VOCAM™ Naphthalene Settings

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VOCAM Settings for Naphthalene

This application note will help you with setting the appropriate operating parameters to perform an analysis of Naphthalene on the VOCAM™. The settings on the left serve as a starting point. If one compares these settings to those found in the BTEX application note, one will observe that the settings are identical except for Tc which is extended to provide time for naphthalene to elute from the column. This is intentional since BTEX and naphthalene are frequently found together. The vapor pressure of 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 above 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
Benzene	71-43-2	9.24	94.8	80	78.1118	C6H6
Toluene	108-88-3	8.82	28.4	110	92.14	C7H8
Ethylbenzene	100-41-4	8.76	9.6	136	106.17	C8H10
p-Xylene	106-42-3	8.45	8.84	138	106.16	C8H10
m-Xylene	108-38-3	8.56	8.29	139	106.16	C8H10
o-Xylene	95-47-6	8.56	6.61	143	106.16	C8H10
Naphthalene	91-20-3	8.1	0.085	218	128.17	C10H8

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	390	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 Naphthalene. 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 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 3.2ppbv to 220ppbv. 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 naphthalene and the text below states the correlation coefficient R^2.
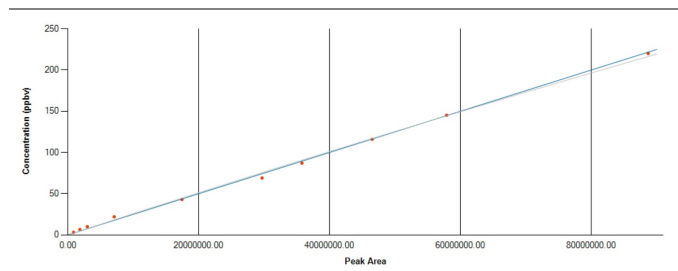
Calibration curve for Naphthalene R^2=0.998

	Naphthalene
Replicate 1	3.81
Replicate 2	3.83
Replicate 3	3.81
Replicate 4	3.87
Replicate 5	3.87
Replicate 6	3.83
Replicate 7	3.84
Replicate 8	3.85
StDev	0.024
MDL	0.074
PQL	0.31

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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