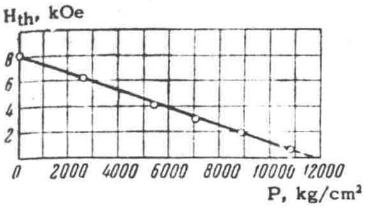

FIG. 5. Dependence of the threshold field H_{th} on the pressure. Room temperature.

Figure 5 shows the variation of the value of H_{th} as a function of the pressure, as determined from the curves of Fig. 4, from which it is seen that H_{th} decreases linearly with increasing pressure. Repeated measurements have shown good reproducibility of these data, so that the variation of H_{th} under the influence of hydrostatic compression can be given by

$$dH_{th}/dP = -0.67 \pm 0.07 \text{ Oe}\cdot\text{cm}^2/\text{kg}.$$

The data we obtained on the variation of the threshold field with pressure are in qualitative agreement with the results of an investigation of the magnetization of $MnAu_2$ under hydrostatic compression up to 4500 kg/cm², carried out by Klitzing and Gielessen [6], who have shown that the hydrostatic compression increases the slope of the magnetization curve and simultaneously shifts the start of the rise in the $\sigma = f(H)$ curves toward smaller magnetic fields. On the basis of the data we obtained it can be assumed that the increase in the magnetization observed in [6], amounting to a factor of $2\frac{1}{2}$ at a pressure of 4600 kg/cm², is apparently connected essentially with the strong decrease in the threshold field under the action of the hydrostatic compression of the specimen.

3. Using for $MnAu_2$ a compressibility $\kappa = 6 \times 10^{-7}$ cm²/kg and a thermal coefficient of volume expansion $\alpha = 6.55 \times 10$ deg^{-1} [7], we can easily verify that a pressure of 10,000 kg/cm² is equivalent (in the sense of the change in distance between atoms) to a change in temperature by 92°. If the change in the threshold field $MnAu_2$ is due only to the change in the parameters of the crystal cell, then we can expect H_{th} to drop to 700 Oe at T = 200°K, which corresponds to the value of H_{th} at P = 10,000 kg/cm². However, the temperature dependence of the threshold field, which we determined on the basis of the measurements of the isotherms of the magnetization of $MnAu_2$ in the temperature range 86–310°K, shows that when the temperature drops H_{th} does not decrease, but increases somewhat. Thus, for example, at T = 77°K, we have H_{th} = 10,000 Oe, and at T = 2000°K it amounts to H_{th} = 9400 Oe.

4. Taking into account the helicoidal magnetic structure of $MnAu_2$, the variation of T_N and H_{th} with pressure as observed by us can be explained in the following manner. If we assume that T_N is determined by the largest of the exchange interactions existing in this crystal, then we can assume that the decrease in the distance between the manganese atoms that lie in the basal planes and are nearest neighbors leads to an increase in the positive interaction, for T_N increases with increasing pressure. At the same time, the decrease in distance between basal planes brought about by the pressure, that is, between every other plane, leads to an attenuation of the negative interactions, the values of which depend very strongly on the distance. According to Herpin, Meriel, and Villain [4], the interaction between the manganese atoms lying in neighboring basal planes is the sum of two interactions, one positive between the atoms of the neighboring layers, and one negative between the atoms of every other layer.

The authors are grateful to I. G. Fakidov for providing the specimen for the measurements, to I. V. Smirnov and M. I. Oleĭnikov for preparation of the high pressure apparatus, and to Yu. S. Bersenev for participating in the measurements.

[1] I. P. Meyer and P. Taglang, J. phys. radium **17**, 454 (1956).

[2] Herpin, Meriel, and Villain, Compt. rend. **249**, 1334 (1959).

[3] A. Jachimori, J. Phys. Soc. Japan **14**, 807 (1959).

[4] Herpin, Meriel, and Villain, J. phys. radium **21**, 67 (1960).

[5] Grazhdankina, Gaidukov, and Rodionov, JETP **40**, 433 (1961), Soviet Phys. JETP **13**, 297 (1961).

[6] K. H. Klitzing and I. Gielessen, Z. Physik **150**, 409 (1958).

[7] Fakidov, Zimina, and Gurfel', Abstracts of Papers, Conf. on Ferromagnetism and Antiferromagnetism, Leningrad, 1961.

Translated by J. G. Adashko
347