

Analysis of 1,4-Dioxane by EPA Method 522 using Strata™ Activated Carbon Extraction in Comparison to Competitor Brand

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Overview

EPA method 522 is a popular testing method for 1,4-Dioxane by GC-MS. This analyte is challenging to get good recovery with traditional sample preparation. Here, EPA method 522 is performed using activated carbon for the extraction of 1,4-Dioxane. 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. Strata Activated Carbon, which contains porous carbon with defined pore volume and high surface area, is an appropriate choice for polar analyte extraction and recovery. In this application note we have extracted 1,4-Dioxane from a 100 mL water sample using Strata Activated Carbon 400 mg pass through cartridges, which are convenient for small sample volume and demonstrate high recovery with low variability.

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, 400 mg pass through cartridge (Part No. [CS0-9210](#)) or Waters® Sep-Pak® AC2 Plus 400 mg short cartridge with 4 mL Methylene Chloride, followed by 4 washes of 5 mL Methanol

Equilibrate: Cartridges with 2 washes of 5 mL Water

Load: 100 mL water sample spiked with internal standard onto cartridges

Dry: Cartridges for 10 min

Elute: With 2 mL Methylene Chloride and repeat elution 1 more time (4 mL total volume)

Water Removal: Pass eluent through Sodium Sulfate tubes, 1 g/6 mL (Part No. [8B-S124-JCH](#)) and wash 2 times with 2 mL Methylene Chloride

Evaporate: Solvent to approximately 0.1 mL at 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

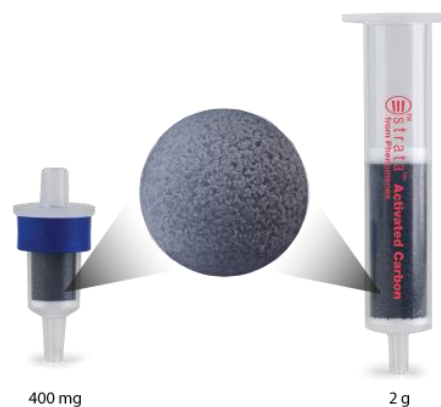


Figure 2. Blank vs Internal Standard Overlay for 1,4-Dioxane-d8 Extraction from Water using the Strata™ Activated Carbon Cartridge

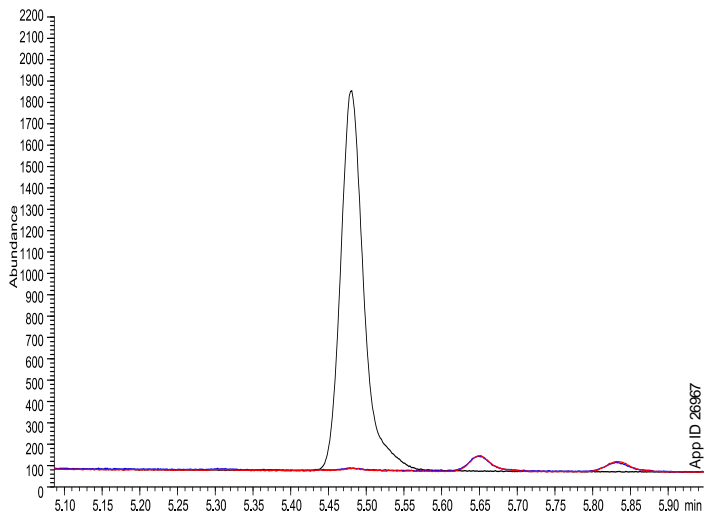


Figure 3. Comparison of 1,4-Dioxane % Recovery from a Water Sample

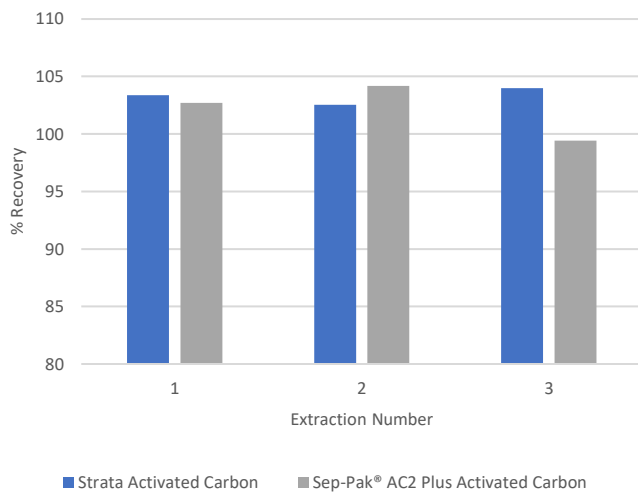
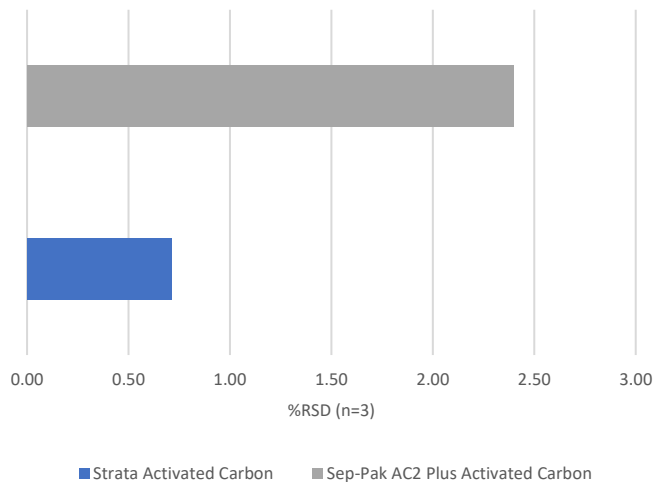


Figure 4. Comparison of 1,4-Dioxane Recovery Variability from a Water Sample



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