

8/27/15

Mr. Craig Snyder  
Mr. Mitch Little  
Hellman & Associates  
11913 W Interstate 70 Frontage Rd N  
Wheat Ridge, CO 80033

**H2S Analysis by GC-FPD**

Dear Mr. Little & Mr. Snyder,

APT Laboratory Services was delivered seven gas phase samples in foil lined Tedlar bags on August 21, 2015. An H2S analysis was performed by APT on August 21, 2015, utilizing a modified ASTM Method D5504. A three-point calibration was performed on a HP 5890 gas chromatograph equipped with a flame photometric detector. Samples were analyzed in triplicate for hydrogen sulfide and a post calibration check was performed to show the stability of the instrument. All calibrations and sample results are enclosed. A summary of the results is shown below.

Hellman & Associates – H2S by GC-FPD, August 21, 2015	
Sample	H2S Conc. (ppm)
RZ081815-01	27.7
CH081815-02	24.3
RZ081915-01	26.6
RZ081915-02	29.0
RZ081915-03	20.1
RZ081915-04	26.4
RZ081915-05	19.4

*Modified ASTM D5504 Results*

We look forward to being of service to Hellman & Associates in the future. Please call me with any questions or comments at (303) 420-5949 or (800) 268-6213.

Regards,



Daniel Williams  
Asst Director of Laboratory Services

APT Project: LWTO5104

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Wheat Ridge, CO

8/21/2015

EPA Method 18: Determination of Gaseous Organic Compounds using Gas Chromatography

Initial Three-Point Calibration										
Low Level Calibration Standard										
Cpd ID	Conc. (ppm)	Inj. 1		Inj. 2		Inj. 3		Average		OK?
		RT	AC	RT	AC	RT	AC	RT	AC	
Hydrogen Sulfide	12.55	1.927	12003.5	1.932	11558.7	1.93	11995.2	1.930	11852	Y
Mid Level Calibration Standard										
Cpd ID	Conc. (ppm)	Inj. 1		Inj. 2		Inj. 3		Average		OK?
		RT	AC	RT	AC	RT	AC	RT	AC	
Hydrogen Sulfide	50.20	1.928	124567.6	1.93	117193.3	1.931	123388.3	1.930	121716	Y
High Level Calibration Standard										
Cpd ID	Conc. (ppm)	Inj. 1		Inj. 2		Inj. 3		Average		OK?
		RT	AC	RT	AC	RT	AC	RT	AC	
Hydrogen Sulfide	125.50	1.926	504179.2	1.93	507292.1	1.925	500150.7	1.927	503874	Y

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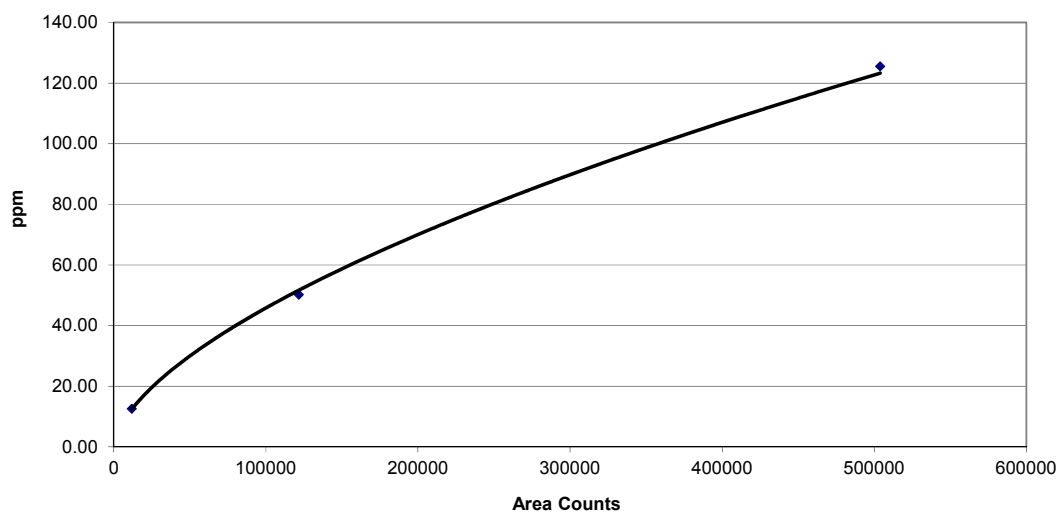
EPA Method 18: Determination of Gaseous Organic Compounds using Gas Chromatography

Power Regression Calculations

$$\text{conc} = A \cdot \text{area}^B$$

Hydrogen Sulfide					
Certified ppm	Average AC	Power Regression Statistics			ppm from curve
		R <sup>2</sup>	A	B	
12.55	11852	0.9995	0.039804	0.612201	12.41
50.20	121716				51.66
125.50	503874				123.28

## Hydrogen Sulfide



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8/21/2015

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Sample Analysis									
RZ081815-01									
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average		
	RT	AC	RT	AC	RT	AC	RT	AC	OK? ppm
Hydrogen Sulfide	1.922	46336.3	1.92	42494.3	1.92	43041.1	1.921	43957	Y 27.69
CH081815-02									
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average		
	RT	AC	RT	AC	RT	AC	RT	AC	OK? ppm
Hydrogen Sulfide	1.919	33697.5	1.921	36956.4	1.923	36041	1.921	35565	Y 24.33
RZ081915-01									
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average		
	RT	AC	RT	AC	RT	AC	RT	AC	OK? ppm
Hydrogen Sulfide	1.919	42471.9	1.922	40880.8	1.919	40101.9	1.920	41152	Y 26.60
RZ081915-02									
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average		
	RT	AC	RT	AC	RT	AC	RT	AC	OK? ppm
Hydrogen Sulfide	1.920	49752.5	1.922	45913	1.919	46379.7	1.920	47348	Y 28.98
RZ081915-03									
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average		
	RT	AC	RT	AC	RT	AC	RT	AC	OK? ppm
Hydrogen Sulfide	1.918	26046.7	1.918	26814.4	1.919	25426.3	1.918	26096	Y 20.13
RZ081915-04									
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average		
	RT	AC	RT	AC	RT	AC	RT	AC	OK? ppm
Hydrogen Sulfide	1.920	41371	1.921	41512.4	1.919	38972.3	1.920	40619	Y 26.39
RZ081915-05									
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average		
	RT	AC	RT	AC	RT	AC	RT	AC	OK? ppm
Hydrogen Sulfide	1.918	25194.8	1.917	24390.7	1.92	23930.9	1.918	24505	Y 19.37



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Quality Assurance													
Recovery / Spike (mid-level calibration gas to the sample probe)													
Cpd ID	Conc. (ppm)	Inj. 1		Inj. 2		Inj. 3		Average			Triplicate OK?	Recovery OK?	Audit OK?
		RT	AC	RT	AC	RT	AC	RT	AC	ppm			
Hydrogen Sulfide	50.20	1.919	116106.9	1.922	120649.1	1.919	127446.8	1.920	121401	51.58	Y	Y	Y

