E2-25 Substituent effects of fluorine on the non aqueous electrochemistry of Pentafluoroiron(III) tetraphenyl porphyrin chloride

Ayanthi N Navaratne
(*Dept. of Chemistry, Univ. of Kelaniya*)

Utility of synthetic iron porphyrins as model compounds to mimic functions of hemoproteins has bee accepted as a logical approach. Redox properties of such model compounds are a very important criterion in this regard and, several electrochemical techniques can be used for this purpose. Cyclic voltammetry is now the most commonly used technique since it is capable of monitoring coupled homogeneous chemical reactions. Mostly, electrochemical characterizations of porphyrins are conducted in non aqueous media due to their very low solubility in water. The objective of this research is to study the substituent effects (on the phenyl ring) of fluorine on the electrochemistry of (F_{20}Fe(III)TPPCl) (pentafluoroiron(III) tetraphenyl porphyrin chloride) in non aqueous media.

Commercially available Fe_{20}Fe (III)TPPCl was used as received. Spectro grade methylene chloride, glass distilled acetonitrile, sodium perchlorate and tetrabutylammonium tetrafluoroborate were used. Cyclic voltammetric experiments were conducted in an electrochemical cell with an EC/225 Voltammetric Analyser and recorded on a X-Y recorder.

Electrochemical characteristics of the F_{20}Fe(III)TPPCl, such as peak potentials and their differences, were obtained in acetonitrile and dichloromethane. These characteristics were compared with those of simple Fe(III)TPPCl. Cycle Voltammetric studies indicated that this fluoro-pocket porphyrin did not undergo any ring oxidation in either solvent. However, the reduction peak of F_{20}Fe(III)TPPCl was shifted anodically indicating that the metal and ring reductions are favoured due to the presence of electronegative fluorine substituents. Therefore, the redox behaviour of F_{20}Fe(III)TPPCl is strongly affected by the fluorine substituents on the phenyl ring in comparison to simple Fe(III)TPPCl.