

Synthesis, Crystal Structure and Magnetic Behaviour of Dimeric and Polymeric Gadolinium Trifluoroacetate Complexes

Daniela John, Alexander Rohde, and Werner Urland

Institut für Anorganische Chemie, Universität Hannover, Callinstr. 9, D-30167 Hannover, Germany

Reprint requests to Prof. Dr. W. Urland. E-mail: urland@acc.uni-hannover.de

Z. Naturforsch. **61b**, 699 – 707 (2006); received January 27, 2006

Dedicated to Professor Wolfgang Jeitschko on the occasion of his 70th birthday

The gadolinium(III) trifluoroacetates $((\text{CH}_3)_2\text{NH}_2)[\text{Gd}(\text{CF}_3\text{COO})_4]$ (**1**), $((\text{CH}_3)_3\text{NH})[\text{Gd}(\text{CF}_3\text{COO})_4(\text{H}_2\text{O})]$ (**2**), $\text{Gd}(\text{CF}_3\text{COO})_3(\text{H}_2\text{O})_3$ (**3**) as well as $\text{Gd}_2(\text{CF}_3\text{COO})_6(\text{H}_2\text{O})_2(\text{phen})_3 \cdot \text{C}_2\text{H}_5\text{OH}$ (**4**) (phen = 1,10-phenanthroline) were synthesized and structurally characterized by X-ray crystallography. These compounds crystallize in the space group $P\bar{1}$ (No. 2, $Z = 2$) (**1**, **2** and **4**) and $P 2_1/c$ (No. 14, $Z = 4$) (**3**), respectively, with the following lattice constants **1**: $a = 884.9(2)$, $b = 1024.9(2)$, $c = 1173.1(2)$ pm, $\alpha = 105.77(2)^\circ$, $\beta = 99.51(2)^\circ$, $\gamma = 107.93(2)^\circ$; **2**: $a = 965.1(1)$, $b = 1028.6(1)$, $c = 1271.3(2)$ pm, $\alpha = 111.83(2)^\circ$, $\beta = 111.33(2)^\circ$, $\gamma = 90.44(2)^\circ$; **3**: $a = 919.6(2)$, $b = 1890.6(4)$, $c = 978.7(2)$ pm, $\beta = 113.94(2)^\circ$; **4**: $a = 1286.7(8)$, $b = 1639.3(8)$, $c = 1712.2(9)$ pm, $\alpha = 62.57(6)^\circ$, $\beta = 84.13(5)^\circ$, $\gamma = 68.28(5)^\circ$. The compounds consist of Gd^{3+} ions which are bridged by carboxylate groups either to chains (**1** and **2**) or to dimers (**3** and **4**). In addition to the Gd^{3+} dimers, compound (**4**) also contains monomeric Gd^{3+} units. The magnetic behaviour of **2** and **3** was investigated in a temperature range of 1.77 to 300 K. The magnetic data for these compounds indicate weak antiferromagnetic interactions.

Key words: Trifluoroacetates, Gadolinium Carboxylates, Synthesis, Crystal Structure, Magnetic Behaviour