INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study	:	**Ph.D.**
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Name of Thesis Supervisor(s)	:	**PROF. BIPLAB MONDAL**
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SHORT ABSTRACT

This thesis broadly covers our endeavor to understand both the reactivity of peroxo complexes of Co(III) with NO in non heme ligand frameworks, L1, L2, L3 and nitrosyl complex of Co(II) with reduced oxygen species, H_2O_2 in heme ligand framework, $TTMPP^{2-}$ respectively. These complexes were synthesized by varying bidentate, symmetric tetradentate, asymmetric tetradentate and square planar ligand framework. The change of reactivity pattern with ligand denticity has been studied. The reactivity of Co(III)-peroxo complexes with NO was discussed in chapters 2-4, following an attempt to mimic the mechanism of the nitric oxide dioxygenase (NOD) enzyme. In every case, formation of putative peroxynitrite intermediate was observed. Efforts were made to identify and characterized the associated intermediates that form during the course of the reaction. For instance, in chapter 2, putative formation of Co(II)-peroxynitrite intermediate was observed using a bidentate ligand framework and finally it isomerizes to the corresponding nitrate complex. In chapter 3 and 4, formation of Co(II)-peroxynitrite intermediates were observed using symmetric and asymmetric tetradentate ligand frameworks, respectively. In case of chapter 3 and chapter 4, different decomposition products were obtained *i.e* corresponding nitrate and nitrite complexes respectively.

On the other way, in chapter 5, a nitrosyl complex of Co(II)-porphyrinate with reduced oxygen species (O_2^{2-}) was explored. Here a Co(III)-porphyrin radical species has been detected after the decomposition of 'O-O' bond of the Co(III)-peroxynitrite intermediate, which indirectly support the involvement of Co(IV)-oxo species in the reaction. In this case, nitrite complex was obtained as a final decomposition product.