

Molecular and stable isotope composition of 7 gas bag samples



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Table 1. Number of analyses performed

| Analysis | Gas | Total |
|------------------------|-----------------|-------|
| | Gas composition | 7 |
| Stable isotopes of gas | 7 | 7 |

Table 2. Gas Composition (volume-%)

| Sample type | Sample info | APT ID | C1% | C2% | C3% | iC4% | nC4% | iC5% | nC5% | CO2% | Sum C1-C5 | Wetness | iC4/nC4 | ppm |
|-------------|-------------|--------|-------|------|------|------|------|------|------|------|-----------|---------|---------|--------|
| Gas bag | 2A | 27725 | 87.5 | 0.04 | 0.02 | 0.01 | 0.01 | 0.00 | 0.00 | 12.4 | 87.6 | 0.08 | 0.97 | 2261 |
| Gas bag | 2B | 27726 | 91.7 | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 8.3 | 91.7 | 0.03 | | 3076 |
| Gas bag | 2C | 27727 | 80.4 | 0.03 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 19.5 | 80.5 | 0.07 | | 1959 |
| Gas bag | 2D | 27728 | 83.7 | 0.02 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 16.3 | 83.7 | 0.05 | 0.00 | 1756 |
| Gas bag | 2E | 27729 | 71.2 | 0.03 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 28.8 | 71.2 | 0.08 | | 958 |
| Gas bag | 3A | 27905 | 100.0 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 100.0 | 0.01 | | 908436 |
| Gas bag | 3B | 27906 | 100.0 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 100.0 | 0.01 | | 948191 |

Table 3. Gas Isotopes ($\delta^{13}\text{C}$, ‰ PDB and δD , ‰ VSMOW)

| Sample type | Sample info | APT ID | C1 $\delta^{13}\text{C}$ | C2 $\delta^{13}\text{C}$ | C3 $\delta^{13}\text{C}$ | iC4 $\delta^{13}\text{C}$ | nC4 $\delta^{13}\text{C}$ | CO2 $\delta^{13}\text{C}$ | C1 δD |
|-------------|-------------|--------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------|
| Gas bag | 2A | 27725 | -74.8 | | | | | | * |
| Gas bag | 2B | 27726 | -74.7 | | | | | | * |
| Gas bag | 2C | 27727 | -73.8 | | | | | | * |
| Gas bag | 2D | 27728 | -73.6 | | | | | | * |
| Gas bag | 2E | 27729 | * | | | | | | * |
| Gas bag | 3A | 27905 | -72.7 | | | | | | -211 |
| Gas bag | 3B | 27906 | -72.6 | | | | | | -210 |

* Not enough gas to measure isotopes

Experimental Procedures

All procedures follow NIGOGA, 4th Edition. Below are brief descriptions of procedures/analytical conditions.

GC analysis of gas components

Aliquots of the samples were transferred to exetainers. 0.1-1ml were sampled using a Gerstel MPS2 autosampler and injected into a Hewlett Packard 5890 Series II GC equipped with Porabond Q column, a flame ionisation detector (FID), a thermal conductivity detector (TCD) and a methylation unit. Hydrocarbons were measured by FID, CO₂ by metylation (to CH₄) and then FID and N₂ and O₂ by TCD.

Carbon isotope analysis of hydrocarbon compounds and CO₂

The carbon isotopic composition of the hydrocarbon gas components was determined by a GC-C-IRMS system. Aliquots were sampled with a syringe and analysed on a Trace GC2000, equipped with a Poraplot Q column, connected to a Delta plus XP IRMS. The components were burnt to CO₂ and water in a 1000 °C furnace over Cu/Ni/Pt. The water was removed by Nafion membrane separation. Repeated analyses of standards indicate that the reproducibility of δ¹³C values is better than 1 ‰ PDB (2 sigma).

Hydrogen isotope analysis of methane

The hydrogen isotopic composition of methane was determined by a GC-C-IRMS system. Aliquots were sampled with a GCPal and analysed on a Trace GC2000, equipped with a Poraplot Q column, connected to a Delta plus XP IRMS. The components were decomposed to H₂ and coke in a 1400 °C furnace. The international standard NGS-2 and an in-house standard (Std A) were used for testing accuracy and precision. The “true” value of NGS-2 is given to -172.5 ‰ V-SMOW (<http://deuterium.nist.gov/standards.html>). Repeated analyses of standards indicate that the reproducibility of δD values is better than 10 ‰ PDB (2 sigma).