

Accepted Manuscript

Synthesis, single crystal X-ray diffraction studies and application of novel chromium(III) complexes with 2,2'-bis(sulfanylethyl)- and 2,2'-bis(selanylethyl)ethers

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PII: S0277-5387(18)30301-2
DOI: <https://doi.org/10.1016/j.poly.2018.05.053>
Reference: POLY 13200

To appear in: *Polyhedron*

Received Date: 9 February 2018
Accepted Date: 16 May 2018

Please cite this article as: V. Bezborodov, I. Babenko, I. Rozentsveig, N. Korchevin, E. Levanova, V. Smirnov, T. Borodina, V. Saraev, A. Vilms, Synthesis, single crystal X-ray diffraction studies and application of novel chromium(III) complexes with 2,2'-bis(sulfanylethyl)- and 2,2'-bis(selanylethyl)ethers, *Polyhedron* (2018), doi: <https://doi.org/10.1016/j.poly.2018.05.053>

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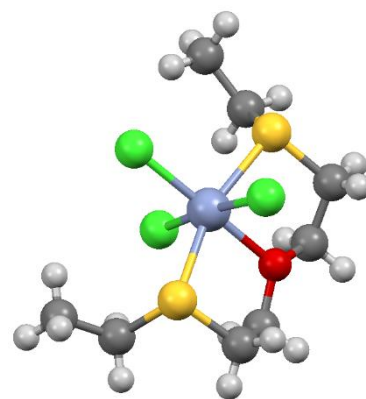
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ABSTRACT

A series of five chromium(III) complexes with tridentate ligands containing S/O- and Se/O-donor groups was obtained by the reaction of $[\text{Cr}(\text{MeCN})_3\text{Cl}_3]$ with 2,2'-bis(sulfanylethyl)ethers or 2,2'-bis(selanylethyl)ethers correspondingly. The new $[\text{Cr}((\text{RSCH}_2\text{CH}_2)_2\text{O})\text{Cl}_3]$ and $[\text{Cr}((\text{RSeCH}_2\text{CH}_2)_2\text{O})\text{Cl}_3]$ complexes were isolated as individual substances and characterized by TG/DSC, IR, EPR and elemental analysis. For the complex $[\text{Cr}((\text{EtSCH}_2\text{CH}_2)_2\text{O})\text{Cl}_3]$, a single crystal was characterized by X-ray diffraction analysis. Complexes $[\text{Cr}((\text{EtSCH}_2\text{CH}_2)_2\text{O})\text{Cl}_3]$, $[\text{Cr}((\text{MeSCH}_2\text{CH}_2)_2\text{O})\text{Cl}_3]$ and $[\text{Cr}((\text{MeSeCH}_2\text{CH}_2)_2\text{O})\text{Cl}_3]$ exhibited catalytic activity in the ethylene oligomerization reaction.



Keywords: coordination chemistry, tridentate ligands, chromium(III) complexes, X-ray studies, ethylene oligomerization.

1. Introduction

In modern chemistry, the synthesis of new complex compounds is of great interest, not only to satisfy academic curiosity, but also to solve some important specific applied problems. In particular, one actual problem requires the design and structural study of complex compounds of transition metals located in groups V–VII of the periodic table which are promising as effective catalysts for selective ethylene oligo- and polymerization to higher α -olefins (butene-1, hexene-1 and octene-1), for instance, new chromium(III) complexes with different N, O, S-donor ligands [1].

It is known that sulfur species are poisons for many catalytic processes, so, sulfur-containing compounds are not usually used as ligands in transition metal catalyzed reactions. However, in contrast with this fact, it was described that various organic SNS-, SOS- and SSS-type ligands can

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