analytical

Steps for ASTM Methods

Steps for ASTM Method

EST analytical

EST
analytical

EST analytical

EST
analytical

EST
analytical

EST analytical

Methane			
Time	Area Count		
	Run 1	Run 2	Run 3
10	33870786	36480328	31584019
20	32423694	31275369	35600765
30	30868005	30395578	34922919
40	34764095	32587438	32365602
50	35189246	28435270	30555772
60	36180776	31001120	31174943
90	33468037	29579816	28600255
120	31099447	32089737	29753239
Ave.	33483010.75	31480582.00	31819689.25
Std. Dev.	1789648.36	2261905.35	2261865.60
%RSD	5.34	7.19	7.11

Saturated Methane Gas Solution Curve Preparation at 20°C		
Standard	**Amount**	**Final Concentration**
Saturated Solution	50ml	11600µg/L
Saturated Solution	25ml	5800µg/L
Saturated Solution	5ml	1160µg/L
Saturated Solution	1ml	232µg/L
Saturated Solution	500ul	116µg/L
Saturated Solution	100ul	23µg/L
Saturated Solution	25ul	6µg/L

*Samples Prepared in a 100ml Volumetric Flask

EST analytical

EST analytical

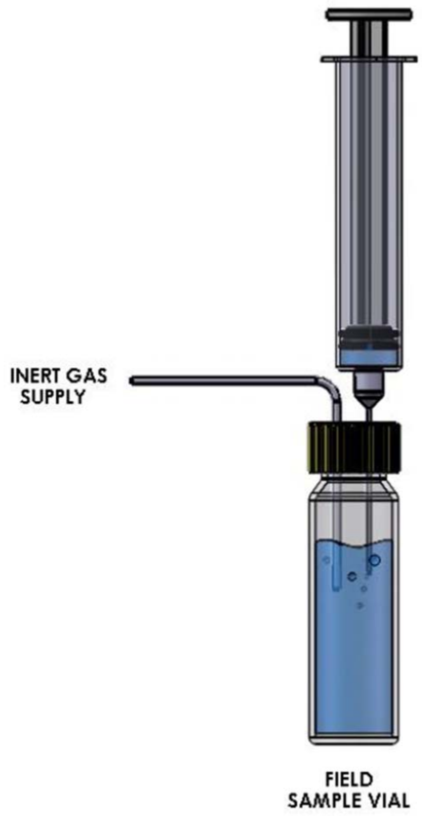
https://us.lgcstandards.com/US/en/search?text=dissolved%20gases

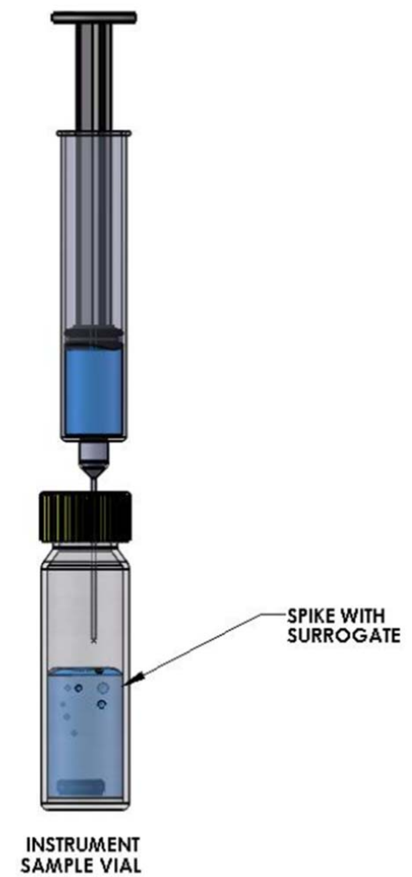
EST analytical

EST analytical

GC/FID	Agilent 7890
Inlet Temperature	250°C
Inlet Pressure	9.97psi
Gas	Helium
Inlet	Split/Splitless
Split Ratio	20:1
Column Flow	12.0ml/min
Column	Restek RT® QS-bond 30m x 0.53mm x 20µm
Oven Program	45°C hold for 1 minute, ramp 16°C/min to 180°C hold for 1.06 min, 10.5 min total runtime
FID Temperature	250°C

EST analytical


INERT GAS
SUPPLY
FIELD
SAMPLE VIAL



analytical

LGX-50

LIQUID GAS EXTRACTOR

ADVANTAGES

- No more manual prep
- Sample is NEVER exposed to atmosphere
- Automatic standard addition
- System can also be used for VOC screening

EST analytical

EST analytical

Compound	Curve Range (µg/L)	Sealed Samples			Poured Samples		
		Curve %RSD	Curve R^2	MDL	Curve %RSD	Curve R^2	MDL
Methane	9.3 to 11600	17.20	0.998	1.96	22.50	0.998	4.81
Ethane	7.7 to 5400	5.45	1.000	2.02	26.09	0.999	2.88
Ethylene	6.2 to 5600	12.18	1.000	1.76	26.10	0.999	7.80
Propane	6.0 tp 6000	8.58	0.999	1.53	27.94	0.998	1.27

Compound	Concentration (µg.L)	Sealed Samples		Poured Samples	
		Precision	% Rec'ry	Precision	% Rec'ry
Methane	1160	5.73	94.06	3.80	88.09
Ethane	1240	6.24	98.23	2.16	86.21
Ethylene	1500	4.70	96.99	6.47	96.18
Propane	1530	3.29	93.87	2.53	91.34

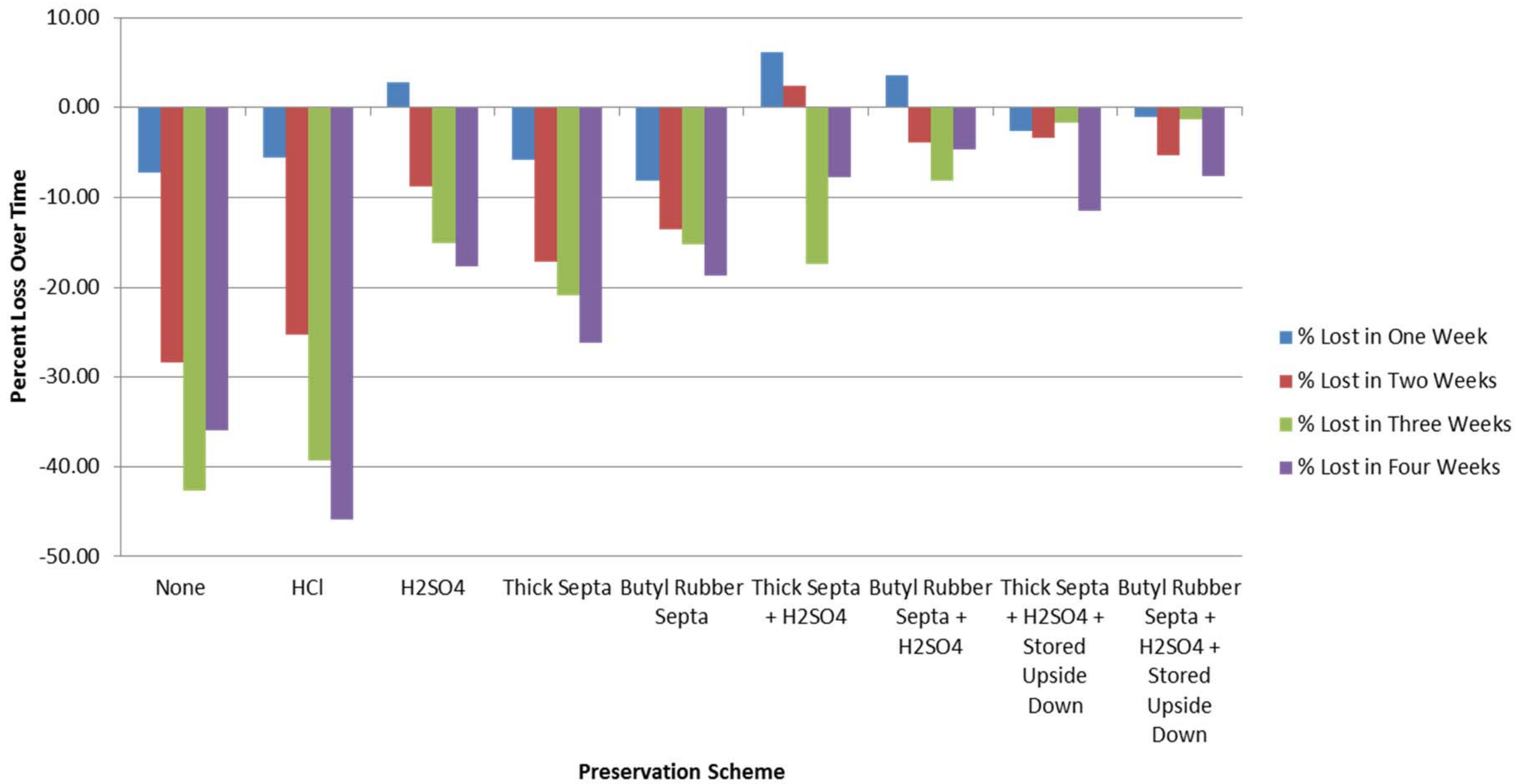
EST analytical

EST analytical

EST analytical

Preservation Scheme	% Lost in One Week	% Lost in Two Weeks	% Lost in Three Weeks	% Lost in Four Weeks
None	-7.22	-28.42	-42.61	-35.99
HCl	-5.53	-25.33	-39.28	-45.90
H2SO4	2.83	-8.82	-15.05	-17.66
Thick Septa	-5.88	-17.21	-20.86	-26.22
Butyl Rubber Septa	-8.16	-13.49	-15.27	-18.76
Thick Septa + H2SO4	6.13	2.40	-17.47	-7.74
Butyl Rubber Septa + H2SO4	3.55	-3.89	-8.16	-4.70
Thick Septa + H2SO4 + Stored Upside Down	-2.61	-3.42	-1.76	-11.53
Butyl Rubber Septa + H2SO4 + Stored Upside Down	-1.06	-5.30	-1.33	-7.66

EST analytical


10.00
0.00
-10.00
-20.00
-30.00
-40.00
-50.00
Percent Loss Over Time
None
HCl
H2SO4
Thick Septa
Butyl Rubber Septa
Thick Septa + H2SO4
Butyl Rubber Septa + H2SO4
Thick Septa + H2SO4 + Stored Upside Down
Butyl Rubber Septa + H2SO4 + Stored Upside Down
Preservation Scheme
% Lost in One Week
% Lost in Two Weeks
% Lost in Three Weeks
% Lost in Four Weeks

EST analytical

EST analytical

EST analytical

Analyte	Average	Repeatability Standard Deviation	Repeatability Limit	Percent Relative Standard Deviation	Percent Recovery
Methane-46	36.53	3.40	9.52	8.83	79.41
Methane-116	100.68	5.97	16.72	5.63	86.79
Methane-232	204.88	15.88	44.47	18.25	93.63
Methane-1160	1026.22	65.77	184.15	6.08	88.47
Methane-5800	4676.24	298.39	835.48	6.05	80.62
Methane-9280	7563.47	521.05	1458.93	6.54	81.50
Surrogate-500	489.99	25.19	70.53	4.88	98.00

EST analytical

Analyte	Average	Repeatability Standard Deviation	Repeatability Limit	Percent Relative Standard Deviation	Percent Recovery
Ethane-32	32.30	1.16	3.25	3.41	100.94
Ethane-64	75.20	7.32	20.48	9.23	121.29
Ethane-310	284.00	23.34	65.36	7.80	91.61
Ethane-1250	1063.40	98.96	277.09	8.83	85.07
Ethane-3100	3224.50	342.81	959.87	10.09	104.02
Ethane-4380	4198.40	201.00	562.81	4.54	95.85
Surrogate-500	462.70	32.97	91.49	6.70	92.54

EST analytical

Analyte	Average	Repeatability Standard Deviation	Repeatability Limit	Percent Relative Standard Deviation	Percent Recovery
Ethylene-30	25.80	4.50	12.70	16.54	85.93
Ethylene-60	59.20	4.60	13.00	7.43	98.67
Ethylene-238	227.80	25.90	72.50	10.78	95.71
Ethylene-1190	1036.80	138.80	388.80	12.70	87.13
Ethylene-2980	2337.60	155.00	434.00	15.67	88.39
Ethylene-4470	3857.90	494.00	1383.20	12.15	86.31
Surrogate-500	537.50	57.30	160.50	10.12	107.50

Analyte	Average	Repeatability Standard Deviation	Repeatability Limit	Percent Relative Standard Deviation	Percent Recovery
Propane-40	32.70	4.81	13.46	13.95	81.75
Propane-196	188.90	32.58	91.21	16.36	96.38
Propane-790	753.60	108.31	303.28	13.64	95.39
Propane-1200	1180.40	123.51	345.82	9.93	98.37
Propane-2400	2211.00	216.01	604.83	9.27	92.13
Propane-4700	5007.90	285.11	798.30	5.40	106.55
Surrogate-500	525.90	42.04	117.71	7.58	105.18

EST analytical

1. Dean, John A., *Lange's Handbook of Chemistry*. 14th Edition, R.R. McGraw-Hill, Inc., 1992.
2. *Gas Encyclopaedia*. (2009). Retrieved November 15, 2011 from http://encyclopedia.airliquide.com/Encyclopedia.asp
3. ConocoPhillips Company, *Drilling and Completion,* Retrieved January 20, 2012, from http://www.powerincooperation.com/en/pages/drilling-and-completion.html
4. Hudson, Felisa, *RSKSOP-175*, Revision No. 2, May 2004.
5. EPA New England, *Technical Guidance for the Natural Attenuation Indicators: Methane, Ethane, and Ethene.* Revision 1, July, 2001.
6. *Light Hydrocarbons in Aqueous Samples via Headspace and Gas Chromatography with Flame Ionization Detection (GC/FID),* PADEP 3686, Rev. 0, April 2012.

EST analytical

let's connect

EST analytical