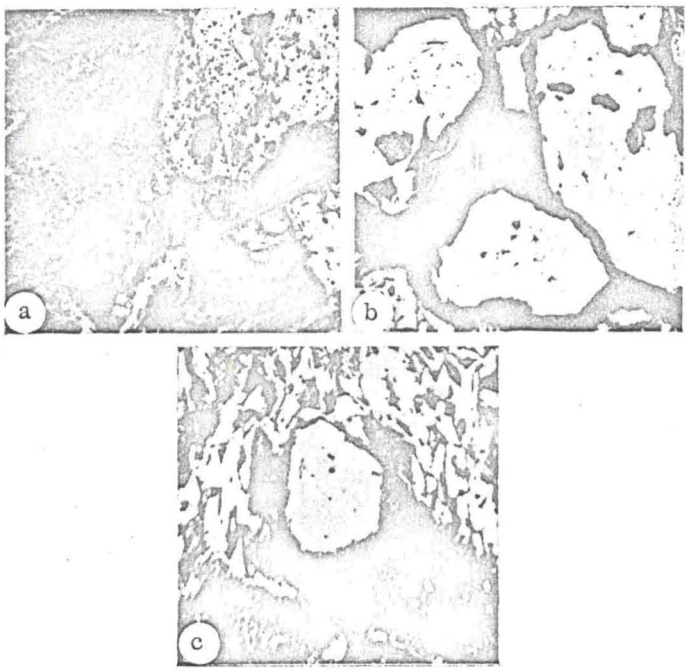

Fig. 1. Magnesium borides, at × 200. a) Magnesium diboride, reflected and polarized light; b) magnesium hexaboride, reflected light; c) isomorphous crystal of magnesium hexaboride and thin magnesium diboride platelets, reflected light.

medium at 2.26, medium at 2.01, medium at 1.86, very weak at 1.60, very weak at 1.346, weak at 1.263, weak at 1.063, strong at 1.050, and medium at 1.047 Å. The intensities of many of the lines do not agree. In particular, a number of lines of the A phase have higher relative intensities than those obtained from our Debye patterns. All these differences can, apparently, be explained not only by the peculiarities of crystallization under pressure, but also by the fact that the material which was named phase A by the authors of [2], and presumably considered by them to be magnesium hexaboride, is actually not single-phase.

Microscopic investigation of magnesium borides prepared by the superhigh-pressure technique was done by observation under a binocular, by the immersion method and by examination of polished sections; characteristic polished sections of magnesium borides are shown in Figs. 1a and 1b. In these polished sections the formation of magnesia as a result of the pyrolysis of magnesium diboride (Fig. 1c) was also observed.

Results of the microscopic investigation and the determination of some properties of magnesium borides prepared under superhigh-pressure conditions and at high temperatures are shown in Table 3.

Thus, the present work showed that under superhigh-pressure conditions favorable conditions are created for the synthesis of well-crystallized magnesium borides of stoichiometric composition. It seems expedient to try to synthesize other magnesium borides, which, as is known, cannot be prepared in pure form by the conventional method [2, 3], in order to define more precisely their chemical composition, crystal structure, and properties.

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