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Synthesis of a Cobalt Cube: A Potential Catalyst for Water Oxidation

ABSTRACT

This presentation outlines the synthesis, isolation, and structural characterization of four cobalt cabane complexes with potential application as catalysts in water oxidation, a key step in artificial photosynthesis. The complexes were synthesized via reactions of cobalt (II) acetate with trifluoroacetic acid and various fluorinated pyridine ligands, including CF_3-pyridine, F_2-pyridine, and per fluoropyridine. The resulting compounds were thoroughly characterized using single-crystal X-ray diffraction, nuclear magnetic resonance (NMR) spectroscopy, and electrospray ionization (ESI) mass spectrometry. These findings potentially may contribute to the development of efficient molecular catalysts for sustainable energy conversion.

BIOGRAPHY

Prof. A. K. Fazlur Rahman is the S. J. Sarkeys Professor and Chair of the Chemistry Department at the Oklahoma School of Science and Mathematics, and an Affiliated Professor of Chemistry and Chemical Engineering at the University of Oklahoma. He earned his B.Sc. (Hons.) and M.Sc. in Chemistry from Jahangirnagar University, an M.A. in Chemistry from Brandeis University, and a Ph.D. in Organometallic Chemistry from the Australian National University, followed by postdoctoral research at Ames Laboratory, the University of Tasmania, and the University of Oklahoma. He has since held research and visiting appointments at institutions including Texas A&M, Rochester, UC Berkeley, Caltech, Rutgers, Columbia, the Free University of Berlin, and Friedrich Schiller University Jena. His research spans organometallic chemistry, homogeneous catalysis, CO_2 activation and utilization, metal-stabilized carbocations, and water oxidation catalysis, with a broader focus on artificial photosynthesis and sustainable energy through molecular catalysis.