

Materials containing the 4f (rare earth) or 5f (actinides) exhibit a large variety of interesting physical properties. The Ce-based compounds have a special place among the rare-earth compounds. The Ce atom contains only a single f-electron that is responsible for the magnetic behavior. The 4f states in compounds with the heavy rare earths have a well localized character, whereas many Ce-based compounds are on the borderline between the localized and itinerant behavior. These compounds show large variety of the magnetic ground states what is a result of the competition between the long-range order of the RKKY type and the screening of the localized moments by conduction electrons. We observe nonmagnetic states with a mixed valence (between Ce³⁺ and Ce⁴⁺), metallic systems with a long-range order of the Ce moments (ferromagnetic, antiferromagnetic or more complex structures). To analyze the electronic properties, the heat capacity data, and namely their low-temperature part, play an indispensable role.

This diploma work comprise the sample preparation of selected cerium compounds, their phase characteristics and the heat capacity measurements at low temperatures (0.4 - 300 K). The main part is focused on the data analysis and comparison with theoretical models.