Exchange interactions in rare earth-transition metal compounds

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Abstract: Using the strenght of R-R interactions deduced from the ordering temperatures of RNi_2 compounds, the R-T exchange-coupling parameter (A_{RT}) in R_mT_n (R = rare earth, T = Co or Fe, m / n = 1 2; 1 3; 6 23; 1 5; 2 17; 1 12) and $R_mT_nB_k$ (m / n / k = 1/4/1; 2/14/1; 1/12/6) systems has been evaluated from analyses of Curie temperatures. Whereas A_{RR}, as deduced from the RNi_2 compounds, increases by almost an order of magnitude in a given series, A_{RT} is enhanced by a factor of only about three from the heavy to the light rare earth compounds. These phenomena, already reported in literature, are based on 4f-5d exchange interactions at R sites. In addition, for a given rare earth element, going from T-poor to T-rich compounds, a tendency to decrease is found for both A_{RCo} and A_{RFe}; this variation is discussed in terms of 3d-5d hybridization. ?? 1993.

Index Keywords: Magnetization; Rare earth compounds; Rare earth elements; Transition metal compounds; Transition metals; Compensation temperature; Curie temperature; Electronic configuration hybridization; Exchange coupling parameter; Exchange interactions; Hybridization; Intersublattice; Magnetic moments; Rare earth sublattice; Transition metals sublattice; Intermetallics

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