but the hump on the specific-heat curve became noticeably smaller at 5800 Oe. At 8100 Oe, the specific heat curve becomes even smoother and the maximum disappears. Thus, when a magnetic field is applied the anomaly of the specific heat in $CrCl_3$ becomes gradually smoothed out, starting with weak fields.

The specific-heat peak vanishes in ordinary ferromagnets in a magnetic field [14] because they have no phase transition in a magnetic field. The smoothing of the maximum of the $CrCl_3$ specific heat maximum in a field is apparently also an indication that the phase transition vanishes in the field. This seems to be an inherent property of layered antiferromagnets with weak antiferromagnetic interaction between layers, in which a ferromagnetic ordering sets in already in weak fields.

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METAMAGNETISM IN THE UAs_ZSe_{1-Z} SYSTEM

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The magnetic properties of solid solutions of uranium monocompounds with elements of groups V and VI, of type UX_ZY_{1-Z}, where X = P, As, Sb, Bi, and Y = S, Se, or Te, have been intensively investigated of late. The reason is that the compounds UX have a collinear antiferromagnetic structure, the compounds UY are collinear ferromagnets, and different collinear and noncollinear magnetic structures are observed in pseudobinary solid solutions of these monocompounds in one another [1 - 5]. Thus, for example, in the system UAs_ZSe_{1-Z} in a zero field, at least seven different magnetic structures were observed [3]. Compounds with $0 \leq Z \leq 0.65$ have a collinear ferromagnetic structure; at $0.65 \leq Z \leq 0.7$ noncollinear antiferromagnetic structures that can be described as a sinusoidal modulation of the Z-component of the magnetic moment are observed, and at $0.7 \leq Z \leq 1$ various types of collinear antiferromagnetic structure are

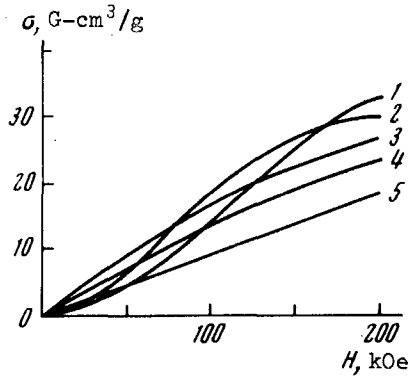
realized. Similar results were obtained in neutron-diffraction investigations of the systems UAs_zS_{1-z} [2, 4] and UP_zS_{1-z} [5].

Magnetic measurements [6 - 9] have shown that metamagnetism is observed in a number of antiferromagnetic mixed compounds UX_zY_{1-z}, viz., a transition from the antiferromagnetic to the ferromagnetic state takes place in a magnetic field. For example, the compound $UAs_{0.75}S_{0.25}$ goes over at helium temperatures into the ferromagnetic state in an approximate magnetic field 20 kOe [9], while $UP_{0.75}S_{0.25}$ has at 30 - 70°K a critical metamagnetic-transition field on the order of 5 - 10 kOe [6]. At the same time, measurements of the magnetization of $UAs_{0.75}Se_{0.25}$ have shown that this compound remains antiferromagnetic at helium temperatures up to 80 kOe [8].

To observe the metamagnetic transition in $UAs_{0.75}Se_{0.25}$, we measured the magnetization of this compound in pulsed magnetic fields up to 200 kOe. The $UAs_{0.75}Se_{0.25}$ samples were synthesized and analyzed by a method described earlier [3]. The magnetization in strong pulsed magnetic fields was measured by an induction method [10].

Figure 1 shows the field dependence of the magnetization of $UAs_{0.75}Se_{0.25}$ at different temperatures. It is seen from the figure that in the magnetically-ordered state (below approximagely 130°K) deviations from a linear field dependence of the magnetization are observed in fields exceeding 100 kOe, and the magnetization approaches saturation in a field of the order of 200 kOe. Figure 2 shows the temperature dependences of the magnetization of $UAs_{0.75}Se_{0.25}$ in different fields. When the field increases, the magnetization maximum, which characterizes the transition to the antiferromagnetic state, shifts towards lower temperatures, and in strong fields the maximum vanishes and the plot of the magnetization against the temperature assumes a shape typical of ferromagnets. We note that the magnetization of $UAs_{0.75}Se_{0.25}$ at 80°K in a field of 200 kOe is 30 G-cm^3/g. This is close to the theoretically calculated saturation magnetization 35 G-cm^3/g of ferromagnetically-ordered $UAs_{0.75}Se_{0.25}$ (assuming the moment of the uranium ion in $UAs_{0.75}Se_{0.25}$ to be equal to the moment $2\mu_B$ determined by neutron diffraction for uranium in USe [11]).

It follows thus from our measurements that $UAs_{0.75}Se_{0.25}$ goes over from the antiferromagnetic to the ferromagnetic state in fields on the order of 100-200 kOe.



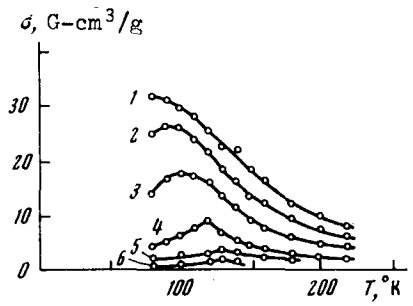


Fig. 1. Field dependence of the magnetization of $UAs_{0.75}Se_{0.25}$: 1 - 80°K, 2 - 100°K, 3 - 120°K, 4 - 130°K, 5 - 140°K.

Fig. 2. Temperature dependence of $UAs_{0.75}Se_{0.25}$: 1 - 200 kOe, 2 - 150 kOe, 3 - 100 kOe, 4 - 50 kOe, 5 - 25 kOe (from data of [8]), 6 - 10 kOe.

The exchange interaction in monocompounds of uranium with elements of groups V and VI is indirect, via the conduction electrons [12]. Within the framework of this model, as shown in [12], the difference between the types of magnetic ordering in monocompounds of uranium with group-V or VI elements is due to the difference in the number of their conduction electrons: the concentration of the conduction electrons is one electron per uranium atoms in compounds with group-V elements and two electrons per uranium atoms in group-VI compounds. Palewski [13] calculated in the same approximation the energies of different ferromagnetic and antiferromagnetic structures in mixed UX_ZY_{1-Z} compounds and has shown that the energies of the ferro- and antiferromagnetic phases of compounds with $Z \approx 0.75$ are close to each other. This gives rise to metamagnetic transitions in $UX_{0.75}Y_{0.25}$ compounds in relatively weak fields.

A comparison of the data obtained by us with results by others [8, 9] (cf. also above) shows that the metamagnetic transition occurs in a mixed compound of uranium with selenium in stronger fields than in analogous compounds with sulfur and phosphorus, i.e., the antiferromagnetic structure is more stable in compounds with selenium than in compounds with sulfur or phosphorus. The reason may be that $UAs_{0.75}S_{0.25}$ and $UP_{0.75}S_{0.25}$ have in the absence of a field a noncollinear magnetic structure [1, 2, 4, 5], while $UAs_{0.75}Se_{0.25}$ is a collinear antiferromagnet [3]. In addition, the metamagnetic-transition field is apparently affected by the magnetic anisotropy, for it is shown in [8, 9, 14] that the anisotropy of uranium monoselenide s larger than that of the monosulfide.

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FEATURES OF THE BEHAVIOR OF $\rho_f(H)$ NEAR $H_{c2}(T)$ OF EXTREMAL TYPE-II SUPERCONDUCTORS

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According to the theory [1, 2], the behavior of the differential resistance $\rho_f(H, T)$ near $H_{c2}(T)$ in type-II superconductors with electron mean free path