Metal-binding biomolecules from Ascidians: Isolation and Modeling

Ritika Uppal, Ann M. Valentine

Department of Chemistry, Yale University

Many ascidians are known to sequester metals in their blood cells in concentrations remarkably higher than found in the surrounding sea water. These organisms may contain small molecules, called tunichromes, in their blood cells and metal-binding proteins, such as the monolobal transferrin, in the plasma. The genome sequence of one such ascidian, *Ciona intestinalis* (*C. intestinalis*), a vanadium accumulator, is available and this species has the gene for the monolobal transferrin. A combination of biochemical and spectroscopic techniques were used to isolate and characterize the monolobal transferrin and the putative tunichromes from *C. intestinalis*.

In conjunction, complexes that can model possible titanium binding sites in a second ascidian species *Eudistoma ritteri* (*E. ritteri*), were also synthesized. *E. ritteri* is a colonial ascidian which accumulates titanium from sea water. Complexes of titanium with citrate (Figure) and N, N′-dialkyl-2,3-dihydroxyterephthalamide (alTAMs, R = methyl, ethyl) have been synthesized and characterized spectroscopically.

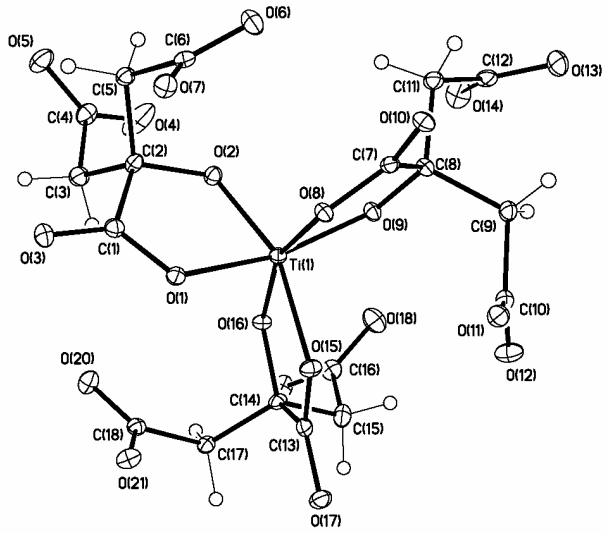

Figure: ORTEP plot of the complex anion $[Ti(C_6H_4O_7)_3]^{8-}$