INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

High-valent non-heme metal intermediates have been invoked as key reactive species in various oxidative transformations. In this thesis, the reactivity studies towards aldehyde deformylation, S-oxidation, C-H activation and oxidative dehalogenation reactions with manganese(III)-peroxo, iron(IV)-oxo and iron(IV)-imido intermediates supported by penta-dentate ligand systems have been evaluated. These reactivity studies provide remarkable insights into the mechanistic pathways of these intermediates.The reactivities of two isomeric side-on manganese(III)-peroxo complexes with bispidine ligands have been investigated towards aldehyde deformylation reaction and was found that the reaction proceeds via an electrophilic hydrogen atom abstraction instead of the commonly proposed nucleophilic pathway. Comparative reactivity studies have been performed between iron(IV)-oxo and iron(IV)-imido complexes toward S-oxidation and C-H activation reactions. In both reactions, iron(IV)-imido complexes were found to be sluggish as compared to their oxo analogue. Finally, the reactivity of iron(IV)-oxo complexes has been evaluated with a series of mono-, di- and tri-halophenols and has established a new mechanism for their oxidative dehalogenation.