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Structure and magnetic characteristics of thiazyl and selenazyl radical ligand combinations with metal ions

What is this research about?

In chemistry, ligands are molecules that can bind a central metal atom, potentially changing the properties of that metal. A clear understanding of ligand-metal interactions is needed for efficient use of these various combinations in the technology and biomedical industries. This research examines the structural and magnetic properties of thiazyl and selenazyl radicals when used to design ligands. Radicals are molecules, ions, or atoms that have unpaired electrons. Thiazyl radicals contain a sulfur-nitrogen linkage, while selenazyl radicals have a selenium-nitrogen link; both of these radical types are very stable.

What you need to know:

This research describes in detail the structure and magnetic characteristics of thiazyl and selenazyl radical ligand combinations with metal ions.

What did the researchers do?

The researchers made both the thiazyl and selenazyl radicals in the lab. The thiazyl radical ligand was combined with the metals nickel, cobalt, manganese, and zinc in a binuclear fashion (two metal ions for one ligand). In addition, the thiazyl radical ligand was combined in a mononuclear fashion with nickel, manganese and cobalt. The selenazyl radical ligand was combined with nickel and manganese in a binuclear manner. The crystal structure and magnetic properties of all of these combinations were measured by crystallography and dc SQUID magnetometry, respectively.

What did the researchers find?

Thiazyl and selenazyl radical ligands had different configurations when dimerized (when two units were formed into one structure). Great detail was given on the crystal packing of each radical ligand combination, as this information will help scientists determine how the combinations will interact with other molecules. These combinations are quite novel because of their symmetry in structure and spin.

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Project supported by:
A program of the
OMAFRA-U of G
Partnership.

Agri-Food and Rural Link
A program of the OMAFRA – U of G Partnership
Mobilizing Agri-Food and Rural Research Knowledge

How can you use this research?

Chemists in the technology and biomedical fields can use this research to gain a better understanding of these radical ligand combinations, leading to more complicated metal-radical materials that may have unique and potentially useful properties.

Article citation:

Wu, J., MacDonald, D.J., Clérac, R., Jeon, I-R., Jennings, M., Lough, A.J., Britten, J., Robertson, C., Dube, P.A., and Preuss, K.E. (2012). Metal Complexes of Bridging Neutral Radical Ligands: pymDTDA and pymDSDA. *Inorganic Chemistry, 51*, 3827-3839.

Cite this work:

University of Guelph, Institute for Community Engaged Scholarship (2013). Structure and magnetic characteristics of thiazyl and selenazyl radical ligand combinations with metal ions. Retrieved from:

http://hdl.handle.net/10214/6157

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Keywords:

Thiazyl, selenazyl, radical ligands, metal complexes

This summary is a project of the Institute for Community Engaged Scholarship (ICES) at the University of Guelph, with project partners: the Catalyst Centre, SPARK Program at the University of Guelph, and the Knowledge Mobilization Unit at York University. This project is part of the Pan-Canadian Research Impact Network.

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