Apr 21st, 2:00 PM - 3:00 PM

Synthesis and Derivitization of Keggin Type Polyoxometalates

Jacqui Hoffman, 01
Illinois Wesleyan University

Rebecca Roesner, Faculty Advisor
Illinois Wesleyan University

Poster Presentation 8

SYNTHESIS AND DERIVITIZATION OF KEGGIN TYPE POLYOXOMETALATES

Jacqui Hoffman and Rebecca Roesner*
Department of Chemistry, Illinois Wesleyan University

Polyoxometalates are early-transition metal-oxygen clusters. The Keggin ion, $XM_{12}O_{40}^{n-}$ is one of the most useful polyoxometalates. The triangular arrays of oxygen atoms present on the surfaces of polyoxometalates are similar to the patterns seen on bulk metal oxide surfaces. Polyoxometalates are therefore excellent compounds for both homogeneous and heterogeneous catalysts.

The Keggin ion can be synthesized with a W-O group missing resulting in a vacancy in an otherwise symmetric molecule. Keggin-type polyoxometalates with mono-lacunary structures of formula $XM_{11}O_{39}^{n-}$, provide a rigid, hydrolytically stable, thermally robust, nonoxidizable framework that behaves as a pentadentate ligand. It is possible to attach organic ligands to the surface of this cluster by inserting another metal atom, one capable of forming a bond with carbon, into the vacancy. The organic ligand can then attach to biomolecules at specific sites. The polyoxometalate adds an appreciable amount of electron density to the biomolecule, thus polyoxometalates are useful in enhancing contrast in electron microscopy. It may also be possible to develop drugs, which "seek out" diseased cells. Before this can be accomplished fundamental techniques for forming polyoxometalate carbon bonds must be developed.

Mono-lacunary Keggin ions with X=P, Si have been synthesized. The tungstophosphate ion has been characterized by ^{31}P NMR, FT-IR and UV analysis. A rhodium atom bearing a $-CH_2COOH$ functional group was then inserted into its vacany. This compound was characterized by FT-IR, ^{1}H NMR, ^{31}P NMR. Attempts to convert the carboxylic acid functional group to an amide failed. Current efforts are aimed at the characterization of tungstosilicate ion. Attempts will then be made to insert Rh-CH_2COOH into its vacancy and convert the carboxylic acid functional group to an amide.