



Dissolved Gas Analysis

Supporting Monitored Natural Attenuation

Be sure to learn the proper sampling methods for Dissolved Gas Analysis

Both abiotic and biologically facilitated reactions of contaminants with components of groundwater often produce species that exist in groundwater as dissolved gases. Typical dissolved gas species are carbon dioxide, methane, ethene, ethane, hydrogen, and acetylene.



The identification and quantification of these dissolved gasses is often useful in:

- 1) identifying the redox process that is predominant in a given volume of groundwater, thus determining the achievable rates of various transformations
- 2) verifying that degradation has taken place
- 3) identifying the path that degradation has taken

Microseeps classifies three suites of dissolved gases:

- the permanent gases including methane, carbon dioxide, oxygen and nitrogen;
- the light hydrocarbons including methane, ethane, ethene, propane, propene, i-butane, n-butane and acetylene;
- dissolved hydrogen

Microseeps is the only certified laboratory that offers dissolved hydrogen analyses. Microseeps' analytical methods for dissolved gases are fully documented and have been reviewed by several state agencies and the USEPA.

- Each method includes all QA/QC that would be expected from promulgated USEPA methods.
- Microseeps' detection levels are the lowest in the industry.
- Microseeps' gas chromatograph is a customized instrument built in-house for this specific procedure. The instrument includes three detectors arranged so all three suites of analytes may be determined from the same sample.

This eliminates potential variables between separate samples due to sampling error. This feature is particular important in the analysis of light hydrocarbons and permanent gases.

- Microseeps built a unique flame ionization detector for the analysis of light hydrocarbons that can achieve PQL's for ethane and ethene of 5 ng/l. This is three orders of magnitude lower than can be achieved on commercial FID's.

At many sites levels of ethene or ethane are below the usual 5 – 10 ug/l detection limits of FID's used by other laboratories, thus their data for these samples is reported as all < 5.0 ug/l. This may erroneously suggest that vinyl chloride is not degrading when in fact it may be. Such data may lead to erroneous conclusions and faulty remedial decisions.

Dissolved Gas Detection Limits

Hydrogen	0.03 nM
Methane (FID)	15 ng/L
Ethane and Ethene	5 ng/L
Carbn Dioxide	0.60 mg/L
Oxygen	0.15 mg/L
Nitrogen	0.04 mg/L
Methane (TCD)	0.07 mg/L





Anions and Cations

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Microseeps' ion chromatographic methods are superior in reliability and detection limits

There are a group of ionic species in groundwater whose concentration is also useful in characterizing chemical and biological degradative processes which are active in a contaminant plume.

These ionic species may be naturally occurring, such as

- nitrate
- ferric iron
- sulfate

Or they may be products of the degradative process itself, such as:

- chloride
- nitrite
- ferrous iron
- Manganese (II)



For that reason, field data was preferable to laboratory data.

Microseeps has overcome this problem by the utilization of septa on our vials which preclude the diffusion of oxygen into the sample, thus the reduced state of these species may be preserved for long periods of time and laboratory analyses may be equally as reliable as the field methodologies.

For several of these species there are field kits and other field analytical tools which may be utilized depending on the needs of the client.

However, for species like ferrous iron and nitrite which are in-situ reduction products of the active biological processes in the plume, there was concern that these species reoxidized during transport to the laboratory.

Even in the laboratory, there are choices in methodologies that may be used to determine the concentration of each of these species. Microseeps has developed ion chromatographic methods which monitor each ion independently and in general are superior in terms of reliability and detection limits.

