Lanthanide Complexes with D-Penicillamine Methyl Ester: Formation Constants, Spectral and Thermal Properties

Shehab A. Sallam[a] and Marwa A. Mahmoud[b]

[a] Chemistry Department, Faculty of Science, Suez Canal University, Ismailia, Egypt
[b] Chemistry Department, Faculty of Petroleum and Mining Engineering, Suez Canal University, Suez, Egypt

Reprint requests to Dr. Shehab Sallam. E-mail:shehabsallam@yahoo.com

Z. Naturforsch. **61b,** 139 – 146 (2006); received October 10, 2005

The complex-formation of the lanthanide(III) cations with D-penicillamine methyl ester have been investigated in acidic and neutral media. The macroscopic protonation constants of the ligand and the formation constants of $[Ln{\cdot}Pme]^{2+}$, $[Ln{\cdot}(Pme)_2]^{+}$, $[Ln{\cdot}Pme{\cdot}OH]^{+}$ and $[Ln{\cdot}Pme{\cdot}(OH)_2]$ complexes have been determined from pH-metric data using BEST computer program. Species distribution diagrams of the complexes were obtained and plotted using SPE and SPEPLOT computer programs. Elemental analyses of the solid complexes indicate the formation of 1:1 metal:ligand species. Infrared spectra show that coordination takes place through the NH_2, the SH and the C=O groups of the ligand. The complexes decompose in four steps as shown by their TG and DTA analysis with the formation of $Ln_2(SO_4)_3$ as a final product. Activation energy values (ΔE_a) are correlated with the atomic radii of the metal ions. The mechanism of the thermal decomposition is proposed.

Key words: D-Penicillamine Methyl Ester, Lanthanide Complexes, Formation Constants, Infrared Spectra, Thermal Analysis