



ISOTECH[®]

ISOTECH LABORATORIES INC

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Dissolved Gas Identification

$\delta^{13}\text{C}$ & δD

Why fingerprint dissolved gas within domestic and municipal water wells?

Dissolution of gas from groundwater can result in fires and explosions when it enters buildings. In some areas, monitoring of dissolved gas in groundwater is required near active oil and gas drilling. Understanding the sources of the gas is critical in knowing how to deal with the problem. The gas may be naturally occurring (either thermogenic or biogenic), or it may have been artificially introduced by a man-made process such as a municipal landfill or leakage from a gas well, or storage fields.

Potential sources of dissolved gas?

- Leakage from underground gas storage reservoirs
- Sanitary Landfills
- Swamps and marshes
- Glacial drift gas
- Mines and mine spoil
- Leakage of active or abandoned oil and gas wells
- Degassing of coal seams

Sampling protocol

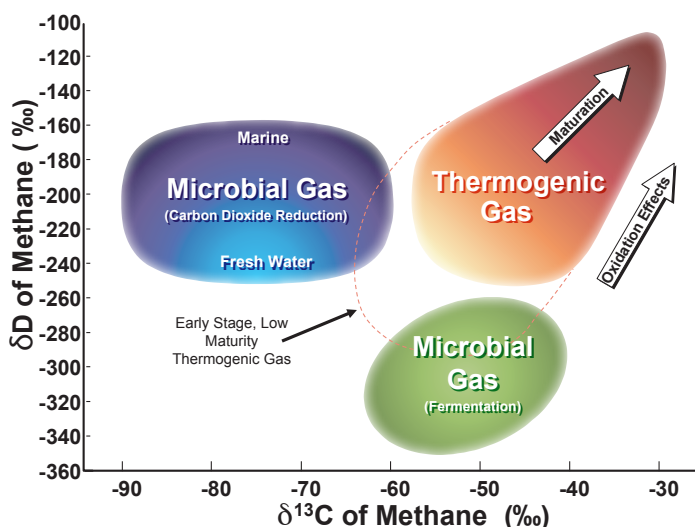
The type of gas can generally be determined by analysis of the dissolved gas itself, but whenever possible it is advisable to also collect samples from known potential sources of gas in the area for direct comparison to the dissolved gas.



•Analyzing the stable isotopes of carbon in methane ($\delta^{13}\text{C}$ and δD) provides information on the mechanism of formation, i.e. biogenic vs. thermogenic.

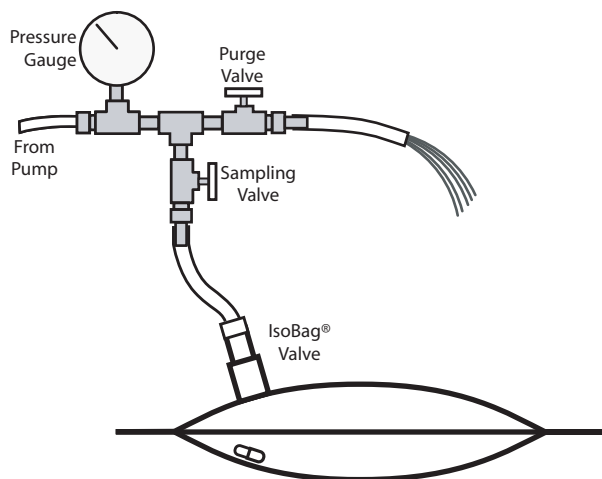
•Analyzing $\delta^{13}\text{C}$ of ethane and propane can help differentiate between different sources of thermogenic gas to further pinpoint the source.

Fingerprinting of Gases



How do I collect samples from the well?

Different types of containers are available for collection of dissolved gas samples from domestic water wells, depending on the amount of gas present and the analyses needed. IsoBags® are advantageous when the amount of gas is above the saturation level and the concentration of dissolved gas in the water needs to be determined. The bags are easy to use both on location, and also within the laboratory, and generally provide large enough samples for both chemical and isotopic analysis.



Turnaround Time for Analysis

NG-1 analysis package

Includes a complete compositional analysis as well as $\delta^{13}\text{C}$ and δD of CH_4

Standard	20 business days
Priority	10 business days
RUSH*	6 business days

BG-1 analysis package

Includes everything in NG-1 and adds $\delta^{13}\text{C}$ of CO_2

Standard	20 business days
Priority	10 business days
RUSH*	6 business days

NG-2 analysis package

Includes everything in NG-1 and adds $\delta^{13}\text{C}$ of C_2H_6 and C_3H_8

Standard	25 business days
Priority	13 business days
RUSH*	7 business days

Extraction and quantification of dissolved CH_4

Standard	10 business days
Priority	5 business days
RUSH*	2 business days

*Advance arrangements required for RUSH SERVICE

Dissolved gas sampling products

Gas Bottles (1L w/septum cap & bactericide capsule)
IsoBags® (set of 2, evacuated, with bactericide)

For your convenience, Isotech also sells dissolved gas bottles for use when the gas is present below the saturation point at atmospheric pressure (ie does not form bubbles) or when quantification of the gas in the water is not needed. These bottles will insure that the samples collected are reliable and meet all analytical requirements. Special jars for collection of gas samples by water displacement are also available.

Procedures for use of the above containers are included in every shipment. Isotech has state-of-the-art facilities for carrying out all of the isotopic analyses outlined above as well as many more. Our staff collectively has over 200 years of hands-on experience in isotopic analyses.