

The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte. [1] In this study we calibrated a FROG-4000 for bromomethane, and then ran a single concentration seven times. The MDL was calculated by multiplying the standard deviation of the seven replicates by 3.14 (student's t for 6 degrees of freedom at the 99% level). We determined the bromomethane MDL to be 22 ppb.

Procedure and Results

We performed a 5 point calibration on FROG containing a Silver PID (this detector has a lower detection limit compared to a FROG with a Black PID) for bromomethane. The calibration ranged from 40 ppb to 1000 ppb. The instrument settings used are listed below in Table 1. After the calibration was performed, the instrument was zeroed and a series of 7 samples of identical concentration were run on the FROG. The standard deviation of the seven replicates was calculated to be 7.02, this value was then multiplied by 3.14 which resulted in an MDL of 22 ppb. The results can be found in Table 2.

Parameter	Setting
T _a	180
T _b	65
T _c	60
C _t	35
H _t	100
Collect	30
Clean	4
Presettle	4
Settle	2
Fire	6

Table 1: Instrument Settings for Bromomethane

Trial	Conc (ppb)
1	112.33
2	117.05
3	106.97
4	123.62
5	108.66
6	119.50
7	124.69
STD	7.02
MDL	22.04

Table 2: Bromomethane MDL Results



References

[1] 40 CFR Appendix B to Part 136 - Definition and Procedure for the Determination of the Method Detection Limit - Revision 1.11 Code of Federal Regulations - Title 40: Protection of Environment (2005)