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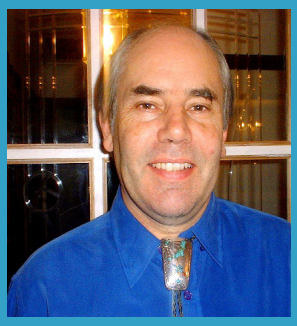
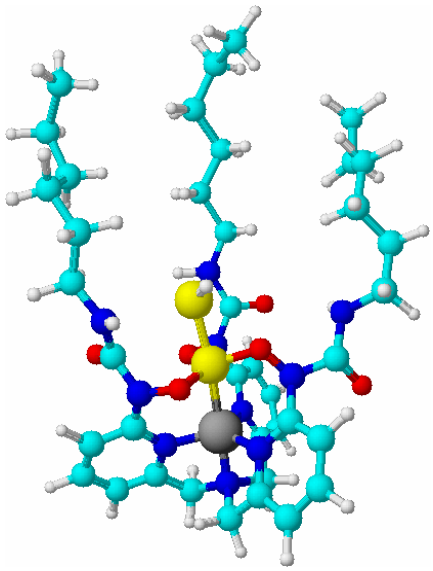


Research Interests: Biomimetic oxidation catalysis, dioxygen, ozone and hydrogen peroxide activation, kinetics and mechanisms of inorganic reactions, aqueous chemistry.

Much of the research in our group is inspired by biology. We are currently designing some novel biomimetic oxidation catalysts based on high valent iron(IV)-oxo or iron(III)-peroxo moieties which incorporate a hydrophobic channel. The aim is to catalyse the 1-oxygenation of n-alkanes within a restricted hydrophobic environment. Our design strategy is based on creation of a binding/activating site for a metal ion, a binding site for the oxygen transfer agent (oxide/hydroperoxide) (urea or amide motif) and a hydrophobic region/channel (attachment of long chain alkyl or perfluorous tail) for the n-alkane.

We are currently focussing our research on iron(III)-OOH complexes of 6-substituted derivatives of TPA (tris(2-pyridylmethyl)amine) (see example below).



We are also interested in the mechanisms of ligand replacement reactions at low symmetry/non-standard metal coordination geometries including those created within metal clusters. In a recent kinetic study of water exchange at 9-coordinated Mo and W in triangular acetate-bridged clusters a novel and unexpected mechanistic changeover from strongly dissociative (Mo) to associative (W) was found between two structurally identical cluster derivatives (ref. 2 below).

SELECTED RECENT PUBLICATIONS

1. Kinetics of the reaction of mer-tris(picolinato) iron(III) with hydrogen peroxide in pyridine: role of hydroxyl radicals ir subsequent catalytic oxygenation of cyclohexane to the ketone. D.T. Richens, S.L. Jain, A.C. Gale. *Inorg. React. Mech.* 2006, **6**, *in print.*
2. Distinct water-exchange mechanisms for trinuclear transition-metal clusters. J.R. Houston, D.T. Richens, W.H. Casey. *Inorg. Chem*. 2006, **45,** 7962-7967.
3. Redox Chemistry of the d^6 Acetato-bridged Clusters $[M^{IV}_3(\mu_3\text{-}O)_n(O_2CCH_3)_6(H_2O)_3]^{2+}$ (M = Mo, W, n = 1, 2): Reversible Redox Between Mono-μ_3-oxo d^8 $M^{III,III,IV}$ and d^9 M^{III}_3 Forms. G. Powell, D.T. Richens. *Dalton Trans.* 2006, 2959-2963.
4. Structure-Property Relationships in Polynuclear μ-O Bridged Aqua Clusters; Effect of M-μO bond Covalency. D.T. Richens. *Comm. Inorg. Chem.* 2005, **26,** 217-232.
5. Ligand Substitution Reactions at Inorganic Centers. D. T. Richens. *Chemical Reviews* 2005, **105,** 1961-2002.
6. Metal Aqua Ions. S.F. Lincoln, D.T. Richens, A.G. Sykes. in *Comprehensive Co-ordination Chemistry II*, eds. J.A. McCleverty, T.J. Meyer. Elsevier: Amsterdam, 2004, **1.25**, 515-555.
7. Syntheses and Characterization of Two Dioxygen Reactive Dinuclear Macrocyclic Schiff-base Copper(I) Complexes. D. Utz, F.W. Heinemann, F. Hampel, D.T. Richens, S. Schindler. *Inorg. Chem.* 2003, **42**, 1430–1436.