

Robust Analysis of 1,4-Dioxane by Isotopic Dilution Using Strata™ Activated Carbon Extraction

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Overview

EPA method 8270 is a popular testing method for semi-volatile organic compounds by GC-MS. The analyte list in this method is quite expansive and is often challenging to get good recovery for all classes of compounds in a single extraction. Here, a modified EPA 8270 method that employs activated carbon for the extraction of polar analytes such as 1,4-Dioxane by an isotopic dilution method is used. While dealing with polar small molecules like 1,4-Dioxane, traditional sample preparation using Solid Phase Extraction (SPE) might not be efficient. Since the analyte is polar, a specialized extraction technique is needed. Activated carbon contains porous carbon with defined pore volume and high surface area that are an excellent choice for polar analytes. In this application note, we have extracted 1,4-Dioxane from water using Strata Activated Carbon cartridges. In addition, multiple batches of Strata Activated Carbon cartridges were evaluated to prove the consistency of the newly developed porous activated carbon material.

GC-MS Conditions

Column: Zebron™ ZB-624PLUS™

Dimension: 30 meter x 0.25 mm x 1.40 μm

Part No.: [7HG-G040-27](#)

Injection: Splitless, 0.5min @ 175 °C, 1 μL

Recommended Liner: Zebron PLUS Z-Liner™ (Compatible with Agilent® & Thermo Scientific® GC instrument)

Liner Part No.: [AG2-0A11-05](#)

Carrier Gas: Helium @ 1 ml/min (Constant Flow)

Oven Program	Ramp (°C/min)	Temp (°C)	Time (min)
	-	35	1.0
	12	100	0.0
	25	230	0.0

Detector: MSD

SIM Ions (m/z): 58, 64, 88, 96

Transfer Line Temperature: 300 °C

Sample Preparation

Condition: Strata Activated Carbon, 2 g/6 mL cartridge (Part No. [CS0-9209](#)) with 2 washes of 10 mL Methylene Chloride, followed by 2 washes of 10 mL Methanol

Equilibrate: Cartridges with 2 washes of 10 mL Water

Load: 500ml Water sample spiked with internal standard onto cartridges

Dry: Cartridges for 10 min

Elute: With 3 mL Methylene Chloride and repeat elution 2 more times (9 mL total volume)

Water Removal: Pass eluent through Sodium Sulfate Giga™ tubes, 5 g/20 mL (Part No. [8B-S124-LEG](#)) and wash with 5mL Methylene Chloride

Evaporate: Solvent to approximately 0.4 mL in a water bath near room temperature (45 °C) under a gentle stream of Nitrogen

Adjust: Final volume to 0.5 mL with Methylene Chloride

Figure 1. Strata Activated Carbon Extraction Cartridges

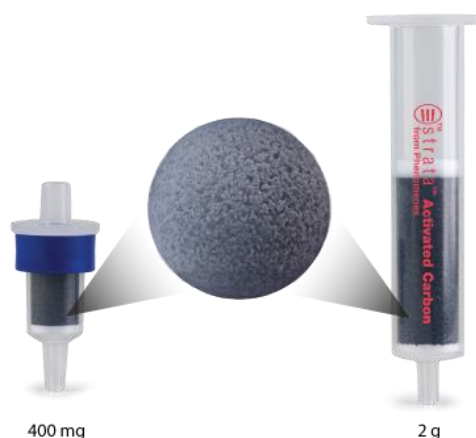


Figure 2. Blank versus Internal Standard Overlay for 1,4-Dioxane-d8 Extraction from Water using the Strata™ Activated Carbon Cartridge

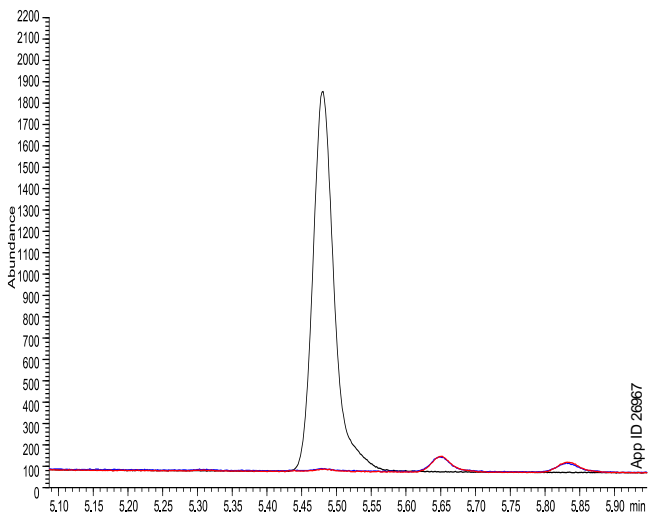


Figure 3. Internal Standard 1,4-Dioxane-d8 Reproducibility using Strata Activated Carbon

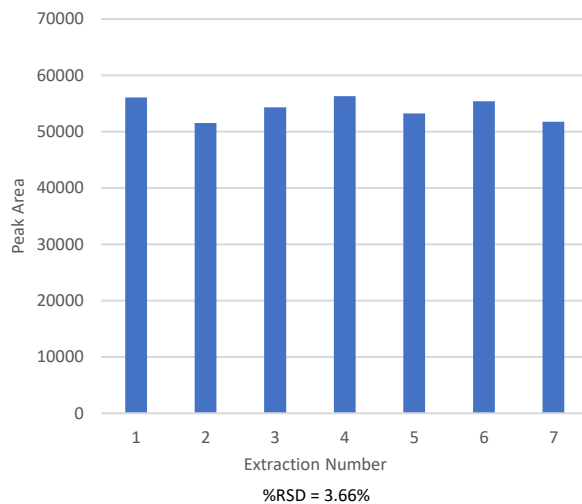


Figure 4. 1,4-Dioxane % Recovery from a Water Sample using Strata Activated Carbon

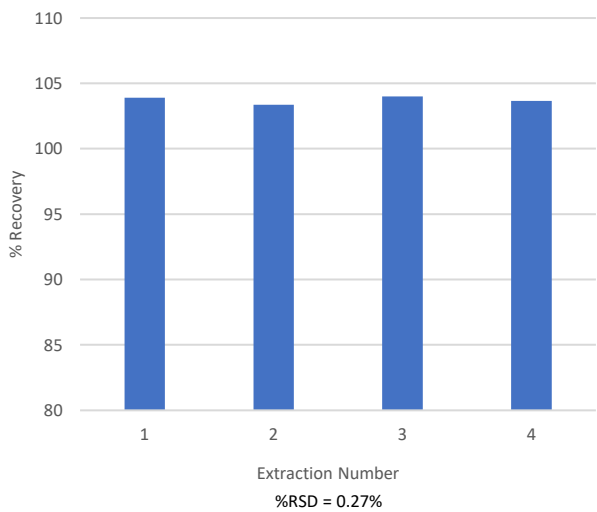
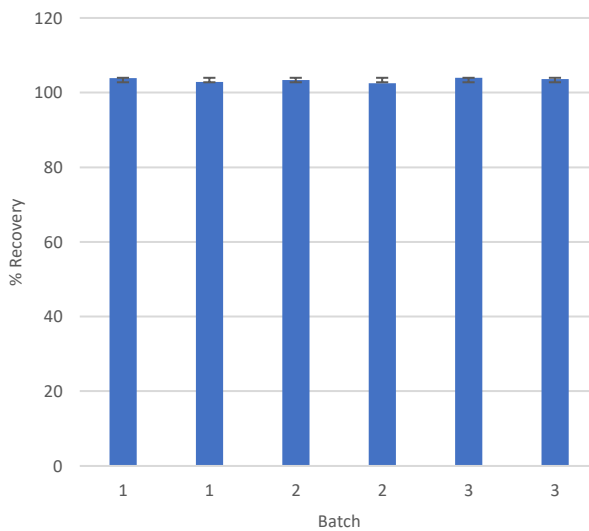


Figure 5. Batch to Batch Reproducibility on Strata Activated Carbon



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