Efficient Removal of Ruthenium-Based Catalysts using SiliaBond® Metal Scavengers

Geneviève Gingras*, Annie Michaud, Marie-Pier Ouellet, Steeven Potvin, Lynda Tremblay, and François Bélènd
Silicycle® Inc. (www.silicycle.com) 114-1200 St-Jean-Baptiste Avenue, Quebec City, Quebec, G2E 5E8, Canada
*(genevievegingras@silicycle.com)

Introduction
Ruthenium-based catalysts are commonly used in organic synthesis, mainly in olefin metathesis reaction (ROMP) and RCM. Grubbs and Hoveyda-Grubbs catalysts are certainly the most popular ruthenium-based complexes in that field of applications. Complete ruthenium removal can be tedious using conventional methods. Silicycle has developed innovative functionalized silica-based products that allow to reach the maximal tolerated concentration of the residual ruthenium concentration: the SiliaBond Metal Scavengers.

The silica matrix offers many advantages: no swelling, mechanical and thermal stabilities, scalable and ease of use (SPE, flash cartridges and, bulk formats).

Here are the results of ruthenium scavenging efficiency using different SiliaBond functionalized silicas.

Ruthenium-Based Catalysts Scavenged
The following ruthenium-based catalysts were studied using SiliaBond Metal Scavengers under several experimental conditions.

Solvent Effect on Scavenging Efficiency
SiliaBond Metal Scavengers can safely be used in any organic and aqueous solvents. However, the nature of the solvent does sometimes influence the scavenging efficiency.

Scavenging Results using SiliaPrep® SPE Cartridges
The use of SiliaBond Metal Scavengers to remove ruthenium catalyst after ring-closing metathesis (RCM) reaction is the most effective purification method (over conventional ones). As demonstrated below, the main advantage is no product lost during the purification step.

SiliaBond Scavengers-Useful Tool in Organic Synthesis
These results illustrate the high efficiency of SiliaBond Metal Scavengers to reach the desired residual ruthenium concentration to single digit ppm of various complexes using different experimental conditions.

Conclusion
These results illustrate the high efficiency of SiliaBond Metal Scavengers to reach the desired residual ruthenium concentration to single digit ppm of various complexes using different experimental conditions.