

Gasmeter™ FTIR application note

Contaminated site measurements

KEY WORDS

- Remediation of contaminated sites
- Volatile organic compounds (VOCs)
- Chlorinated compounds

PRODUCTS

- [DX4040](#) Portable FTIR Gas Analyzer

OVERVIEW

Remediation and cleaning of contaminated sites is necessary when old industrial areas are converted to residential or commercial use. Aromatic and Chlorinated volatile organic compounds (VOCs) and other toxic substances may have leaked into the ground, necessitating measurements in order to determine the identity of pollutant, extent of spill and the pollutant concentration in the ground.

The Gasmeter DX4040 portable multi-gas analyser can achieve this by sampling the headspace of boreholes drilled into the ground. As FTIR (Fourier Transform Infrared) gas analysis is non-destructive, the sample can be extracted from the borehole, circulated through the analyser, and returned to the hole so that equilibrium is formed between the ground and the air in the borehole.

Simultaneous analysis of up to 25 gases with sub-ppm detection limits and high accuracy make the DX4040 an ideal tool for this purpose. Additionally, when a gas that is not included in the 25

component list is present, its infrared spectrum can be compared against a larger library with a laptop computer and the unknown gas can be identified.

Alternatively, if only a survey measurement for the presence of certain pollutants is required, the analyser can be operated without returning the sample gas to the borehole. In this way the operator can cover a large number of test points in a short period of time. The measurements are continuous, real time results with time weighted averaging. Typical averaging periods are from 5 to 60 seconds and the instrument takes approximately two minutes to reach 90% of the target concentration ($T_{90} < 120$ seconds).

The DX4040 gas analyzer results are displayed on a PDA via bluetooth wireless communication. No span calibrations are required and the DX4040 is fully operational after a simple zero in clean ambient air.



Figure 1 Contaminated ground site being measured



Figure 2 Gasmeter DX4040 portable gas analyzer.

TYPICAL GASES MEASURED AT CONTAMINATED REMEDIATION SITES

Compound name	Range (in ppm)	Limit of detection*
Benzene	0 – 100	0.13
Toluene	0 – 100	0.13
p-Xylene	0 – 100	0.10
Trichloroethylene (TCE)	0 – 100	0.08
1,1-Dichloroethylene	0 – 100	0.30
cis-Dichloroethylene	0 – 100	0.14
Perchloroethylene (PCE)	0 – 100	0.03
Dichloromethane (DCM)	0 – 100	0.10
Chloroform	0 – 100	0.04
Methane	0 – 1 000	0.10
Ethyl Chloride	0 – 100	0.21

* Limit of detection is calculated as 3 x standard deviation of baseline noise, 60 second averaging time. Other ranges and compounds available; please contact Gasmeter Technologies for further details

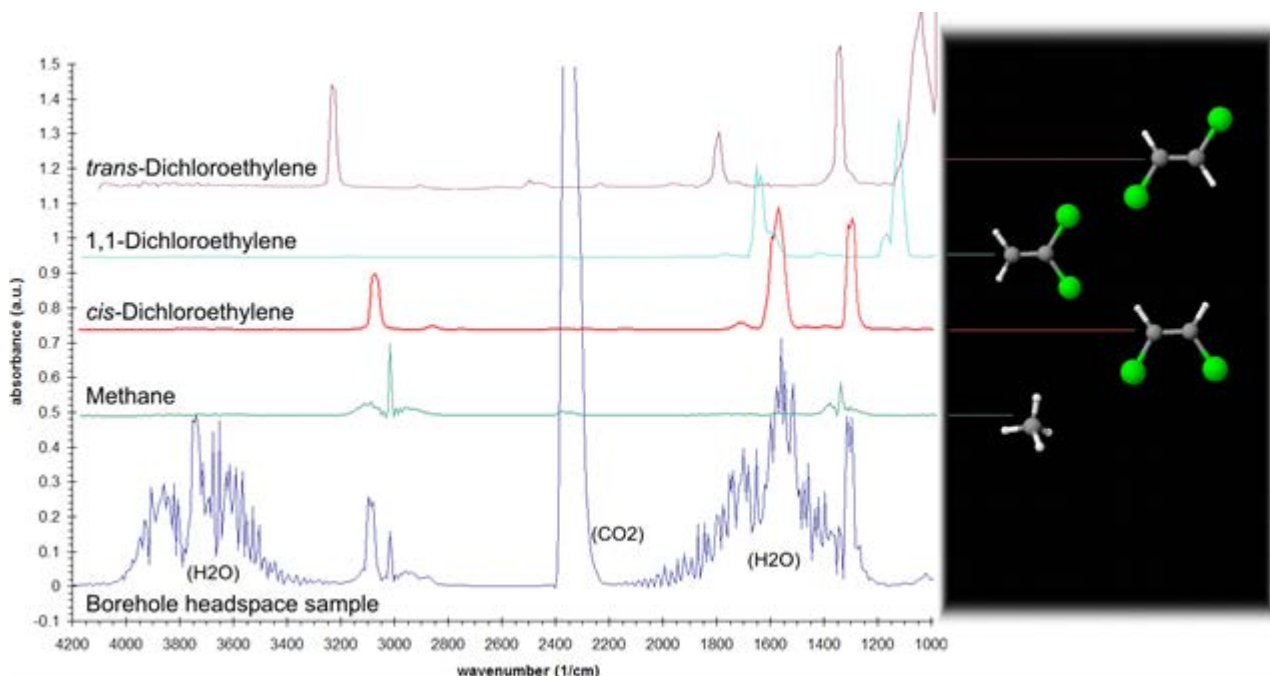


Figure 3 Sample spectrum from borehole and reference spectra for expected gases. Methane and *cis*-Dichloroethylene are present, whereas *trans*-dichloroethylene and 1,1-dichloroethylene are not. FTIR can reliably distinguish between similar molecules, including isomers in the above case. The multicomponent analysis method fits reference spectra (up to 25 gases) to the sample spectrum, and gases with overlapping spectra may be analysed with high accuracy.

* *cis* and *trans* refer to position of the chlorine atoms on same side (*cis*) or on opposite sides (*trans*) of the ethylene double bond (see illustration above)

This application note is meant to be an informative example of typical application where Gasmeter analyzers could be used. This is not a technical specification sheet. Information in this document is subject to change without prior notice. Optimal product configuration is application dependent, and exact application details such as detection limits, components included in the application, etc depend on process and/or measurement site details and may vary. Please, contact your local Gasmeter sales representative to get information specific to your needs.

Gasmeter Technologies Oy
 Helsinki, Finland
 TEL : +358 (9) 7590 0400
 EMAIL : contact@gasmet.fi
 WEB : www.gasmet.fi

Gasmeter Technologies Inc
 North America
 TEL : +1 866 685-0050,
 EMAIL : sales@gasmet.com
 WEB : www.gasmet.com

Gasmeter Technologies (Asia) Ltd
 Hong Kong
 TEL : +852 3568-7586
 EMAIL : sales@gasmet.com.hk
 WEB : www.gasmet.fi