Structure of a New Tetranuclear Iron(III) Complex with an Oxo-Bridge; Factors to Govern Formation and Stability of Oxo-Bridged Iron(III) Species in the L-Subunit of Ferritin

Yuichi Sutoh, Yuko Okawamukai, Satoshi Nishino, and Yuzo Nishida*

Department of Chemistry, Faculty of Science, Yamagata University, Yamagata 990-8560, Japan. Fax: +81-23-628-4591. E-mail: yuzo@sci.kj.yamagata-u.ac.jp

* Author for correspondence and reprint requests

Z. Naturforsch. **61 c**, 149–154 (2006); received July 27/August 23, 2005

We have investigated the reaction products of several iron(III) compounds with hydrogen peroxide, and have found that hydrogen peroxide promotes the formation of an oxo-bridged iron(III) species in the presence of methanol (electron donor), and carboxyl groups of the ligand systems play a role to give the tetranuclear iron(III) compound containing a bent Fe-O-Fe unit (O: oxo oxygen atom). Based on the present results and the facts that L-chains of human ferritins lack ferroxidase activity, but are richer in carboxyl groups (glutamates) exposed on the cavity surface, it seems reasonable to conclude that (i) the hydrogen peroxide released in the H-subunit may contribute to the formation of a diferric oxo-hydrate in the L-subunit, (ii) the formation of a bent oxo-bridged iron(III) species is essentially important in the L-subunit, and (iii) rich carboxyl groups in L-subunits contribute to facilitate iron nucleation and mineralization through the capture and activation of the peroxide ion, and formation of a stable bent oxo-bridged iron(III) species.

Key words: Tetranuclear Iron(III) Complex with Bent Oxo-Bridged Unit, Hydrogen Peroxide, Glutamates of L-Subunit Ferritin