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Vanadium Substituted Polyoxometalates

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Poster Presentation P7

VANADIUM SUBSTITUTED POLYOXOMETALATES

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Oxidation reactions are important for many industries, including the bleaching of paper and waste water treatment. Chlorine, sodium hypochlorite, pyridinium chlorochromate and other chromium containing compounds are powerful oxidants, but are harmful to the environment. Green oxidants, such as hydrogen peroxide, often require a catalyst. In such systems, the catalyst is reduced as it oxidizes the substrate and then the catalyst is re-oxidized by hydrogen peroxide. This cyclic reaction, illustrated in Figure 1, has the potential to be repeated numerous times without much waste. The catalysts of interest in this work are polyoxometalates (POMs), which are known to function as oxidation catalysts. The phosphomolybdate ion, $PMo_{12}O_{40}^{3-}$, is known to have some catalytic activity; whereas the vanadium substituted phosphomolybdates, $PMo_{11}V_1O_{40}^{4-}$ and $PMo_{10}V_2O_{40}^{5-}$, have higher activities and are the focus of this work. The vanadium substituted POMs were synthesized and characterized and their ability to act as oxidation catalysts was confirmed though the oxidation of benzyl alcohol to benzaldehyde. Current work is focused on immobilizing the POMs on anion exchange resins; the catalytic activity of the resin-bound POMs will be compared to that of the dissolved POMs.

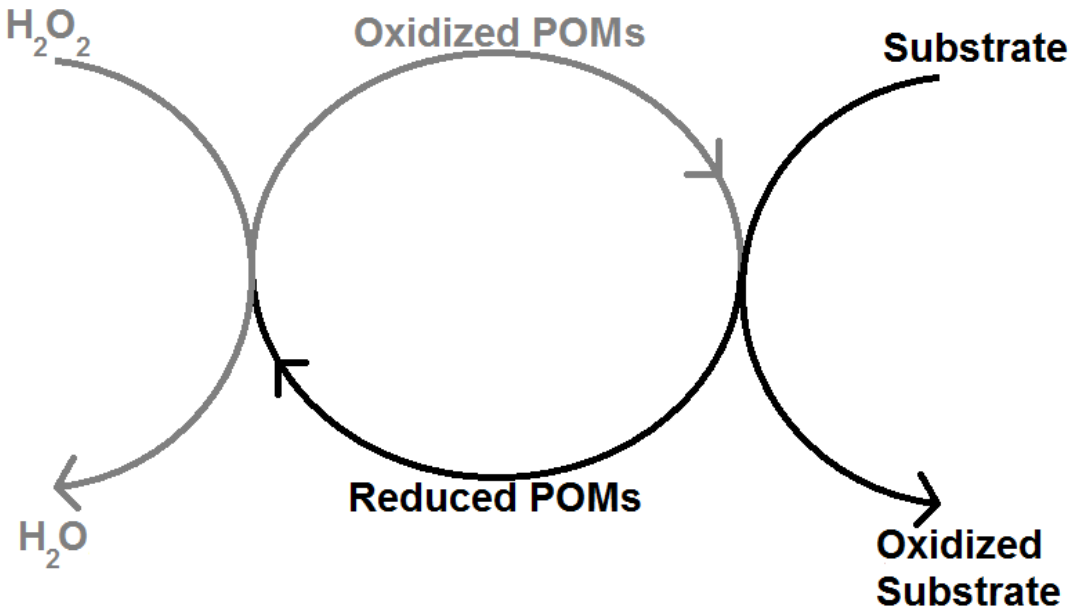

Figure 1. Oxidation-reduction catalytic cycle