Tech Note: MIP-XSD Detection of cis-1,2-DCE
From: Dan Pipp, Chemist, MIP Specialist
Date: October 11, 2010

FAQ: Can MIP detectors see cis-1,2-Dichloroethylene (cis-1,2-DCE) and at what levels?

This document presents data from standard response tests performed on cis-1,2-Dichloroethylene (cis-1,2-DCE) and Trichloroethylene (TCE) using a halogen specific detector (XSD) and Photo ionization detector (PID) mounted in series on a SRI GC. All of the response tests were performed in accordance to the Geoprobe SOP and ASTM Practice D 7352-07. Detailed MIP System operating parameters for the system used in this testing are listed at the end of this document.

Part I: Comparison of cis-1,2-DCE to TCE

The response test standards were made up from 50mg/ml stock solutions of cis-1,2-DCE and TCE. Separate response test runs were made for each compound on the FI6000 and DI-Acquisition software. Each compound was tested at concentration levels of 1, 5 and 25mg/L in 500ml of water with the membrane exposed to the solution for 45 seconds at each level. The probe was inserted into clean water between response test runs.

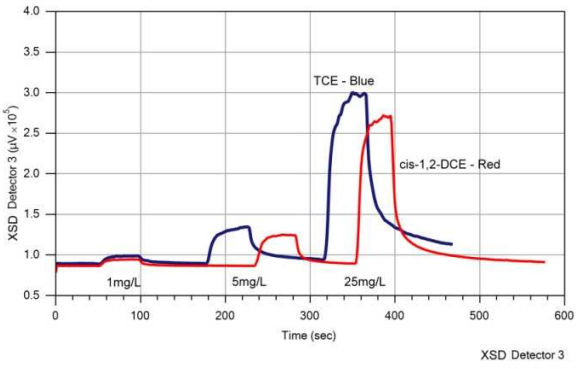

Figure 1: MIP-XSD Test Data

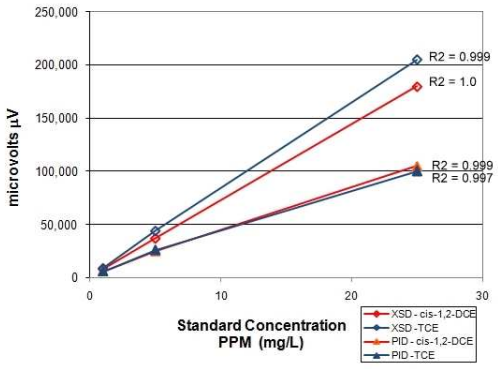

Figure 2: Comparing cis-1,2-DCE to TCE by MIP-XSD & PID

The response test data in Figure 1 shows the XSD responded slightly higher to TCE compared to cis-1,2-DCE. The response tests indicate an MIP- XSD peak height response equal to approximately 7,000µV per mg/L of cis-1,2-DCE, which is similar to the response of TCE. The MIP-PID response, while lower than the XSD, was essentially identical for the two compounds (Figure 2).

Part II: Low Level analysis of cis-1,2-DCE

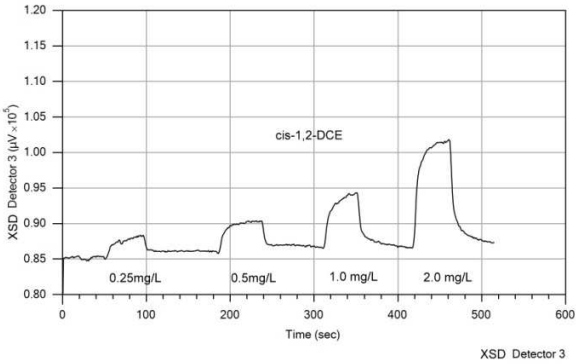

Figure 3: cis-1,2-DCE response from 0.25-2.0ppm

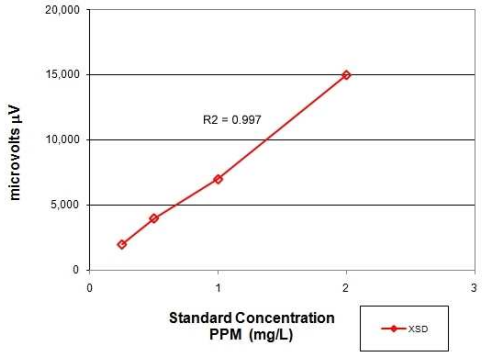

Figure 4: XSD response over baseline of cis-1,2-DCE

Low level response tests of cis-1,2-DCE by the MIP-XSD are shown in Figure 3. Standard concentration levels of 0.25, 0.50, 1.0 and 2.0mg/L were run with each level being exposed to the membrane for 45 seconds. Detector signal response above baseline for these concentrations is shown in Figure 4.

The response test data in Figure 3 indicate good detector response over the XSD baseline for all of the concentration levels. Since a new membrane was used in these tests, 0.5 mg/L would be a reasonable detection limit to expect with a used membrane (conditioned by soil abrasion) and the given system parameters (listed below).

System Parameters:

Trunkline: 150' Peek Carrier (N_2) Flow: 38.5ml/min Trip Time: 50 seconds

Probe: MP6520 Temperature: 121°C Membrane: New

Exposure Time: 45 Seconds

GC System: SRI 310c GC with PID, FID and OI model 5360 XSD detectors

Detector Carrier Flows: PID – 100%, FID 35% and XSD 65%

XSD Temperature – 1,100°C XSD Air Flow: 20ml/min

Nafion dryer installed – 81ml/min

Acquisition: FI6000 Controller: MP6505

Test Date: August 6, 2010