VOCAM™ Chlorinated Alkenes Settings

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VOCAM Settings for Chlorinated Alkenes

This application note will help you with setting the appropriate operating parameters to perform an analysis of chlorinated alkenes on the VOCAM™. The settings on the left serve as a starting point. Chlorinated alkenes are unsaturated hydrocarbons that are chlorinated. Among other commercial applications, compounds like trichloroethylene and tetrachloroethylene are associated with cleaning or degreasing like cleaning machined parts, electronics boards, and dry-cleaning. The vapor pressure these compounds is in the table below. Defiant Technologies uses an unmodified PDMS stationary phase for this application which tends to separate chemicals based on their vapor pressure from highest vapor pressure to lowest vapor pressure; some call this a boiling point column. The table below shows both the vapor pressure and the boiling point for each compound.

Chemical Name	CAS	eV	Vapor Pressure mmHg at 25°C	Boiling Point °C at 1 atm	Formula Weight (g/mol)	Formula
Trichloroethylene (TCE)	79-01-6	9.45	69	87	131.388	C2HCl3
Tetrachloroethylene (PCE)	127-18-4	9.32	18.5	120	165.833	C2Cl4

VOCAM features

Base Chromatographic System

- Heated Photoionization Detector to extend the length of time for a valid calibration
- Heated/Passivated inlet Valve
- Micro-GC Column with temperature ramping
- Micro Preconcentrator
- Hybrid integration for MEMS components
- Regenerable hydrocarbon scrubber
- Long-term polar molecule (including humidity) scrubbing for carrier gas and sample gas
- 10,000-hour continuous duty cycle diaphragm pump for carrier gas
- 10,000-hour sample collection pump
- No external specialty gases are required for operation.

Parameter	Typical Value	Explanation
Ta	200	Time to hold the cold temperature of the GC in seconds
Tb	340	Time to ramp from the cold temperature of the GC to the hot temperature in seconds
Tc	60	Time to hold the hot temperature of the GC in seconds
Ct	50	The initial temperature of the GC column in °C
Ht	120	The final temperature of the GC column in °C
Collect	60	The time used to load an air sample on the system preconcentrator (seconds)
Clean	4	The time to clean the micro preconcentrator (seconds)
Presettle	10	The time to allow the micro preconcentrator to cool prior to collecting a sample (seconds)
Settle	2	The time to allow for a pressure change when the bypass valve switches (seconds)
Fire	6	The time that the micro preconcentrator will be at the desorption temperature (seconds)

The VOCAM settings shown above can be found on the Ellvin settings Tab. These are the parameters used to conduct the MDL and PQL study for chlorinated alkenes. As always if you observe a chromatogram ending mid-peak it is best practice to extend the Tc parameter to ensure that no compounds are left on the column. This could lead to confusing results.

For more information about VOCAM™, serial commands, and data output description, please contact Defiant Technologies, Inc. at 505-999-5880 or visit our website at www.defiant-tech.com.

VOCAM™ Chlorinated Alkenes MDL and PQL

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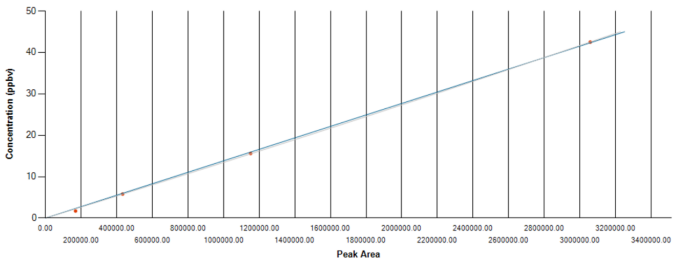
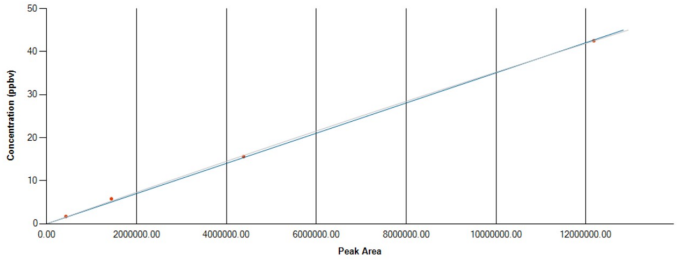
VOCAM Method Detection Limit and Practical Quantitation Limit

A method detection limit and practical quantitation limit were calculate for the method shown on the previous page. A calibration was performed on the VOCAM from 1.70ppbv to 42.5ppbv. The results are shown in the table below. Each concentration is in ppbv. Rather than use an estimate of the 10:1 value for the practical quantitation limit, Defiant has multiplied the standard deviation of seven replicates by 13 to be more inline with our bottom calibration point for this study and our customer guidance for minimum peak height. On the right hand panel is a screenshot of the calibration curve for each analyte and the text below states the correlation coefficient R^2.



Calibration curve for Trichloroethylene R^2=0.999



Calibration Curve for Tetrachlorethylene R^2=0.999

	Trichloroethylene (TCE)	Tetrachloroethylene (PCE)
Replicate 1	1.72	1.80
Replicate 2	1.68	1.76
Replicate 3	1.72	1.78
Replicate 4	1.79	1.77
Replicate 5	1.72	1.77
Replicate 6	1.72	1.78
Replicate 7	1.75	1.76

StDev	0.036	0.014
MDL	0.11	0.044
PQL	0.46	0.18

The MDL or method detection limit was calculated by multiplying the standard deviation for the 7 replicates (shown in the table above as StDev) by the student's T value for the number of replicates. For 7 replicates and a confidence level of 99%, we use a value of 3.14.

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