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*Applications of Coordination Chemistry in Biological Systems*

G. Kaur<sup>1</sup>, R. Hartshorn<sup>1</sup>

<sup>1</sup>University of Canterbury, Department of Chemistry, Christchurch, New Zealand

A novel 2,2':6',2''-terpyridine–picolylamine-based bridging ligand has been synthesized and fully characterized using a variety of analysis techniques including single crystal X-ray diffraction. As shown in figure (a), the ligand has both tridentate and bidentate metal binding sites available to coordinate with various metal ions. By varying the size of anions both dinuclear complexes and supramolecular assemblies have been produced. Addition of metal salts containing small anions like halides result in formation of Cu<sub>2</sub>L and Zn<sub>2</sub>L dinuclear complexes, figure (b), where one metal ion binds at each of the binding sites of the ligand. The metal ions in these complexes mimic active site of the hydrolytic enzymes and promote phosphodiester hydrolysis of model DNA/RNA compounds. Nearly ten times increase in the rate of hydrolysis of bis(p-nitrophenyl)phosphate (BNPP) is observed in comparison to the parent terpyridine and picolylamine complexes under physiological conditions. Larger anions like PF<sub>6</sub><sup>-</sup>, ClO<sub>4</sub><sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, NO<sub>3</sub><sup>-</sup> result in formation of Zn<sub>4</sub>L<sub>4</sub> type squares via head-to-head and tail-to-tail, HH-TT, (H=tridentate site, T=bidentate site) coordination of the ligand. The octahedrally bound Zn(II) ion between two tridentate sites can be replaced with Fe(II) to prepare Fe<sub>2</sub>Zn<sub>2</sub>L<sub>4</sub> squares. A flat molecule of terephthalic acid was also deliberately encapsulated in the middle of the Fe<sub>2</sub>Zn<sub>2</sub>L<sub>4</sub> square as shown in figure (c). The head-to-tail, HT, coordination of the ligand in case of Ni(II) results in formation of decanickel wheels, like [Ni<sub>10</sub>L<sub>10</sub>Cl<sub>4</sub>(H<sub>2</sub>O)<sub>6</sub>](Cl)<sub>15</sub>Br•~140H<sub>2</sub>O shown in figure (d). Due to the large structure of the molecule X-ray crystallographic studies rather have been quite challenging.

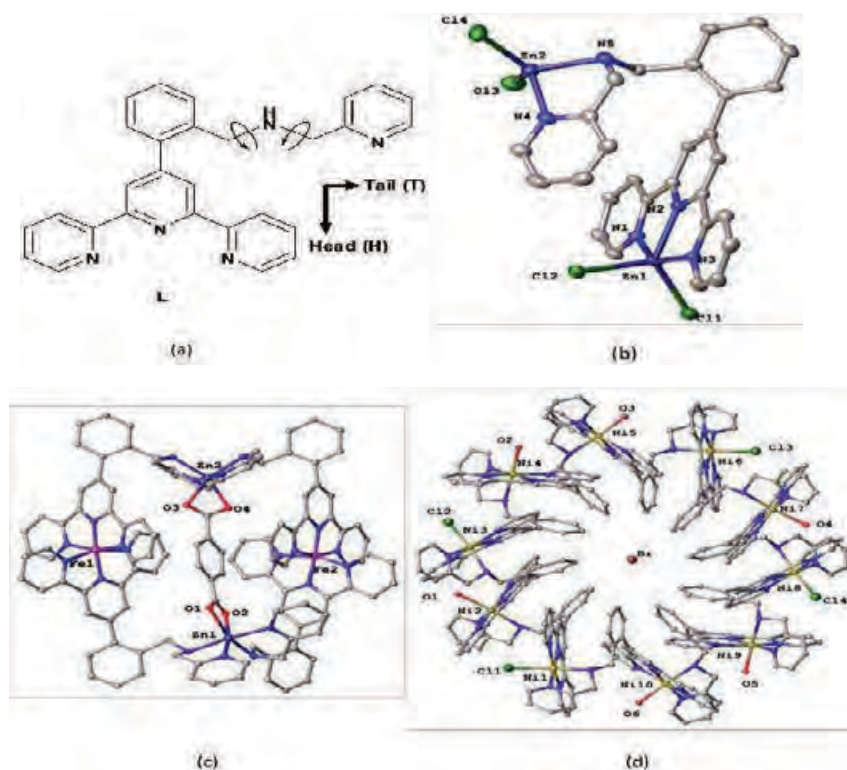


Figure 1. (a) The polydentate ligand L; and its complexes (b) dinuclear Zn(II) complex; (c) Fe<sub>2</sub>Zn<sub>2</sub>L<sub>4</sub> box complex encapsulating Zn(II) coordinated terephthalate ion; (d) deca-nickel wheel complex

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