

443e Separation of Molybdate Catalyst from Pulp Bleaching Effluents

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Molybdate anion is a catalyst for the bleaching reactions of hydrogen peroxide with many organic compounds. Among the largest industrial applications of peroxide is the bleaching of hardwood pulps. It was shown recently [1, 2] that by using milder pulping and bleaching conditions, the yield of pulp from hardwood chips could be increased by about 5% resulting in significant savings for the paper industry. The bleaching process uses peroxide catalyzed by molybdate during one of the stages.

The ability to economically recover the molybdate catalyst from the spent bleach liquors is the key to the economic viability of this process. Molybdate recovery also renders the effluent less stressful to the environment and thus is attractive for both the economic and environmental benefits it provides.

We developed a new process to recover most of the molybdate anion [MoO₄²⁻] from aqueous solutions in the pH range of typical bleaching effluents. In this process, we first added a cationic surfactant to cause precipitation of a surfactant molybdate complex. The precipitates were then filtered using nanoporous membranes. After washing, the precipitates were redissolved and the surfactant was recovered using flotation.

The influence of particle size, concentration, solution chemistry (ionic environment & pH) and temperature on the filtration & flotation recovery processes were investigated. We considered the effectiveness of two different cationic surfactants and correlated foam stability and drainage to the effectiveness.

1. R. C. Francis, S. Chaiarekij and B. V. Ramarao. 'Pulp bleaching by the addition of peroxide to the D2 stage and recovery of molybdates by selective ion flotation techniques.' *J. Wood Chem. Tech.*, 23, 2, 113-129 (2003).
2. M. Manning, G. Henry, S. Omori and R. C. Francis. 'Simultaneous oxidation of lignin by chlorine dioxide and molybdate-activated hydrogen peroxide.' Accepted to appear in *Holzforschung* (2005).