Overview

Purpose: The following methodology explains the use of alternative carrier gases as well as a purging gas and purge duration. A purge and trap method was used to evaluate the GC-MS He carrier gas conservation.

Methods: Purge and trap GC-MS using a helium conservation device was used to develop methods for the determination of volatile compounds. Using nitrogen as a purging gas for sample introduction was also explored.

Results: Use of nitrogen as a purging gas and reduced purge volumes to those found when using traditional methods, which is a trade-off with respect to sensitivity and/or absolute quantitation of the target compounds.

Introduction

The investigation is based on previous work described in literature in order to show the need for alternative carrier gases or system adjustments to conserve helium for GC-MS. Using purge introduction, volatile organic compounds analysis requires a purging gas for the introduction of the sample. The purging gas is chosen to be inert to avoid the formation of any volatile organic compounds that would affect the separation efficiency in the GC column. Additionally, analysis was developed for volatile organic compounds (VOCs) and proved to be sensitive to the purging gases and purging volume used.

The following methodology demonstrates the effectiveness of the helium conservation device, which facilitates the determination of VOCs without the use of hydrogen carrier gas and with limited purging gas.

Materials

A variety of samples, including water, soil, and air, were analyzed for VOCs using a Thermo Scientific™ Trace™ 1310 Gas Chromatograph equipped with a helium conservation device and a mass spectrometer.

Methods

A nine-point calibration curve was prepared in deionized water, ranging from 0.5–200 ppb, along with a standard and surrogate standards. The determination of volatile compounds by purge and trap was performed using a nine-point calibration curve.

Results

Hydrogen carrier gas migration limitations

Reduced sensitivity

Method development

Using the GC-MS He carrier gas conservation device, reduced sensitivity was observed when using traditional methods. Using nitrogen as a purging gas for sample introduction, better results were achieved.

Conclusion

Using nitrogen as a purging gas for sample introduction drastically reduces sensitivity to helium carrier gas, leading to reduced sensitivity and increased sample introduction.

References


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