Kenneth N. Raymond

Professor Kenneth N. Raymond was born on January 7, 1942 in Astoria, Oregon. Following his B.A. from Reed College in 1964 and his Ph.D. from Northwestern University, he was appointed to the faculty of the University of California at Berkeley in 1967. There he has remained, becoming Associate Professor in 1974 and Professor in 1978. He was appointed Chancellor's Professor in 2005, and has served both as Chair and Vice Chair of the Berkeley Chemistry Department. He has also been a Visiting Professor or Lecturer at several universities. These include Stanford University (1973), The Australian National University (1974), Université Louis Pasteur, Strasbourg (1980), University of Rennes (1988), The University of Queensland (1989), and the ETH (2001). He was William Pyle Phillips Distinguished Visitor, Haverford College (1993), 3`eme Cycle Lecturer in Switzerland (1990, 1995), Patrick Lecturer, Kansas State University (1996), Endowed Lecturer, University of Oklahoma (1987, 1996), Ernest H. Swift Lecturer, Caltech, and Sacconi Lecturer, University Florence (1996), Erskine Fellow, University of Canterbury, New Zealand (1997), and Frontiers in Chemistry Lecturer, Texas A & M University (2004). He has served on several national science advisory boards, including those of the NIH, NSF and ACS. He has been an Alfred P. Sloan Research Fellow (1971-1973), a Miller Research Professor at the University of California (1977-1978, 1996, 2004) and a Guggenheim Fellow (1980-1981). He has received: the Ernest O. Lawrence Award of the Department of Energy (1984); a Humboldt Research Award for Senior U.S. Scientists (1991); the ACS Alfred Bader Award in Bioinorganic or Bioorganic Chemistry (1994); the Basolo Medal at Northwestern University and the Max-Planck-Institut für Strahlenchemie "Frontiers in Biological Chemistry" award (1997); the Reed College Howard Vollum Award for Distinguished Accomplishment in Science and Technology (2002); the Kosolapoff Award of the Auburn section of the ACS (2004); and the Izatt-Christensen Award in Macrocyclic Chemistry (2005). He was elected to the National Academy of Sciences in 1997 and the American Academy of Arts and Sciences in 2001. Professor Raymond is a member of the editorial boards of several journals, and is a cofounder (2001) of Lumiphore Inc. He has served as a consultant for Epix, DuPont and Monsanto Corps., and was the first member of the scientific advisory board for Salutar. He is the author of 15 patents and over 430 research publications.

3M Lecturers:

1962	**Sir Derek H.R.Barton, Imperial College**
1963	Sir Ronald Nyholm, University College
1964	F. C. Tompkins, Imperial College
1965	S. Winstein, U.C.L.A.
1966	F. A. Cotton, M.I.T.
1967	J. O. Hirschfelder, Wisconsin
1968	A. Eschenmoser, E.T.H, Switzerland
1969	**H. Taube, Stanford**
1970	S.A. Rice, Chicago
1971	F.H. Westheimer, Harvard
1972	R.G. Pearson, Northwestern
1973	W.A. Klemperer, Harvard
1974	G. Stork, Columbia
1975	R. J. P. Williams, Oxford
1976	J. A. Morrison, McMaster
1977	D. Arigoni, E.T.H., Switzerland
1978	J. Chatt, Sussex
1979	**J. A. Pople, Carnegie-Mellon**
1980	W.P. Jencks, Brandeis
1981	J. Halpern, Chicago
1982	Sir John Meurig Thomas, Cambridge
1983	R. Breslow, Columbia
1984	M. L .H. Green, Oxford
1985	**D. R. Hershbach, Harvard**
1986	**J. M. Lehn, Strasbourg**
1987	M. H. Chisholm, Indiana
1988	**R.A. Marcus, Cal. Tech.**
1989	**D.J. Cram, U.C.L.A.**
1990	D. Seyferth, M.I.T.
1991	D. A. Shirley, Berkeley
1992	K. U. Ingold, NRC
1993	H. Schmidbauer, Munich
1994	A. J. Bard, U. Texas, Austin
1996	R. Huisgen, Munich
1998	Jean M. J. Frechet, Univ. of Calif., Berkeley
1999	Robert W. Field, M.I.T.
2000	Ian Dance, New South Wales
2001	K.C. Nicolaou, San Diego
2002	R.R. Birge, Connecticut/Syracuse
2003	D. Fenske, Univ. Karlsruhe, Germany
2005	A. Padwa, Emory University, Atlanta
2006	N. Dovichi, Washington State
2007	Kenneth N. Raymond, Univ. of Calif., Berkeley

Western

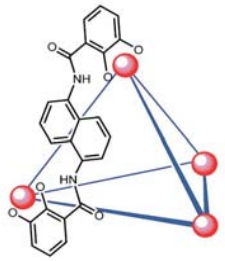
The UNIVERSITY *of* WESTERN ONTARIO

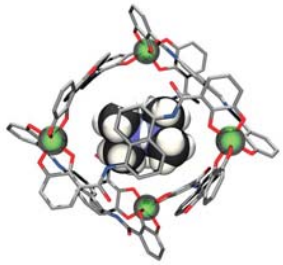
The 3M University Lecturer in Chemistry 2007

KENNETH N. RAYMOND

Department of Chemistry
University of California, Berkeley

M is for Metals, Medicine and Molecular Architecture





Prof. Raymond will present three lectures:

Monday, March 26th, 2007
4:30 p.m.
HSB 236 (Health Sciences Building UWO)

Lecture #1 - Biological Iron Transport and Storage: From Microbes to Man

While iron's chemistry makes it biologically essential, the insolubility of ferric hydroxide at pH 7.4 limits the concentration of Fe^{3+} (the free aqueous ion) to 10^{-18} M. Even below this concentration free ferric ion is toxic, so the human serum iron transport protein, transferrin, maintains the free ferric ion concentration at 10^{-24} M. Pathogenic bacteria must compete against this thermodynamic limit to obtain iron from the serum or tissues of their human host. As a consequence, it is difficult to overestimate the significance of iron as a limiting nutrient in microbial growth. Powerful and selective iron chelators (siderophores) are produced and secreted specifically in response to iron deficiency. These are taken up by specific membrane proteins. Spectacular advances have taken place in recent years in understanding the recognition and transport processes involved in siderophore-mediated iron acquisition. Siderocalin, a protein of the human innate immune system, interrupts siderophore mediated iron transport of pathogenic bacteria. The anthrax pathogen produces a stealth siderophore that evades this protein.

Contact

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Tuesday, March 27th, 2007
4:30 p.m
HSB 236 (Health Sciences Building UWO)

Lecture #2 - Coordination Chemistry and Magnetic Resonance Imaging

Magnetic resonance imaging (MRI) has evolved into one of the most powerful techniques in diagnostic clinical medicine and biomedical research by enabling the acquisition of high resolution, three-dimensional images of the distribution of water in vivo. The strong expansion of medical MRI has prompted the development of a new class of pharmacological products, called contrast agents. These agents catalytically shorten the relaxation time of nearby water molecules, thereby enhancing the contrast with background tissues. Over 40% of all MRI scans use a contrast agent, usually based on highly paramagnetic Gd(III), with seven unpaired electrons and a long electronic relaxation time. However, the high toxicity of $[Gd(H_2O)_8]^{3+}$ requires that the metal be complexed by strong organic chelators before it is administered to patients. Current MRI agents require injection of gram quantities of Gd in order to obtain satisfactory contrast in the resulting image. We are designing second generation agents with much higher relaxivities, beginning with a basic new approach to the coordination chemistry problem of achieving high complex stability **and** fast water exchange of several coordinated water molecules.

Coffee and Donuts will be served
15 minutes prior to the talks outside the lecture room.

Wednesday, March 28th, 2007
8:30 a.m.
****PLEASE NOTE UNUSUAL TIME AND LOCATION****
NS 7 (Natural Sciences Bldg. UWO)

Lecture #3 - Supramolecular Metal Clusters as Nanoscale, Chiral Flasks

We form nanometer scale molecular flasks using labile metal-ligand interactions. Most of the clusters made are highly negatively charged and very water-soluble. However they have hydrophobic interiors that strongly and selectively encapsulate hydrophobic cationic guests. Because of trigonal propeller chirality at the metal vertices and mechanical linkage between the metal vertices, these clusters are homochiral and resolvable. Catalyst guests operate within the flasks, enabling chiral recognition and catalytic turnover. Enzyme-like catalysis of 3 to 4 orders of magnitude has been seen. Like enzymes and other natural receptors, these cavities create an asymmetric environment that allows the recognition and control of molecular asymmetry in reactions, which is essential for preparing compounds that have biological activity.

Our website: http://www.uwo.ca/chem/