

High-valent Metal-oxo and Imido Cores in Chemistry and BiologyR. Kallol¹

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Although terminal $\text{Co}^{\text{IV}}\text{-O}$, $\text{Ni}^{\text{III}}\text{-O}$ and $\text{Cu}^{\text{III}}\text{-O}$ intermediates have been implicated as active intermediates in a number of important chemical transformations, no spectroscopic evidences for the species are available, leaving the pathway uncertain. Evidences of the presence of terminal M-O units (M = Cu(III), Ni(III) or Co(IV)) are to date limited to mass spectrometric studies in the gas phase. Theory suggests that they should be powerful oxidants, perhaps even more reactive than the related $[\text{Fe}^{\text{IV}}=\text{O}]^{2+}$ units that have been extensively studied. In this presentation, we will summarize some of our recent efforts to stabilize the elusive metal-oxo and isoelectronic metal-imido units of Cu(III), Co(IV) and Ni(III)) in solution phase at low temperatures. The high-valent metal-oxo or metal-imido assignments are made on the basis of a variety of spectroscopic methods. The reactivity of the intermediates in hydrogen atom abstraction, oxo transfer reactions and dioxygen reduction reactions are also discussed.