C180-E081A

SHIMADZU
Excellence in Science

Headspace Sampler

HS-10

Cost-Efficient Model Equipped with the Functions Needed for Headspace Analysis

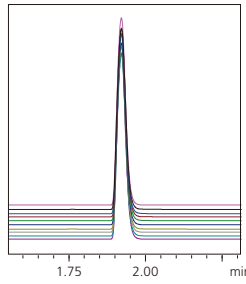
The HS-10 headspace sampler is highly cost efficient, yet is equipped with advanced features such as a mixing function and the ability to heat-ahead the sample vials waiting for analysis.
This instrument is the perfect platform for the analysis of residual pharmaceutical solvents and trace VOCs in wastewater.

Features

1. Outstanding Reproducibility

A thermostatic vial chamber capable of highly accurate temperature control and a stable sampling mechanism result in excellent reproducibility.
Even better reproducibility can be obtained by combining this instrument with a GC equipped with an electronic flow controller (AFC or APC).

The temperature in the thermostatic vial chamber is uniform; as a result, there is no variance in gas-liquid equilibrium depending on intake position.

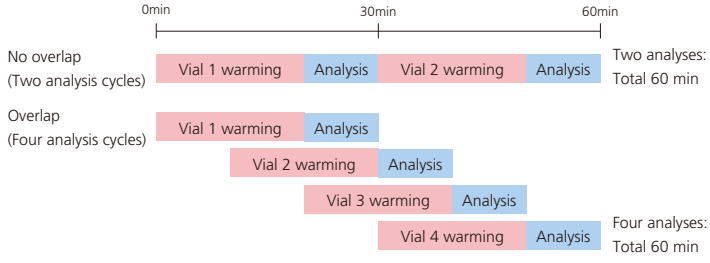


Reproducibility for 0.4 % Ethanol 2.0 % (n = 10)

2. Overlapped Warming

Overlapped warming by the headspace sampler is a method of shortening the processing time by starting the warming process for multiple vials at different times.
With the HS-10, up to six vials can be warmed efficiently, even with long warming times, for more efficient analysis cycle times.

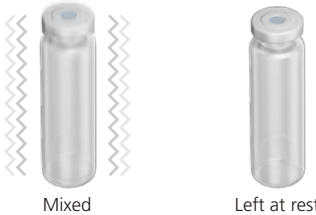
Capable of new vial intake even while other vials are being warmed.



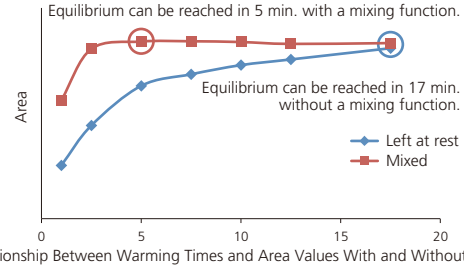
Difference in Analysis Times With and Without Overlap
(Assuming the warming time to be 20 minutes and the analysis cycle to be 10 minutes.)

3. Mixing Function

The HS-10 is equipped with the ability to mix each vial by shaking. This allows the headspace concentration within each sample to come to equilibrium sooner, ultimately saving time and increasing throughput.



Vials are mixed by moving them up and down.

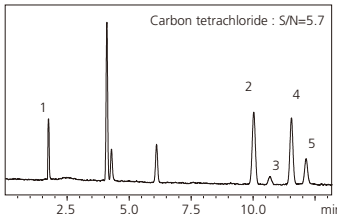


Relationship Between Warming Times and Area Values With and Without Mixing

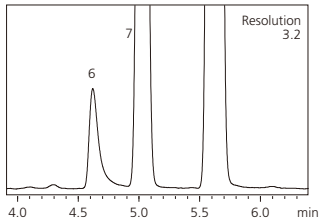
Applications

1. USP <467> Analysis of Residual Pharmaceutical Solvents

Residual solvents in pharmaceuticals are mainly analyzed utilizing headspace GC. In the United States Pharmacopeia (USP), residual solvents are categorized as Class 1 to Class 3 depending on the risk they pose to health. The sensitivity, degree of separation, and reproducibility are prescribed for each test method. Class 1 Procedure A requires a S/N ratio ≥5 for 1,1,1-trichloroethane and a S/N ratio ≥3 for all peaks, while Class 2A requires a resolution ≥1.0 for acetonitrile and methylene chloride. The HS-10 satisfies all of these requirements.



Class 1 Procedure A: Analysis of a Standard Solution



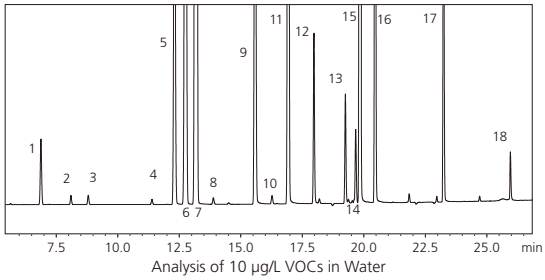
Class 2A Procedure A: Analysis of Standard Solution and Separation of Acetonitrile and Methylene Chloride

1: 1,1-Dichloroethene
2: 1,1,1-Trichloroethane
3: Carbon tetrachloride
4: Benzene
5: 1,2-Dichloroethane
6: Acetonitrile
7: Methylene chloride

GL Sciences B.V. InertCap467
0.32mmI.D.×30m df=1.80 µm

2. Analysis of VOCs in Water

This is an example of the analysis of 10 µg/L (10 ppb) VOCs in water using the HS-10 and an ECD. The VOCs in water can be measured with excellent reproducibility due to the high thermal stability of the HS-10.



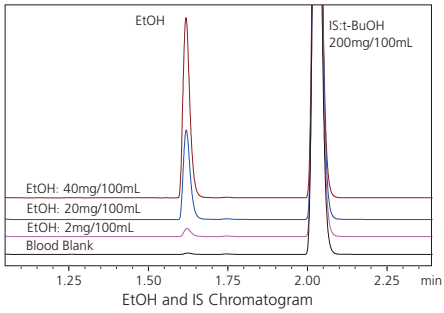
Analysis of 10 µg/L VOCs in Water

Reproducibility of 10 µg/L VOCs RSD % (n = 5)

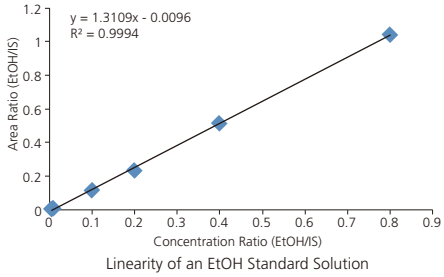
1: 1,1-Dichloroethene	2.1	10: 1,2-Dichloropropane	1.9
2: Dichloromethane	2.0	11: Bromodichloromethane	2.4
3: trans-1,2-Dichloroethene	2.6	12: cis-1,3-Dichloropropane	1.6
4: cis-1,2-Dichloroethene	2.3	13: trans-1,3-Dichloropropane	1.7
5: Chloroform	2.1	14: 1,1,2-Trichloroethane	2.2
6: 1,1,1-Trichloroethane	2.6	15: Tetrachloroethene	3.4
7: Carbon tetrachloride	3.3	16: Dibromochloromethane	2.1
8: 1,2-Dichloroethane	1.9	17: Bromoform	1.6
9: Trichloroethene	2.7	18: 1,4-Dichlorobenzene	2.8

3. Blood Alcohol Concentration (BAC)

The analysis of alcohols in blood is performed in the fields of forensic medicine and emergency medicine. This is utilized to determine the level of drunkenness from alcohol ingestion, to evaluate criminality, and to distinguish alcohol ingestion from other medical cases. These measurements must be performed easily, quickly, and with high accuracy.



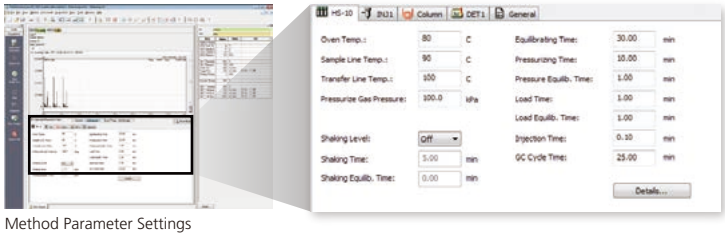
EtOH and IS Chromatogram



Linearity of an EtOH Standard Solution

Compatible with the LabSolutions Comprehensive Workstation

LabSolutions LC/GC software integrates the conventional programs LCsolution and GCsolution. With a user control function and an audit trail function for method parameters, LabSolutions can accommodate a variety of regulations, including directives related to FDA 21 CFR Part 11.



Method Parameter Settings

HS-10 Specifications

Instrument Specifications Item	Details
Sample Injection Method	Inactivated sample loop 1 mL (standard), 0.5 mL, 2 mL (option)
Number of Vials	20
Vial Mixing	3 stages max.
Vial Warming Temperature	Room temp. +10 to 225℃ (Setting: 35 to 225℃)
Sample Line Temperature	Room temp. +10 to 225℃ (Setting: 35 to 225℃)
Transfer Line Temperature	Room temp. +10 to 225℃ (Setting: 35 to 225℃)
Carrier Gas Control	Electronic control via AFC built into GC
Vial Pressurized-Gas Control	Electronic control via APC built into GC
Control Software	Operates collectively with LabSolutions LC/GC (FDA 21 CFR Part 11 compliant)
Power Supply	1400 VA max.
Dimensions	W407 × D527 × H455 mm
Weight	35 kg
Applicable Models	GC-2010/GC-2010 Plus, GC-2014

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