

APPLICATION NOTE: Gasmeter™ DX-4030 on-site air quality monitoring

Contaminated site measurements

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 (VOC's) 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 DX-4030 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 DX-4030 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 DX-4030 Gas Analyzer results are displayed on a PDA via bluetooth wireless communication. No span calibrations are required and the DX-4030 is fully operational after a simple zero in clean ambient air.



Figure 1 Contaminated ground site being measured

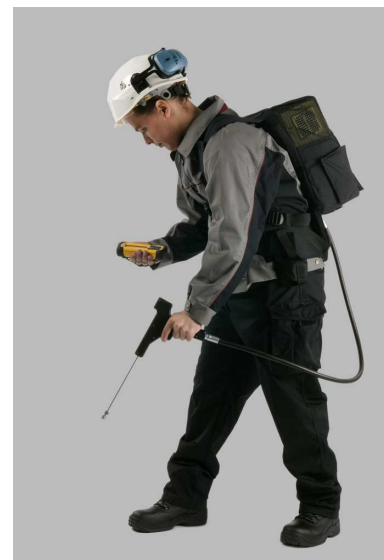


Figure 2 Gasmeter DX-4030 portable gas analyzer

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Typical gases measured at contaminated remediation sites

Gas	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
<i>cis</i> -Dichloroethylene	0 - 100	0.14
Perchloroethylene (PCE)	0 - 100	0.03
Dichloromethane (DCM)	0 - 100	0.10
Chloroform	0 - 100	0.04
Methane	0 - 1000	0.10
Ethyl chloride	0 - 100	0.21
Water vapour	0 - 50 000	
Carbon dioxide	0 - 5 000	

* Limit of detection is calculated as 3 × standard deviation of baseline noise, 60 second averaging time

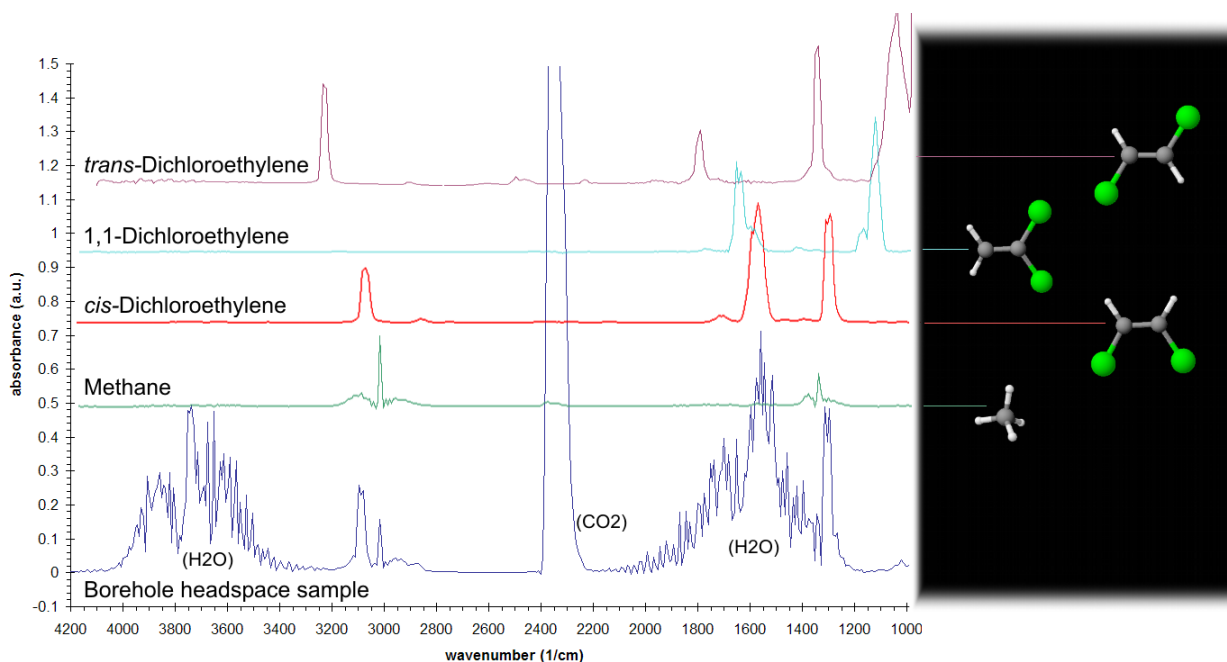


Figure 3 Sample spectrum from borehole and reference spectra for expected gases. Methane and *cis*-Dichloroethylene are present, whereas *trans*-Dichloroethylene and 1,1-Dichloroethylene are not. FTIR can reliably distinguish between similar molecules, including isomers in the above case. The multicomponent 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)