

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 gases 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.

PAES classifies three suites of dissolved gases:

- Permanent gases including methane, carbon dioxide, oxygen and nitrogen.
- Light hydrocarbons including methane, ethane, ethene, propane, propene, i-butane, n-butane and acetylene.
- Dissolved hydrogen.



PAES is the only certified laboratory that offers dissolved hydrogen analysis. Our 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.
- **Lowest Detection Levels in the Industry!**
- The PAES gas chromatograph is a customized instrument built in-house for this 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 is extremely important in the analysis of light hydrocarbons and permanent gases.

- PAES has a unique flame ionization detector for the analysis of light hydrocarbons that can achieve MDLs for ethane and ethene of 5 ng/L. This is three orders of magnitude lower than can be achieved on commercial FIDs.

At many sites, the levels of ethene or ethane are below the usual 5-10 ug/L detection limits of FIDs used by other laboratories. The reported NDs or <5.0 ug/L may suggest that vinyl chloride is not degrading when it may be.

Dissolved Gas Detection Limits

Hydrogen	0.088 nM
Methane (FID)	0.037 ug/L
Ethane and Ethene	0.004 ug/L
Carbon Dioxide	0.27 mg/L
Oxygen	0.097 mg/L
Nitrogen	0.203 mg/L