

THERMAL ANNEALING OF $^{60}\text{Co(II)}$ -DOPED $[\text{Co(dipy)}_3](\text{ClO}_4)_x$

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Tris-dipyridylcobalt perchlorate was prepared with the central cobalt atom in the (I), (II) and (III) oxidation states. Each batch of crystals was surface-doped with $^{60}\text{Co(II)}$ for thermal annealing. Analysis was carried out on an anion exchange column, following dissolution in either hydrochloric acid (9M) or dimethylsulfoxide. These different dissolution media permit distinguishing between the several cobalt complexes, even though the analytical procedure identifies only the fully substituted cobalt complex and non-complexed cobalt(II).

The presence of excess dipyridyl in the DMSO solvent used in the dissolution of annealed $^{60}\text{Co(II)}$ -doped $[\text{Co(dipy)}_3](\text{ClO}_4)_3$ modifies the quantity of complex observed, even at concentrations significantly lower than those required to produce complex from free cobalt(II) and dipyridyl in DMSO. This suggests the presence of intermediate complexes $[\text{Co(dipy)}_y]^{n+}$ in the solid.

Isothermal annealing of $^{60}\text{Co(II)}$ -doped $[\text{Co(dipy)}_3](\text{ClO}_4)_x$ indicates that the radioactivity transfer occurs with similar velocities in $[\text{Co(dipy)}_3](\text{ClO}_4)_3$ and $[\text{Co(dipy)}_3](\text{ClO}_4)_2$ but that no transfer takes place with $[\text{Co(dipy)}_3](\text{ClO}_4)$.

Taken together, these results suggest that the transfer annealing may occur in a stepwise manner and that $^{60}\text{Co(dipy)}_3^{2+}$ may be an important intermediate species in the transfer process.

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