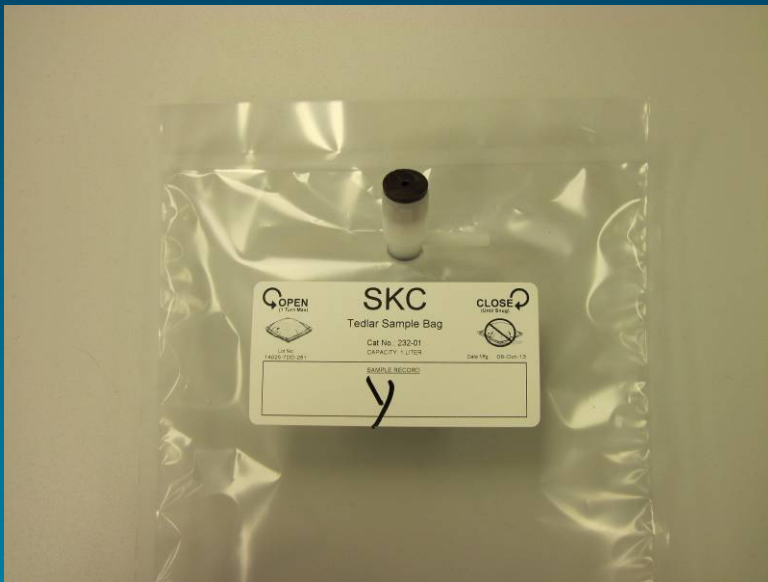


Storage of Gas and Dissolved Gas Samples for GC-IRMS Measurement

Paul Eby

Comparing Gas and Dissolved Gas Samples



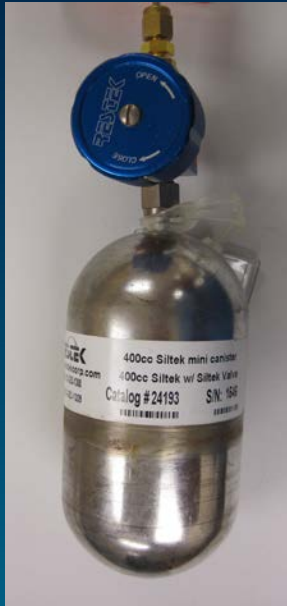
Comparing Gas and Dissolved Gas Samples

Sample		d13C CH4 vs VPDB	dD CH4 vs VSMOW
A	free gas	-69.4	-318
	dissolved gas	-58.1	-196
B	free gas	-68.5	-317
	dissolved gas	-59.8	-209
C	free gas	-72.9	-328
	dissolved gas	-52.1	-152

Experimental Design: What Containers Work?

- Free Gas vs Dissolved Gas
- Bottles, Gas Bags, Canisters
- Different Types of Septa
- Affect of Piercing Septa
- Affect of Air Travel
- Sample Preservation

Free Gas Containers



Steel Canister



Exetainer



BTEX Vial



Wheaton Bottle



Tedlar Bag



Foil Bag

Dissolved Gas Containers



Steel Canister

Exetainer



BTEX Vial



Wheaton Bottle



Tedlar Bag



Foil Bag

Septa for Crimp Top Bottles



1

2

3

4

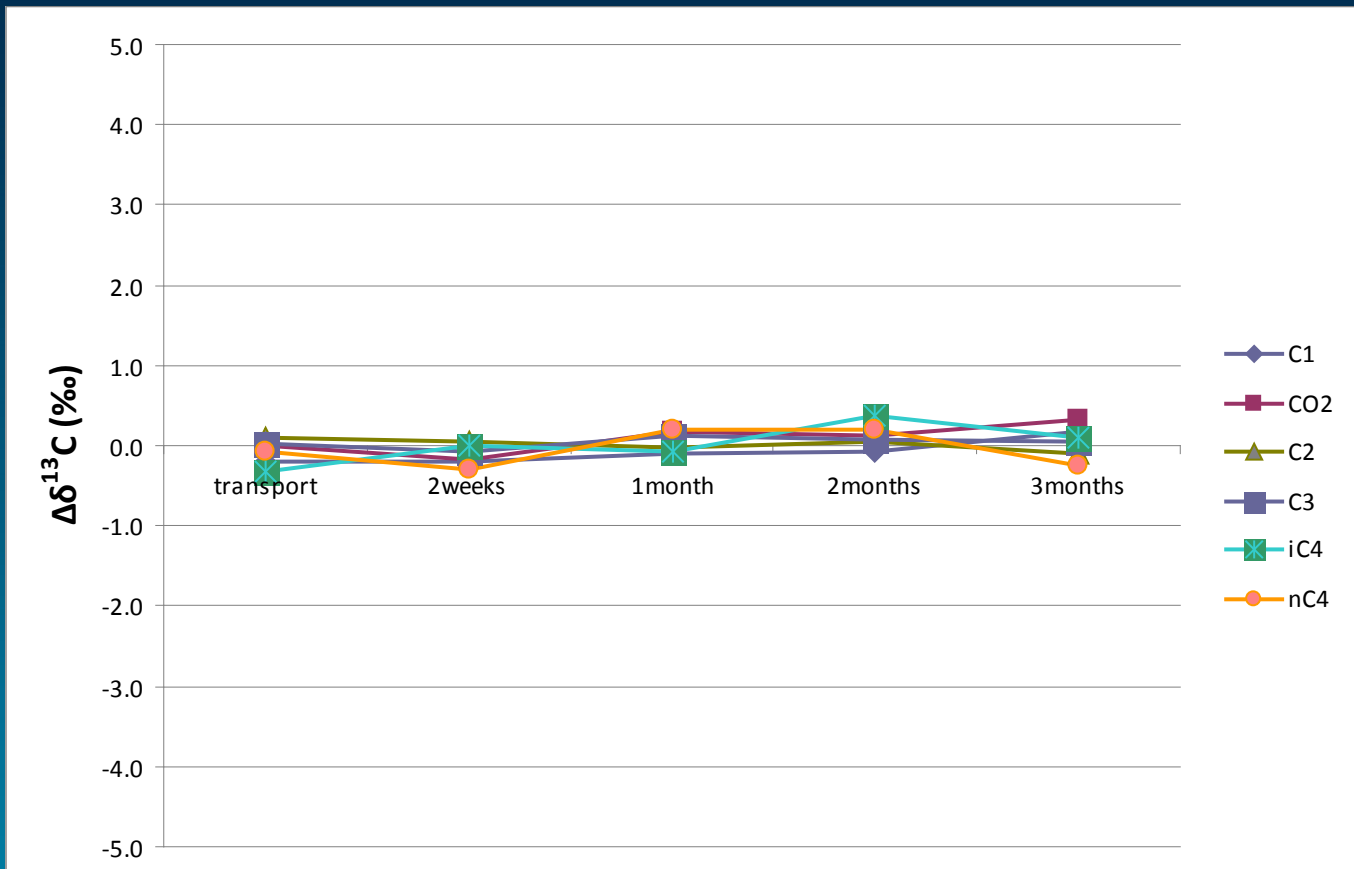
1. Thick Butyl Rubber
2. PTFE Lined Butyl
3. Thin Butyl Rubber
4. Silicone Rubber

Gas Mixture

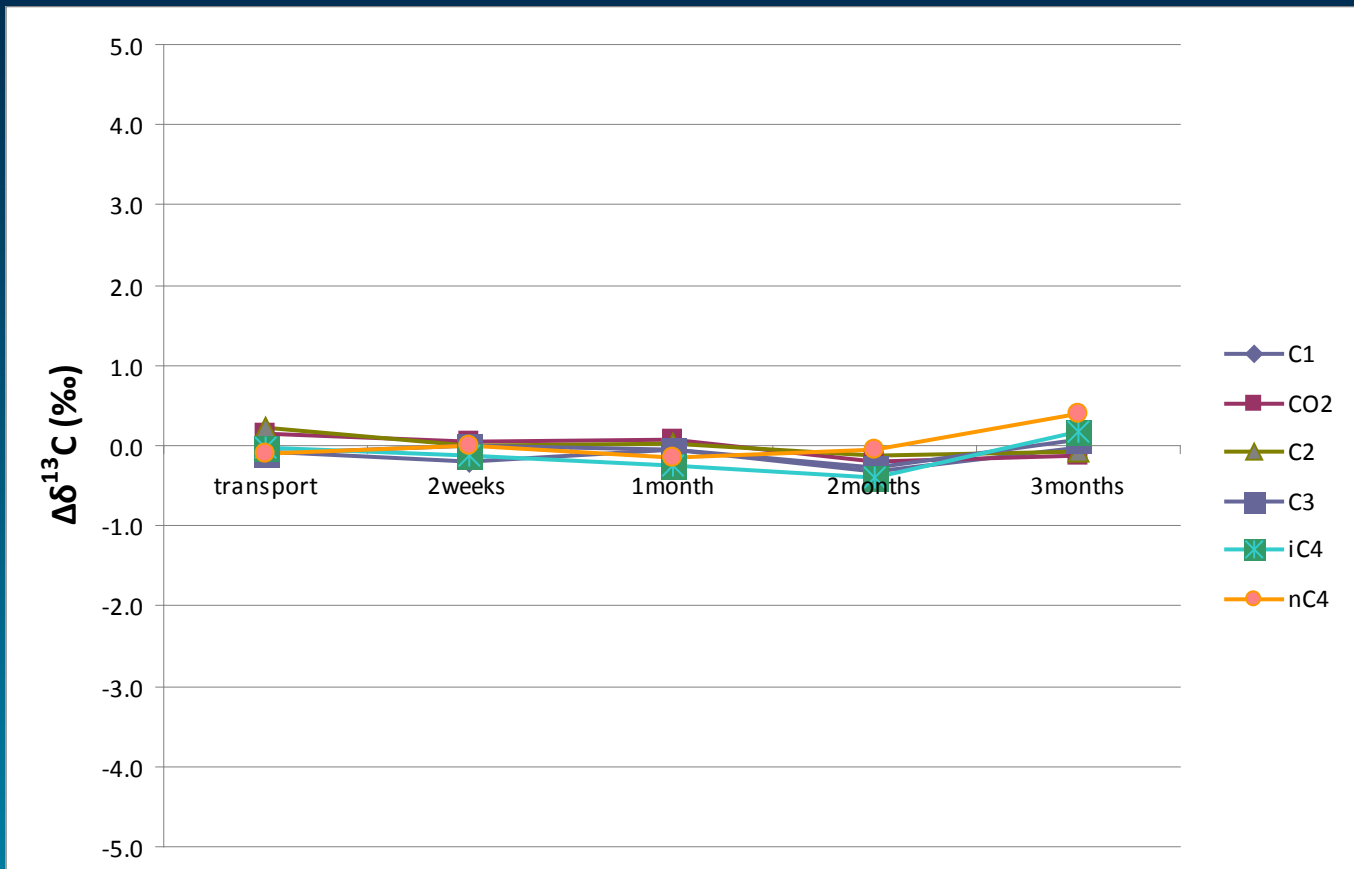
Component	%	d13C
Methane	balance	-42.4 ‰
Ethane	5	-30.1
Propane	3	-33.1
i-Butane	2	-30.2
n-Butane	2	-33.5
CO ₂	5	-32.0

- Free Gas & Dissolved Gas
- Various Containers and Septa
- Pierced Septa
- Time Series
- Air Travel
- Sample Preservation

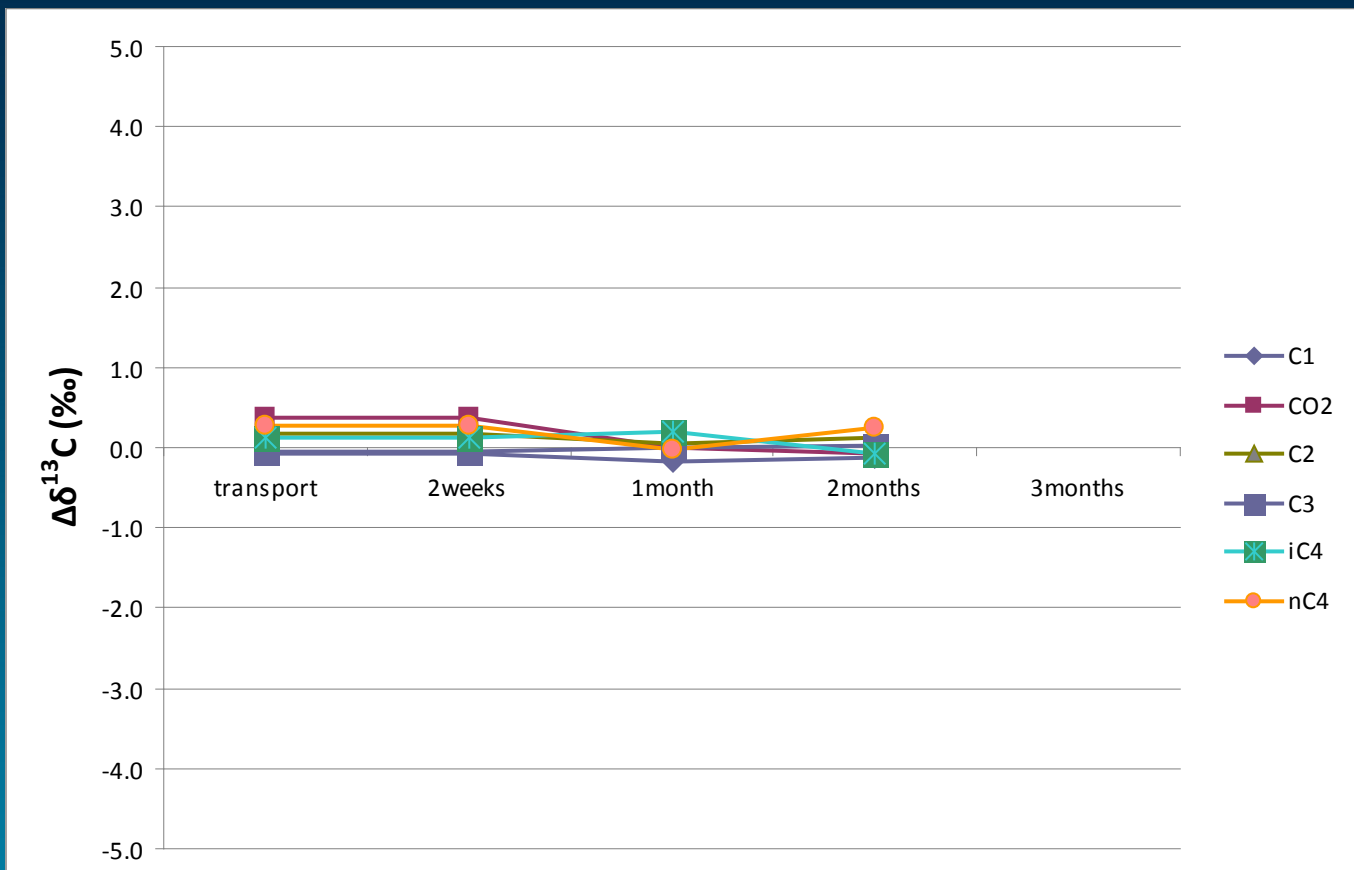
Free Gas - Canister



Free Gas – Thick Butyl Septa



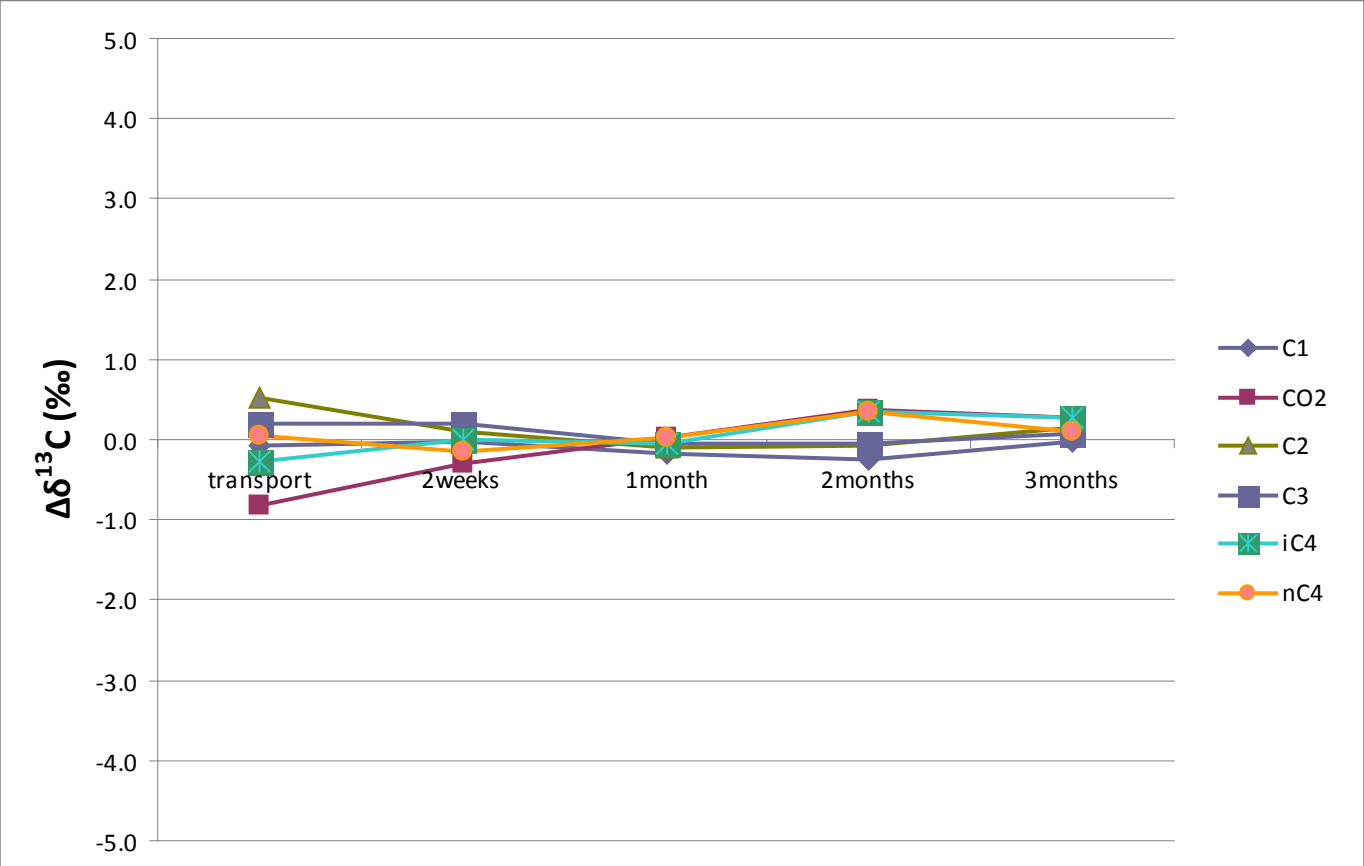
Free Gas – Thin Butyl Septa



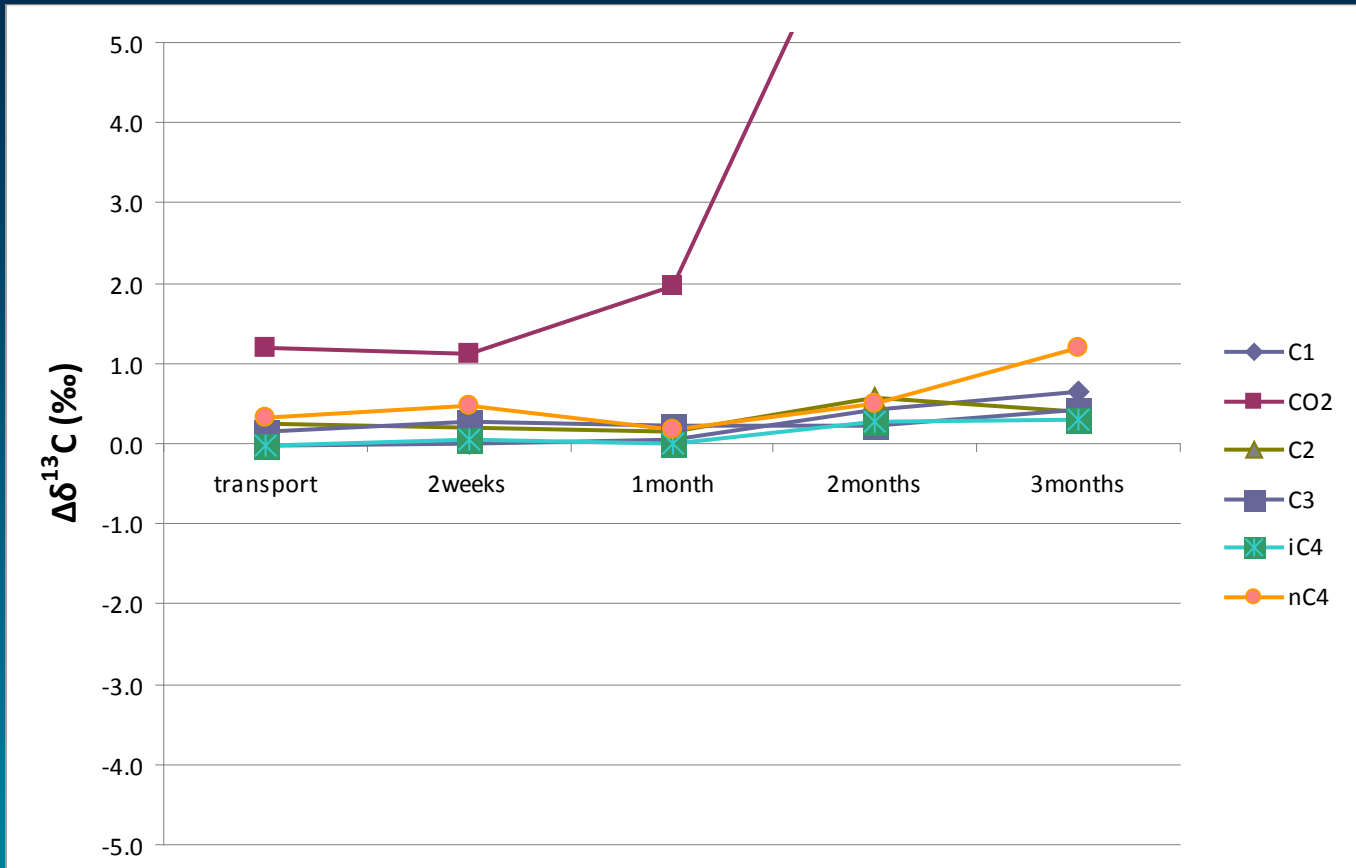
Free Gas – Thin Butyl Septa (Pierced)



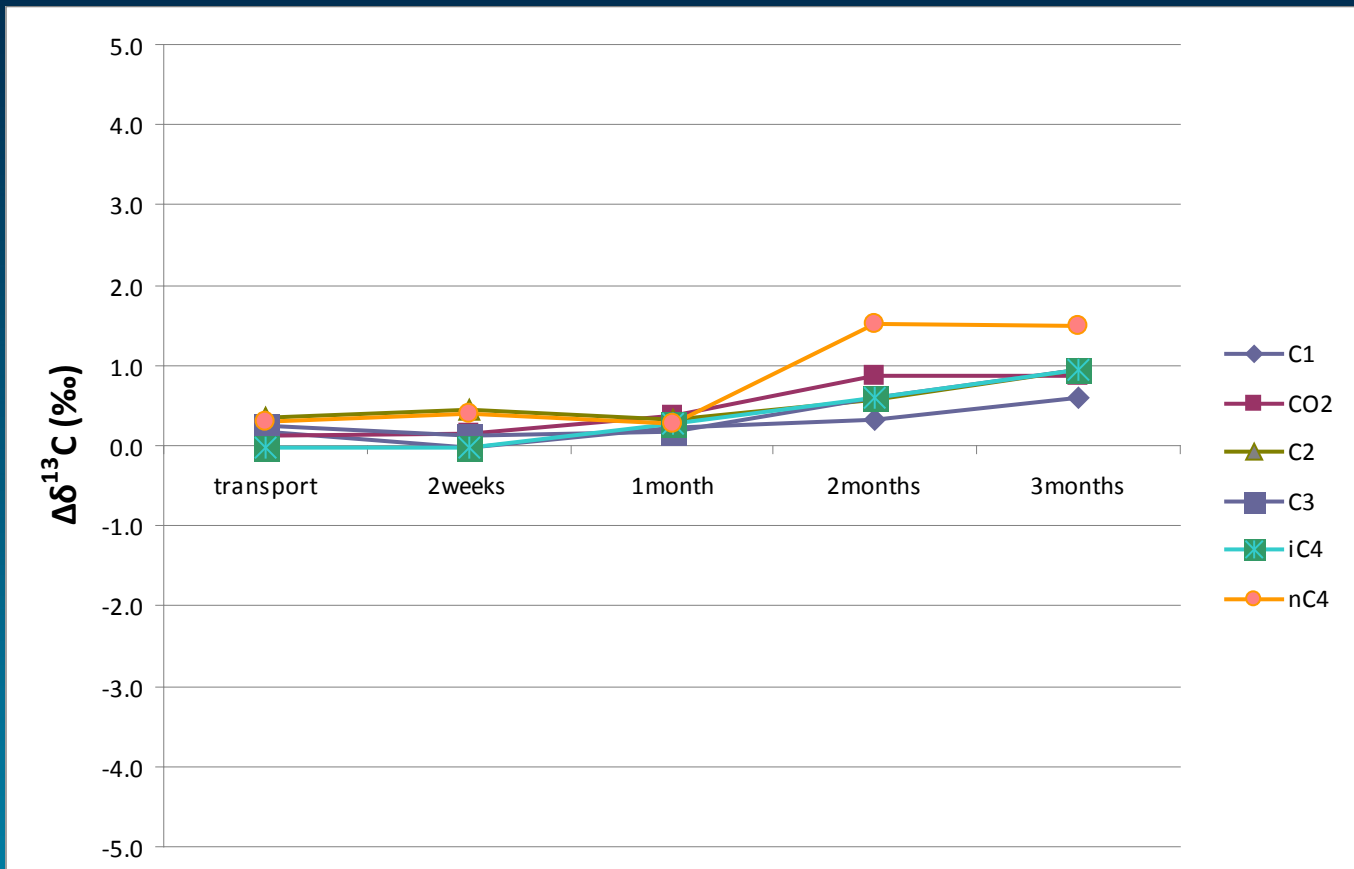
Free Gas – Exetainer (Pierced)



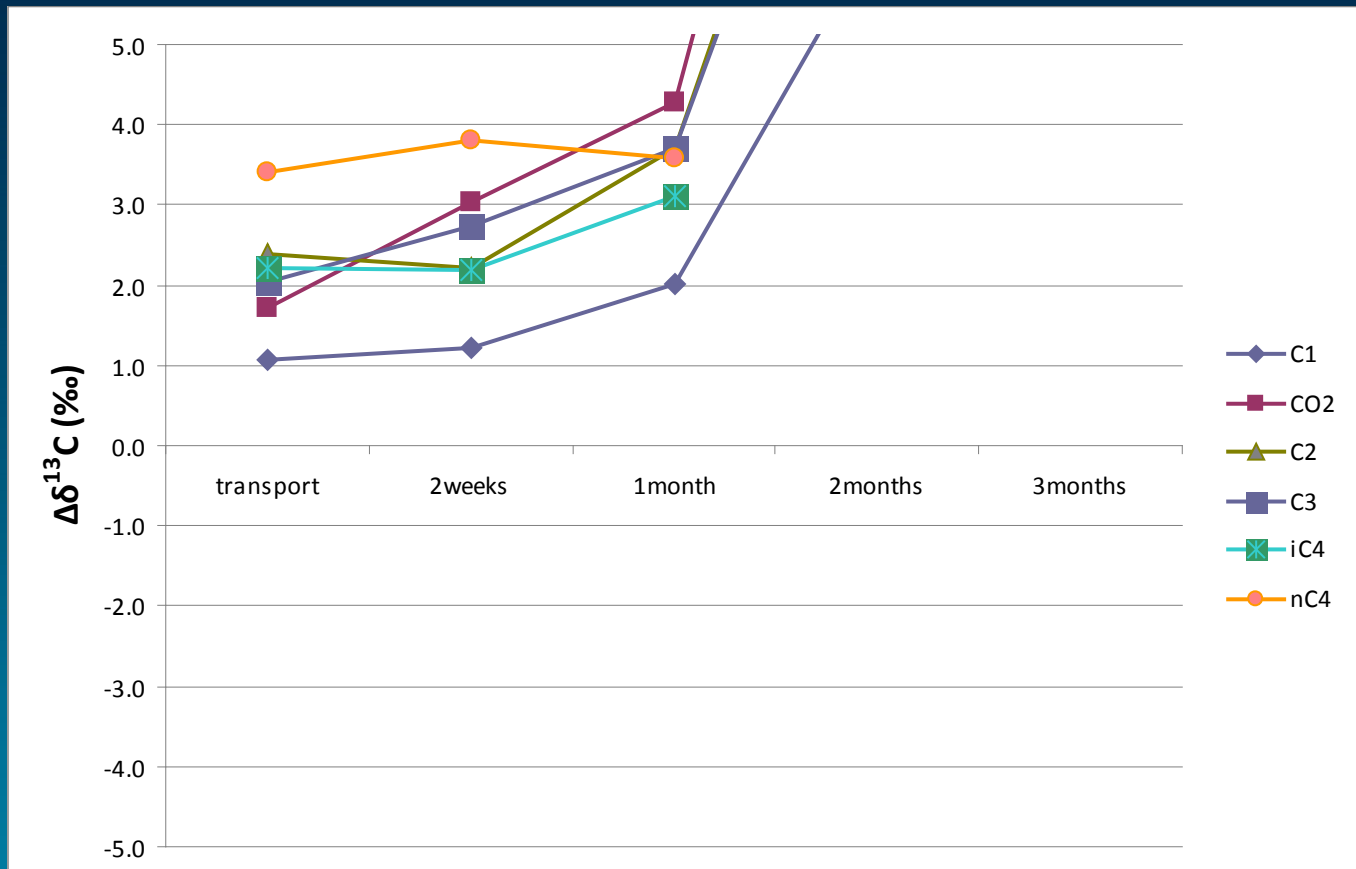
Free Gas – Tedlar Bag



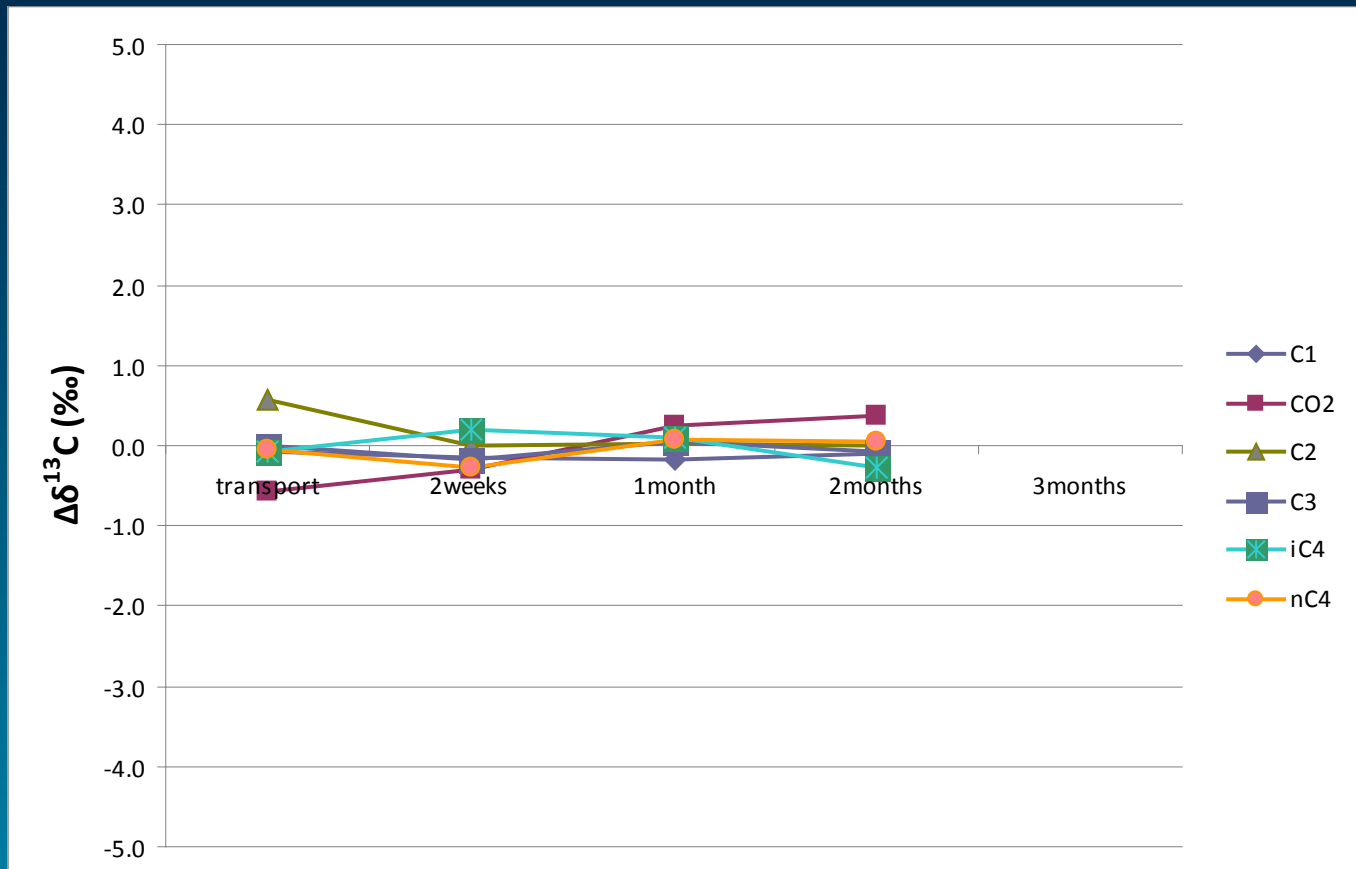
Free Gas – Foil Bag



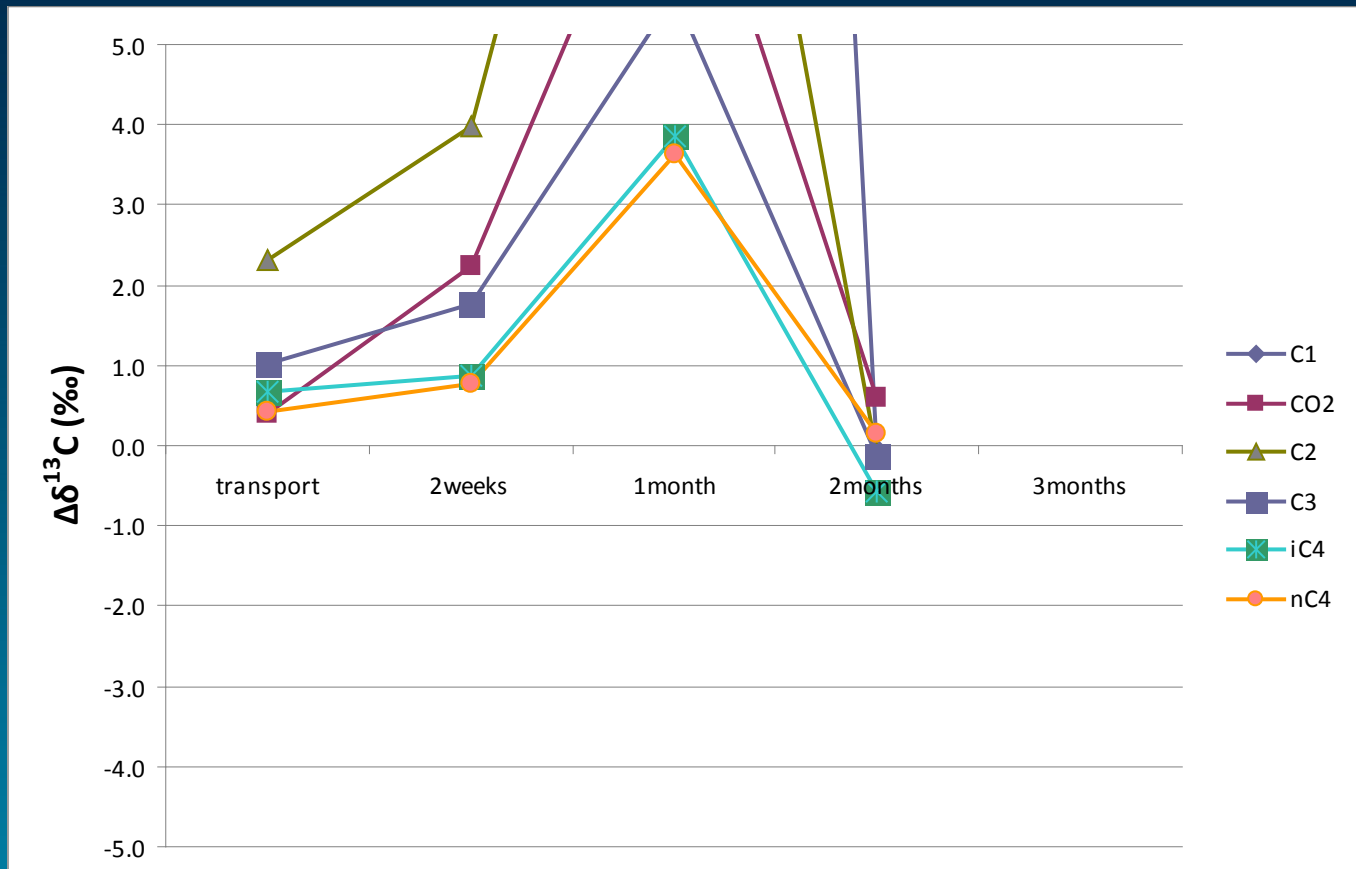
Free Gas – Silicone



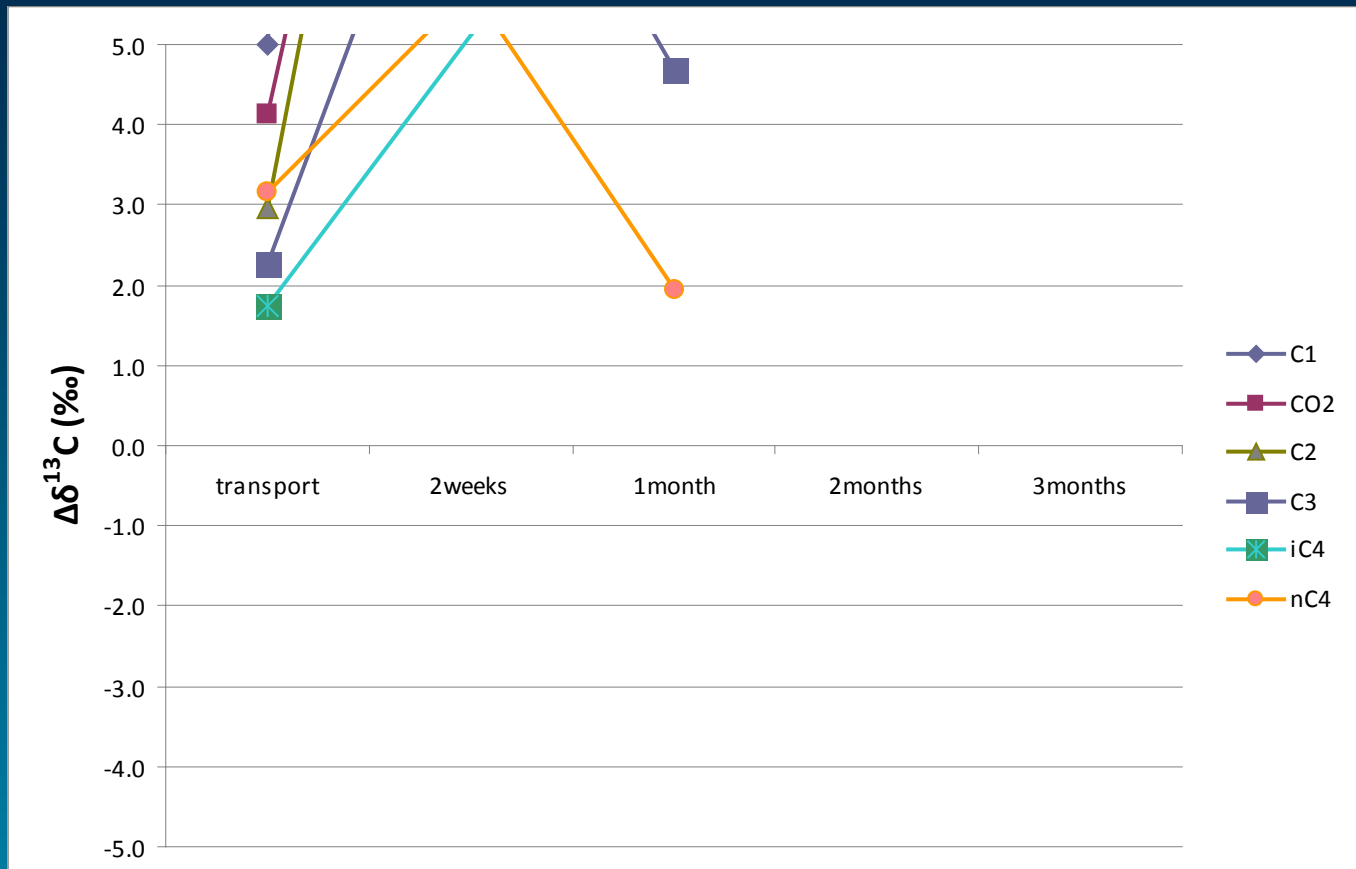
Free Gas – PTFE/butyl



Free Gas – PTFE/butyl (Pierced)



Free Gas – BTEX (Pierced)



Free Gas – Summary

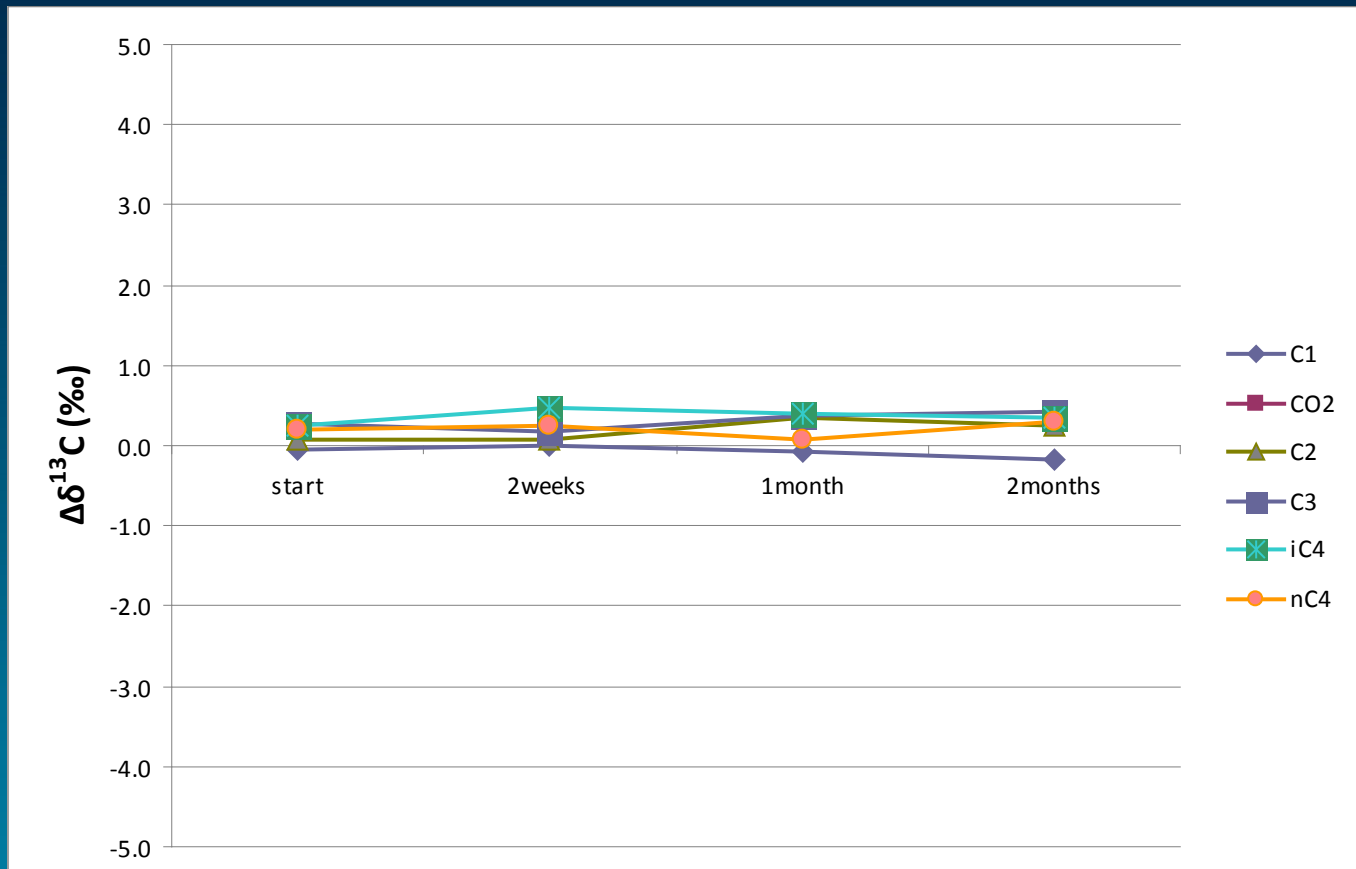
YES

- Canisters
- Butyl Rubber Septa
- Foil Gas Bags (1 month only)
- Tedlar Gas Bags (1 month only, not CO₂)

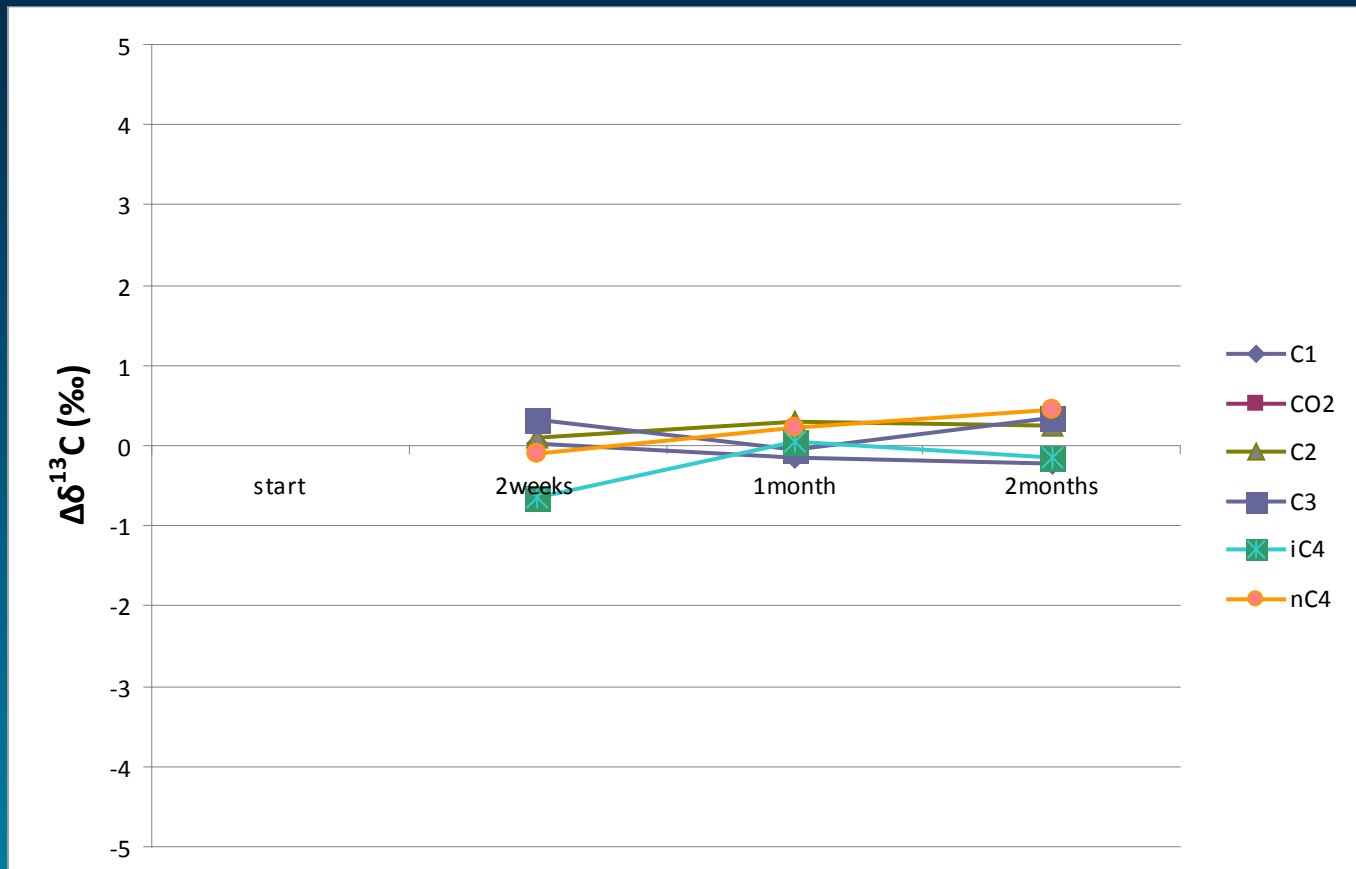
NO

- Pierced Septa
- Silicone Rubber
- PTFE ?

Dissolved – Thin Butyl Septa



Dissolved Gas – Thick Butyl Septa



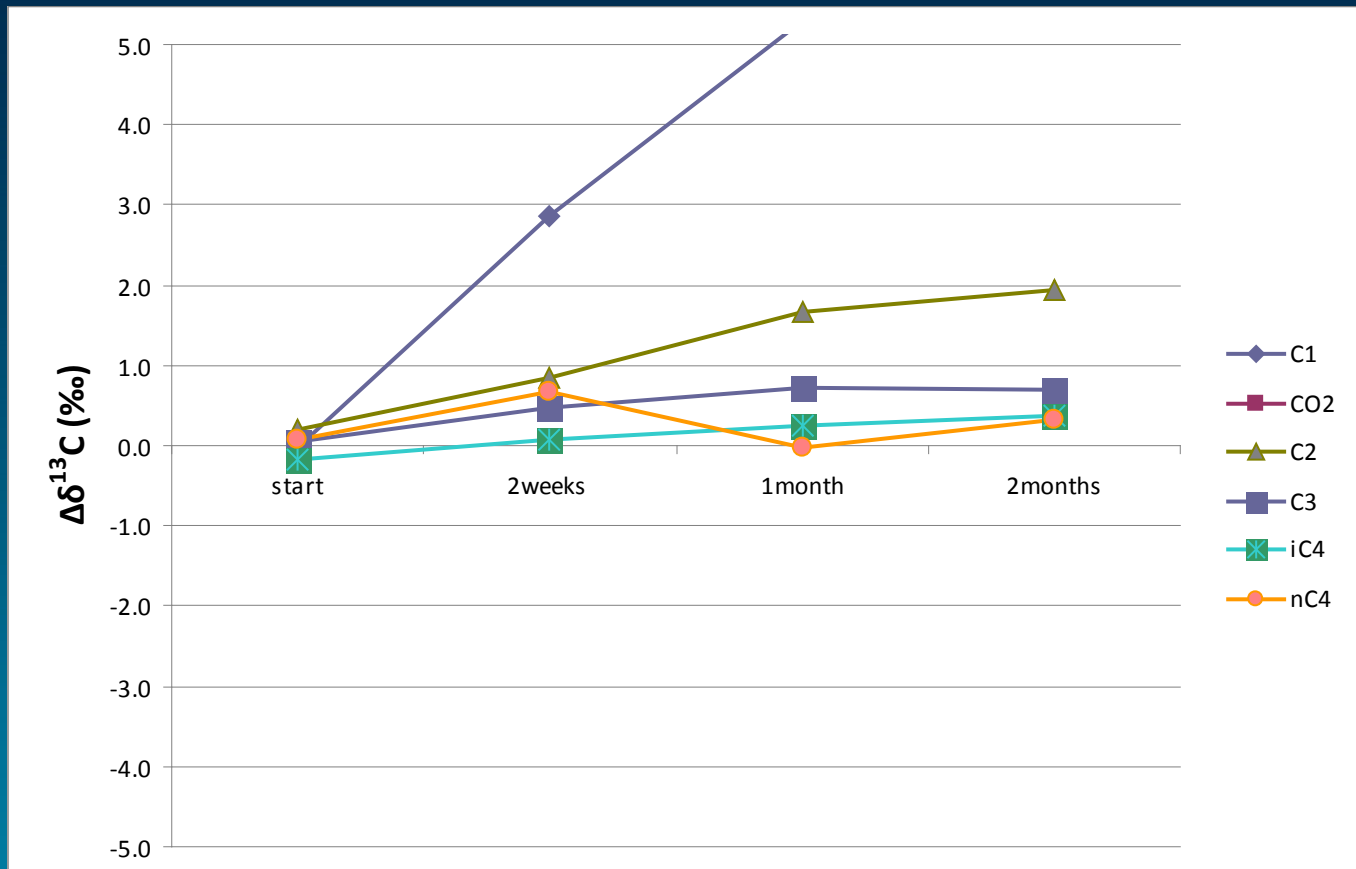
Dissolved Gas – Silicone



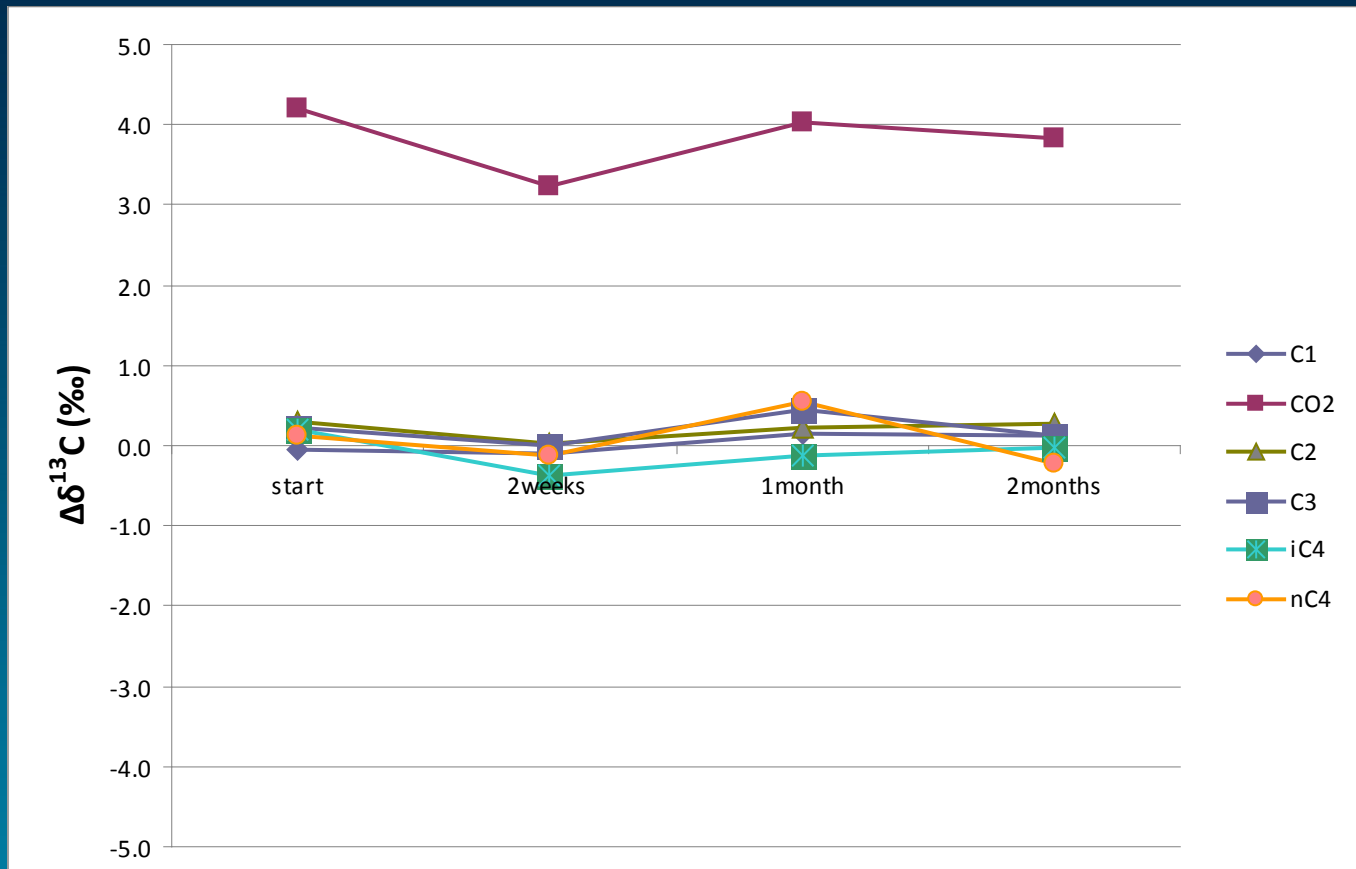
Dissolved Gas – PTFE/butyl



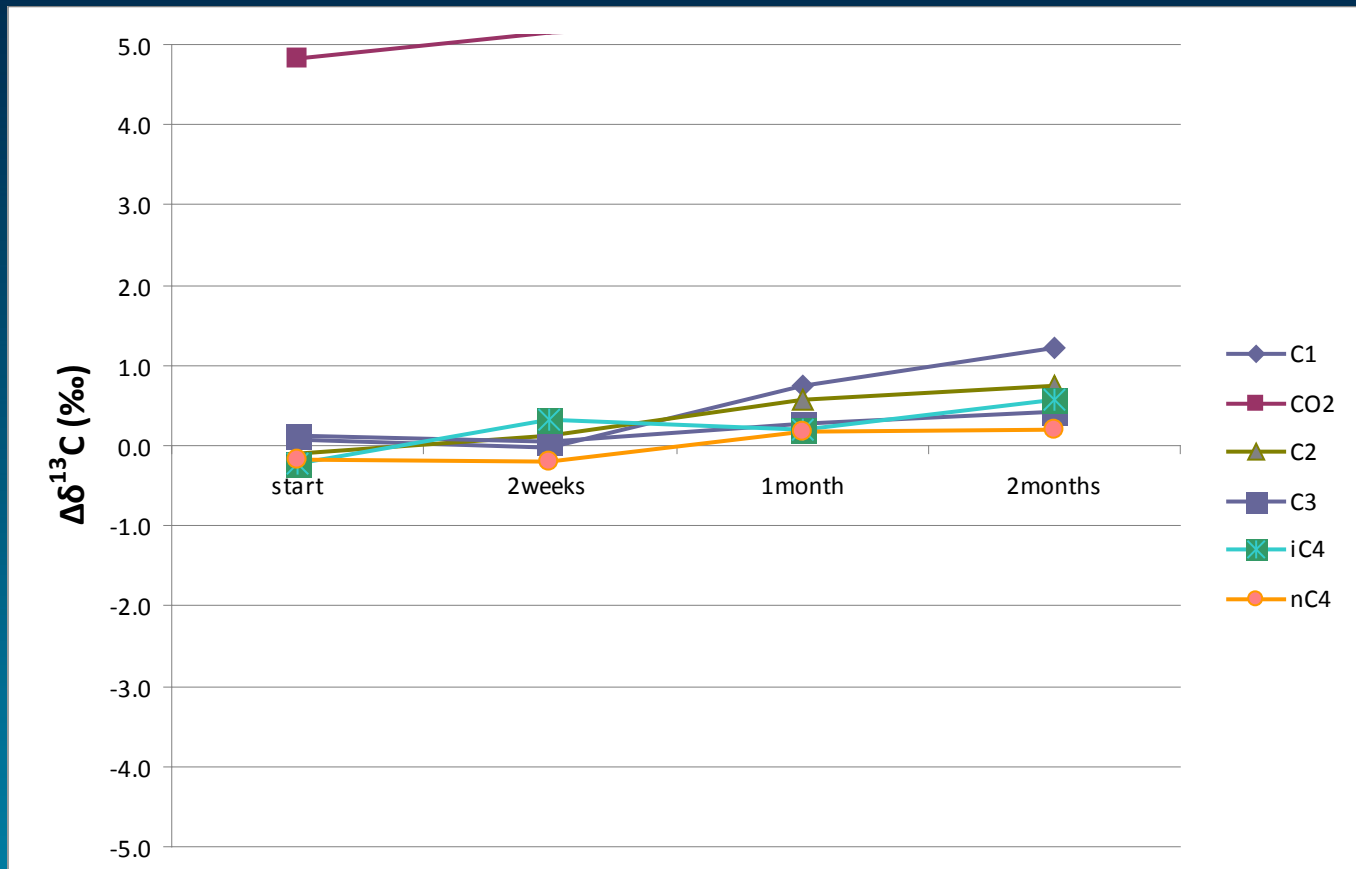
Dissolved Gas – BTEX



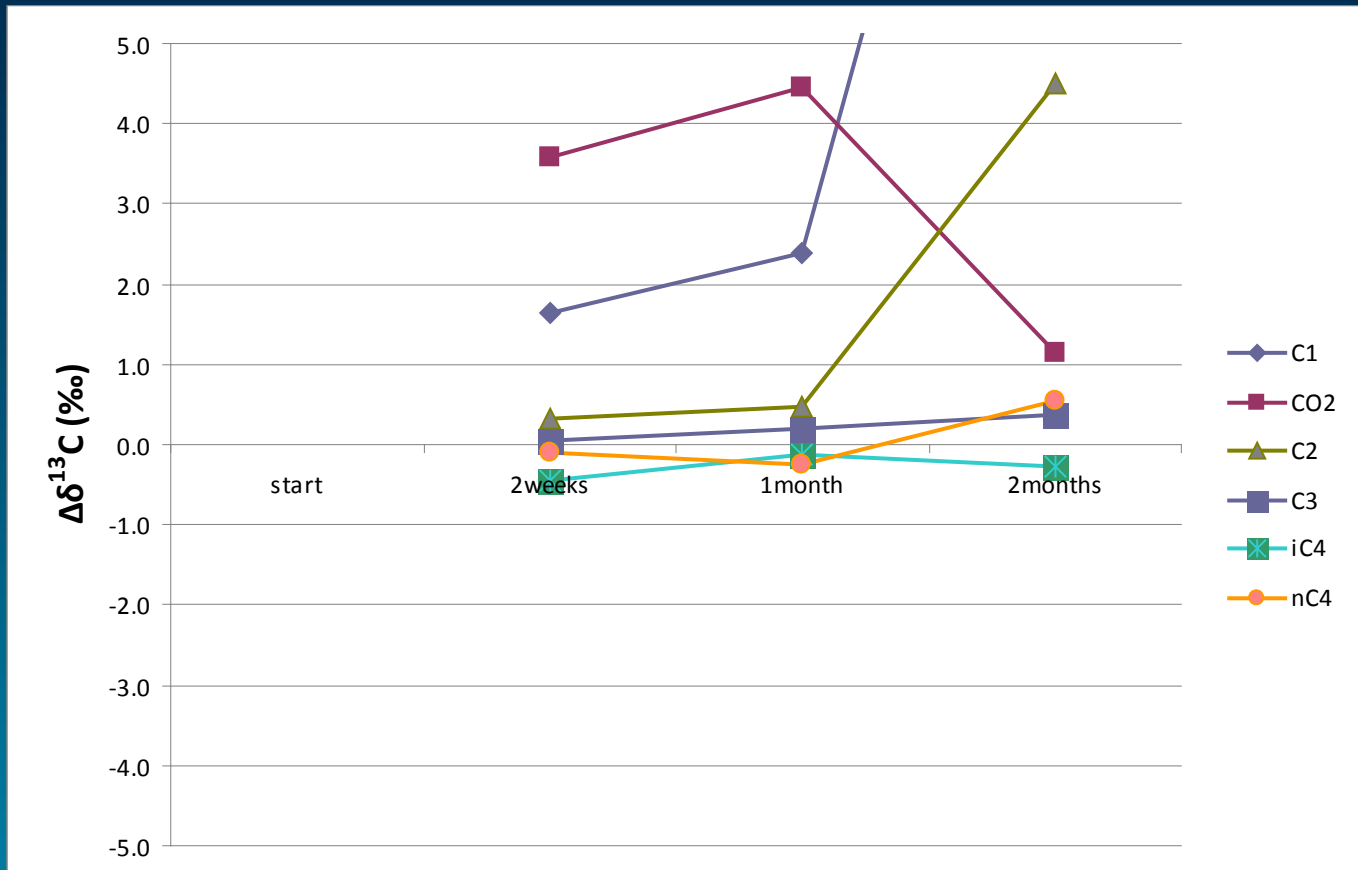
Dissolved Gas – Foil Bag



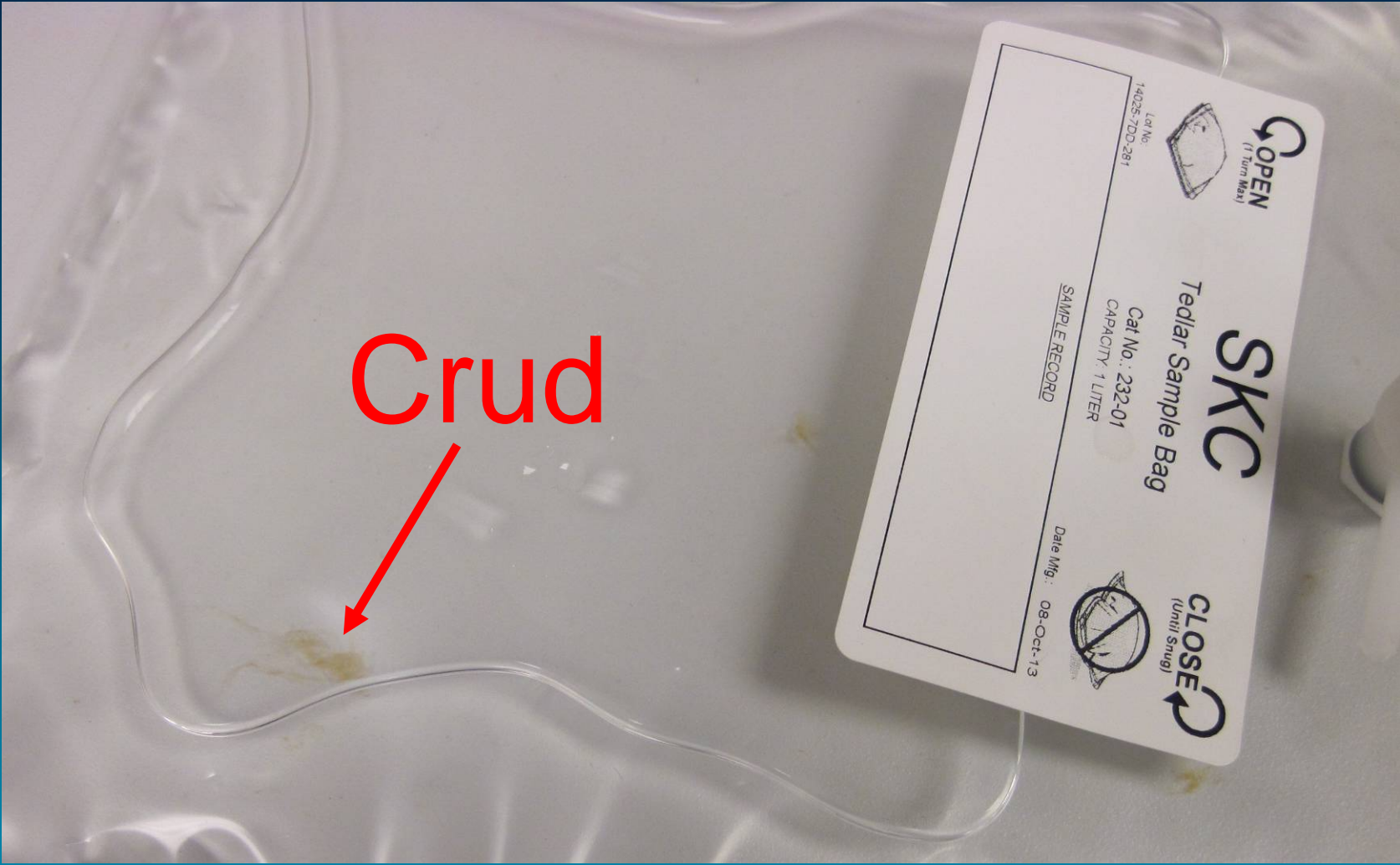
Dissolved Gas – Tedlar Bag



Dissolved Gas – Tedlar Bag (no preservative)



Dissolved Gas – No Preservative



Dissolved Gas – Foil Bag (no preservative)



Dissolved Gas – Summary

YES

- Foil Gas Bags
- Tedlar Gas Bags (1 month only)
- Butyl Rubber Septa
- Preserve the samples

NO

- Silicone Rubber
- PTFE