

# ON THE MAGNETIC PROPERTIES OF SOME INTERMETALLIC COMPOUNDS OF THE U-Co SYSTEM<sup>1</sup>

МАГНИТНЫЕ СВОЙСТВА НЕКОТОРЫХ ИНТЕРМЕТАЛЛИЧЕСКИХ СОЕДИНЕНИЙ СИСТЕМЫ U-Co

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From all composition of the U-Co system only the compound  $UCo_2$  was thoroughly investigated in papers [1—7]. About other intermetallic compounds belonging to this system incomplete information concerning mainly the crystal structure were published [8—10]. In the present contribution the magnetic properties of nearly stoichiometric  $UCo$ ,  $UCo_3$ ,  $UCo_4$  and  $U_2Co_{11}$  are reported.

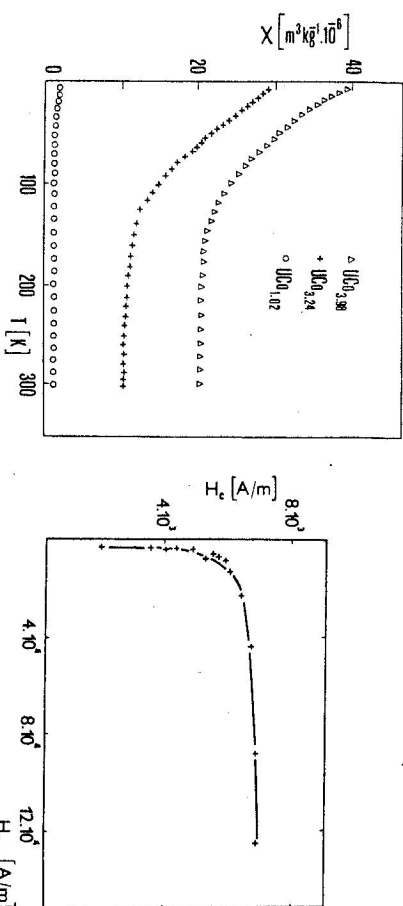


Fig. 1. Temperature dependence of the initial magnetic susceptibility of the studied samples.

Fig. 2. Field dependence of the coercive force for the ferromagnetic sample  $UCo_{3.45}$  (Measured at room temperature).

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The polycrystalline samples were prepared at the Inst. of Experimental Physics, Slovak Acad. Sci., Košice in an induction furnace under an argon atmosphere. The stoichiometry was determined by determining the U and Co content, the phase purity was checked metallographically. The phase purity of  $\text{UCo}$  and  $\text{UCo}_2$  had to be improved by annealing.

For  $\text{UCo}$ ,  $\text{UCo}_2$  and  $\text{U}_2\text{Co}_7$ , the temperature dependence of the initial ac susceptibility was measured by an induction method. The results for  $\text{UCo}$  in the temperature range 4.2–300 K (Fig. 1) show that the compound is a weakly temperature dependent paramagnetic one with a small increase of susceptibility at low temperatures. In the temperature interval 4.2–300 K the compound  $\text{U}_2\text{Co}_7$  obeys approximately the Curie–Weiss law (Fig. 1) with  $\Theta = -150$  K,  $\mu_H = 3.1 \mu_B$ . The same is valid for  $\text{UCo}_2$  (Fig. 1) with  $\Theta = -185$  K,  $\mu_H = 3.8 \mu_B$ . For  $\text{U}_2\text{Co}_7$ , we have found by observing the powder patterns at room temperature ferromagnetic properties which were also confirmed by measuring magnetization and susceptibility. The Curie temperature could not be increased up to 500 K. The coercive force in dependence on the highest field applied is shown in Fig. 2.

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## REFERENCES

- [1] Olsen, C. E.: *J. Appl. Phys.* **31** (1960), 340.
- [2] Hamaguchi, Y., Kamura, S., Kunitomi, N., Sakamoto, M.: *J. Phys. Soc. Japan Suppl.* **17**, *B-III* (1962), 46.
- [3] Čečernikov, V. I.: *Sov. Phys. JETP* **31** (1970), 44.
- [4] Hřebík, J., Coles, B. R.: *Physica* **86–88 B** (1977), 169, and *Int. Conf. on Magnetism*, Munich 1979.
- [5] Turán, J., Zentko, A., Hřebík, J., Šternberk, J.: *Proc. of 6<sup>th</sup> Conf. Cs. Phys.* Ostrava 1979.
- [6] Zentko, A., Šternberk, J., Hřebík, J., Turán, J.: *Proc. Int. Symp. on the Physics of Actinides and Related Materials*, Zürich 1980.
- [7] Freeman, A. J., Darby, J. B.: *The Actinides*, Vol. I–II Academic Press, New York 1974.
- [8] Beahm, E. C.: *Oak Ridge National Lab. Rep.* ORNL-TN-4915.
- [9] *Diagrammi sostojania i fazovje prevrščanja splavov urana*, Nauka, Moskva 1972.
- [10] Sikirica, M., Ban, Z.: *Croat. Chem. Acta* **3b** (1964), 151.

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