

# Thiol-SAMMS<sup>®</sup> Metal Scavenger Kit

## Introduction

Thiol-SAMMS<sup>®</sup> products show tremendous capacity for removing a wide range of precious metal catalysts including platinum and palladium. Thiol-SAMMS<sup>®</sup> should enable pharmaceutical companies to achieve cleaner processes and to meet strict regulatory limits on metal contamination. The ability to potentially recover the catalyst from Thiol-SAMMS<sup>®</sup> scavengers will further reduce the overall costs of production. Thiol-SAMMS<sup>®</sup> can be utilized in a very broad range of pH and in a variety of solvents so it may be used directly within existing reaction streams without modification.

## Contents of Kit

- 50 grams of THMS-03
- 50 grams of THMS-04
- 100 grams of THMS-M1

**PLEASE NOTE: THMS-03 and THMS-04 are interchangeable in terms of capacity and performance.**

**We recommend performing small scale tests with both the THMS-03 and THMS-M1, in order to determine the appropriate SAMMS<sup>®</sup> product to use in your metal removal process.**

## STEP 1: Assessment Phase

1. Prepare three vials containing the same quantity of the sample to be treated with the Thiol-SAMMS<sup>®</sup> Metal Scavengers in the kit.
2. For each Thiol-SAMMS<sup>®</sup> Metal Scavenger, calculate the amount needed (4-8 eq) according to the residual metal concentration. (Refer to the "Product Calculation" section to determine how much Thiol-SAMMS<sup>®</sup> Metal Scavenger to use).
3. For use in aqueous solutions, please follow "Prewetting Procedure"; then proceed to the next step; for use in organic solutions, please go to the next step directly.
4. Add the Thiol-SAMMS<sup>®</sup> Metal Scavenger to the solution and stir for one hour at room temperature.
5. Filter the Thiol-SAMMS<sup>®</sup> Metal Scavenger using a porous (fritted) funnel or filtration device and rinse the scavenger with additional solvent for total recovery of the Active Pharmaceutical Ingredient (API).
6. Examine residual metal concentration of each vial to identify the most effective scavenger (The one with the lowest residual metal concentration).
7. Follow "Ensuring Efficiency" steps with the Thiol-SAMMS<sup>®</sup> Metal Scavenger identified in #6.

## STEP 2: Ensuring Efficiency

If optimal results do not occur during the assessment phase or desired efficiency is not acquired, the following steps should be performed:

1. Increase the amount of Thiol-SAMMS<sup>®</sup> Metal Scavenger material used in the process.
2. Increase the temperature of the scavenging reaction.
3. Change the reaction time.

**Please note:** the above parameters can be incorporated either one at a time or simultaneously to increase the metal removal efficiency.

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## STEP 3: Implementation

Once the ideal experimental conditions have been established (time, temperature, solvent and number of equivalents), add the Thiol-SAMMS® Metal Scavenger to the solution and stir mixture at appropriate temperature for the preferred period of time. Recover the API by Filtering off the scavenger with the solvent.

## Product Calculations for Determining Amount of Thiol-SAMMS® Metal Scavenger to Use

In order to ensure a productive metal removal process, calculations will need to be completed to determine the amount of Thiol-SAMMS® Metal Scavenger that should be used. There are two different ways to make this determination; from the metal concentration (more accurate results) or from the amount of metal catalyst used (typically only used when the amount of the residual metal concentration is unknown).

### Example 1: Metal Concentration

**Capacity of the Scavenger (THMS-03):** Ex. 2 mmol/g

**Molecular Weight of Pd:** 106.4 g/mol

**Solution to be treated:** Ex. 500 g

**Concentration of Pd:** Ex. 1000ppm

1. Establish the amount of palladium to be scavenged:  

$$\text{Pd (mmol)} = (1000\text{ppm Pd} \times 500\text{g}/1000) / 106.4$$

$$\text{g/mol} = 4.70 \text{ mmol}$$
2. Calculate the amount of metal scavenger (THMS-03):  

$$\text{THMS-03 (g)} = (4.70 \text{ mmol of Pd}) / (2 \text{ mmol/g})$$

$$\text{THMS-03} = 2.35 \text{ g of THMS-03 (1 eq)}$$

### Example 2: Amount of Metal Catalyst Used

**Capacity of the Scavenger (THMS-03):** Ex. 2 mmol/g

**Molecular Weight of Pd(II) Acetate:** 226.5g/mol

**Amount of Catalyst to be treated:** Ex. 5 g

1. Calculation of Amount of Pd in the Solution To Be Treated:  

$$\text{Pd (mmol)} = (5\text{g Pd(II) Acetate} \times 1000) / 226.5$$

$$\text{g/mol} = 22.08 \text{ mmol}$$
2. Calculation of 1 eq Amount of Scavenger (THMS-03):  

$$\text{THMS-03 (g)} = (22.08 \text{ mmol of Pd}) / (2 \text{ mmol/g})$$

$$\text{THMS-03} = 11.04 \text{ g of THMS-03 (1 eq)}$$

## Prewetting Procedure for Use in Aqueous Solutions

1. Prepare 20% ethanol/water solution.
2. Weigh required amount of Thiol-SAMMS® Metal Scavenger and 20% ethanol/water solution to achieve liquid to solid ratio of 40 g/g.
3. Add Thiol-SAMMS® Metal Scavenger into 20% ethanol/water solution.
4. Mix for about 5 min.

### NOTE:

- a) The ethanol content may be varied as long as adequate wetting is achieved.
- b) The ratio of ethanol to adsorbent can be varied as long as the adsorbent is adequately wetted.

## Ordering Information

Cat. #	Description	Size
24886	Thiol-SAMMS® Metal Scavenger Kit	1 Kit

### Additional Products:

19772	Rare Earth Magnet (Nd-Fe-B)	1 ea
85200	Multi-SEP Magnetic Separator	1 ea

## To Order:

In The U.S. Call: 1-800-523-2575 • 215-343-6484  
 In The U.S. FAX: 1-800-343-3291 • 215-343-0214  
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