MÖSSBAUER SPECTROSCOPIC AND MAGNETIC PROPERTIES OF IRON/III/ PHEOPHYTINS

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Mössbauer spectra of /pheophytinato a/iron/III/chloride [Fe/Pheo-a/Cl] and /pheophytinato b/iron/III/chloride [Fe/Pheo-b/Cl] have revealed that the central iron/III/ ion is in a high-spin state and axially coordinated by chloride ions in solid phase. Temperature-dependent asymmetry observed for the quadrupole splitting doublet of iron/III/ pheophytins, i.e., Fe/Pheo-a/Cl and Fe/Pheo-b/Cl, is interpreted on the basis of the zero-field splitting. The structural difference between iron/III/ pheophytins and iron/III/porphyrins is reflected in the quadrupole splitting more than in the isomer shift. Magnetic behaviour of iron/III/ pheophytins near 4.2 K is very similar to that of iron/III/porphyrins.

INTRODUCTION

Chlorophylls and their derivatives have received a great deal of attention because of their importance in photoconversion synthesis. In spite of continuous in-
interest in these natural products, few reports have focussed on metal-substituted chlorophylls such as iron pheophytins. The skeletal structure of iron pheophytins is quite similar to that of iron porphyrins extensively investigated as an oxygen carrier. Pheophytins are typical chlorins in which a double bond in one of the four pyrrole rings is saturated. Besides this saturated bond, they have a fifth isocyclic ring, i.e., a cyclopenetenone ring. It is of importance to clarify how the structural difference in the macrocyclic ligands of iron(III) pheophytins and iron(III) porphyrins influences the electronic structure of the central iron(III) ion.

In the present study two iron(III) pheophytins of the types Fe/Pheo-a/Cl and Fe/Pheo-b/Cl have been characterized by Mössbauer spectroscopy and magnetic measure-