April 2018

Analysis of Polyelectrolytes and Functionalized Silica for Precious Metal Catalyst Recovery

Amy Elizabeth Toscano
Worcester Polytechnic Institute

Patrick M. Bresnahan
Worcester Polytechnic Institute

Analysis of Polyelectrolytes and Functionalized Silica for Precious Metal Catalyst Recovery

A Major Qualifying Project

Submitted to the Faculty

of

WORCESTER POLYTECHNIC INSTITUTE

in partial fulfillment of the requirements for the

Degree of Bachelor of Science

by

_____

Patrick Bresnahan

_____

Amy Toscano

Date: 4/26/2018

Sponsoring Organization: Sunovion Pharmaceuticals

Project Advisors:

_____

Professor Stephen Kmiotek, Advisor

_____

Professor Drew Brodeur, Co-Advisor

Abstract

Sunovion Pharmaceuticals utilizes an organometallic rhodium-based catalyst in one of their drug production processes. Due to its high cost, it is beneficial to recover for reuse; however, due to the low concentration of the catalyst in the waste stream of the process, it has proven difficult to separate from solution. Our team investigated the use of polyelectrolytes and functionalized silica metal scavengers as a means to recover the catalyst. Through the use of the ICP-OES, rhodium concentrations were analyzed before and after the addition of the polyelectrolytes and metal scavengers. While the polyelectrolytes proved ineffective due to the lack of precipitation and inability to filter, the functionalized silica metal scavengers showed over 90% recovery of rhodium at various loadings.

This MQP contains information deemed confidential to the business interest of the industrial sponsor. Please contact Stephen Kmiotek at sjkmiotek@wpi.edu or Drew Brodeur at dbrodeur@wpi.edu for additional information.