

A novel low spin iron(III) complex with four amide and two pyridine coordination. X-ray structure, EPR spectra and electrochemical properties

MANABENDRA RAY, DEBALINA GHOSH and R N MUKHERJEE*

Department of Chemistry, Indian Institute of Technology, Kanpur 208 016, India

A newly synthesized tridentate dipicolylamide ligands, $H_2 dpa$, affords a novel low-spin iron(III) complex, $[Fe(dpa)_2]^-$ which has been isolated as $Et_4 N^+$ salt. The complex has been structurally characterized by single-crystal X-ray crystallography. It is a six-coordinate iron(III) complex where the coordination is provided by four deprotonated amide groups and two pyridine rings. In this complex the ligands adopt a *mer* conformation. This reddish-brown complex exhibits EPR spectrum characteristic of low-spin iron(III). Cyclic voltammetry of this compound in MeCN solution at a platinum electrode exhibits reversible-to-quasireversible $Fe^{III}-Fe^{II}$ redox process at -0.91 V and an oxidative response at $+1.05$ V vs. SCE. To the best of our knowledge, the present ligand in its deprotonated form, $dpa(2-)$ provides maximum stabilization of the iron(III) state in a non-macrocyclic ligand environment. The one-electron oxidized species is greenish brown in colour and is comparatively stable. Interestingly, this solution can be reduced back to its original form by the addition of water, implying oxidation of water.

*For correspondence