3As_2 " has two T_c 's, $\sim \frac{1}{3}$ of the specimen at 3.6-3.5°K, $\sim \frac{2}{3}$ at 1.21-1.17°K. The powder photograph indicates that free Sn is present and the T_c 's confirm the presence of Sn and Sn_4As_3 in the right proportions.

¹¹For a discussion of the calculation of these n 's, see reference 6.

¹²C. J. M. Rooymans, *Phys. Letters* **4**, 186 (1963); A. N. Mariano and E. P. Warekois, *Science* **142**, 672 (1963).