

Abstract Submitted  
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**Variation of critical temperature with dilution in a 3D-XY insulating ferromagnet**<sup>1</sup> G.C. DEFOTIS, R.A. HUDDLESTON, B.C. ROTHERMEL, J.H. BOYLE, E.S. VOS, Y. MATSUYAMA, A.T. HOPKINSON, College of William and Mary — A very rare 3D-XY insulating ferromagnet is the molecular material Fe(III) bis(diselenocarbamate) chloride, ordering near 3.4 K. The XY anisotropy arises because of a large zero-field splitting of the quartet crystal field ground term, with a positive axial splitting parameter making the (+1/2,-1/2) Kramers doublet low-lying. Intermolecular exchange interactions operate via Fe-Se...Se-Fe contacts. We have succeeded in diluting this material to significant degrees with a diamagnetic near structural isomorph, Zn(II) bis (dithiocarbamate). Analysis of dc susceptibility and magnetization data leads to estimates of the ferromagnetic ordering temperature in undiluted, 0.137, and 0.202 Zn-mole fraction diluted material. Compositions are determined by atomic absorption spectrophotometry. The ordering temperature decreases moderately with increasing dilution, at a rate typical of three-dimensional systems and much slower than in two-dimensional materials. It is more difficult to distinguish among spin interaction models based on the data.

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