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Abstract

: A many electron theory of the exchange interactions within a mixed valence clusters of transition metal ions has been developed. The theory takes into account the degeneracy of the orbital states of d ions, and the electron electron interactions, which result in a complex spectrum of ions in crystal fields. Present work discusses a triad of ions of the type (dn+l @ d n @ d n-l), where n is 2. It is assumed that all three ions are in their ground manifolds, so the cluster manifold under discussion is (4 A @ 3T " 2 1 @ 2T). The electronic states of the mixed valence cluster are obtained as 2 linear combinations of the states arising from all possible single electron states. Second quantization techniques are used to calculate the energy matrices in second order of perturbation. The energy matrix for the ground multiplet with S = 3 has been diagonalaized and the energy eigenvalues have been determined to suggest an energy spectrum for the system

Supervisor	: د. خورشيد أظهر صديقي ، د. محمد سعيد الأحمدي
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