Technical Overview

Agilent
Trusted Answers

IsoMist Temperature Controlled Spray Chamber

Introduction

The Agilent IsoMist Temperature Controlled Spray Chamber is an optional programmable spray chamber for Agilent's Inductively Coupled Plasma Optical Emission Spectrometers (ICP-OES). It is designed to accurately control the temperature of the sample introduction system.

The IsoMist comprises of a glass, double-pass spray chamber, housed in a thermally conductive polymer layer that uses a powerful Peltier device to accurately control the temperature. The IsoMist is fully controllable from within the ICP Expert software that controls the ICP-OES instrument. The temperature can be set, and maintained, between –10 and +60 °C.

Lowering the temperature of the spray chamber can help to improve the long-term stability of volatile organic solvents and viscous oil samples. In contrast, the IsoMist can be used to simply maintain a constant spray chamber temperature when the laboratory temperature is prone to fluctuations. Stable spray chamber conditions help to ensure the consistent nebulization and sample transport characteristics that are vital to maximizing signal stability.

Benefits

Low temperature stability for the analysis of volatile organic solvents

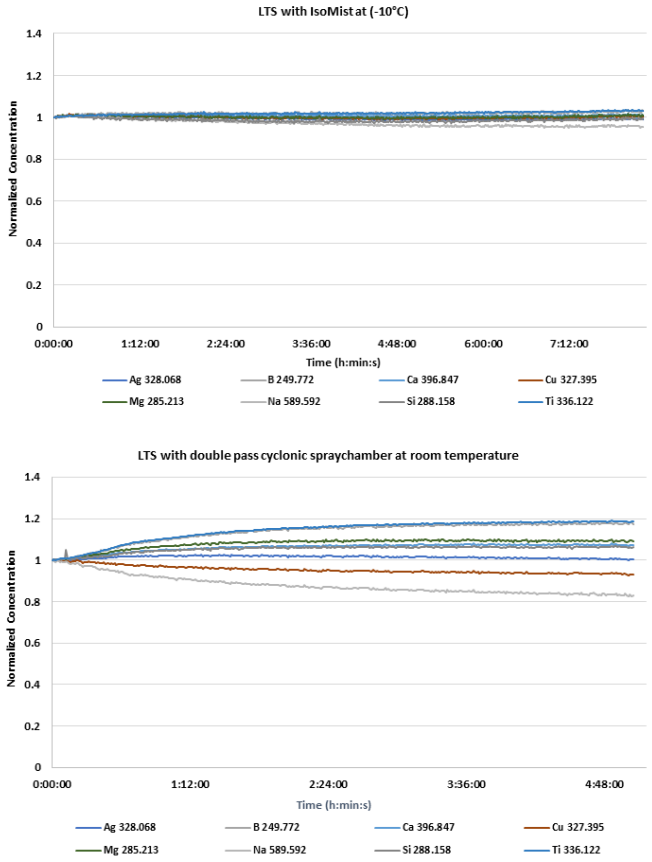

Figure 1. Long term stability results of elements in gasoline, spiked at 1 ppm, measured over an 8-hour period with IsoMist (upper) and over a 5-hour period without IsoMist (lower).

The IsoMist provides excellent signal stability for ICP-OES analysis of volatile organic solvents, such as gasoline (*1*). Cooling the spray chamber for the analysis of volatile organics reduces the solvent loading on the plasma, ensuring a more stable plasma. Figure 1 compares the long-term stability (LTS) of elements in gasoline spiked at 1 ppm—continuously measured with and without the IsoMist temperature controlled spray chamber. The signal stability over the sampling period is significantly improved when operating the IsoMist at –10 °C (Figure 1, upper), compared with the results obtained using a double pass cyclonic spray chamber at room temperature (Figure 1, lower).

The precision (% RSDs) for all the elements in the gasoline sample over the sampling period, with and without the IsoMist, is shown in Table 1. The precision is improved with <2% RSDs for all elements with the use of the IsoMist at –10 °C.

Table 1. Long term stability precision (%RSD) results of elements spiked at 1 ppm in gasoline, continuously measured with and without the IsoMist temperature controlled spray chamber.

Element & Line (nm)	With IsoMist (-10 °C) %RSD	Operating Humidity Range (%RH)	Without IsoMist Room Temp %RSD
Ag 328.068	0.57	Ag 328.068	0.63
B 249.772	0.51	B 249.772	4.28
Ca 396.847	0.26	Ca 396.847	1.83
Cu 327.395	0.49	Cu 327.395	1.87
Mg 285.213	0.45	Mg 285.213	2.29
Na 589.592	1.57	Na 589.592	4.94
Si 288.158	0.72	Si 288.158	1.56
Ti 336.122	0.64	Ti 336.122	4.43

The Method Detection Limits (MDLs) for elements in gasoline were determined using the ICP-OES with IsoMist held at –10 °C. Excellent results (Table 2) were achieved, with MDLs at sub-ppm levels for all elements.

Table 2. Method detection limits (MDLs) for elements in gasoline using the IsoMist cooled to –10 °C.

Element and line (nm)	MDL (ppm)
Ag 328.068	0.020
B 249.772	0.026
Ca 396.847	0.008
Cu 327.395	0.031
Mg 285.213	0.021
Na 589.592	0.067
Si 288.158	0.110
Ti 336.122	0.030

Laboratory ambient temperature stability

Accurate, long term analysis of samples is much more difficult if the ambient temperature in the laboratory fluctuates. In this situation, the IsoMist can be used to maintain a stable spray chamber temperature.

Ease of use

The Agilent IsoMist Temperature Controlled Spray Chamber is simple to install and set up. It connects to the PC via Bluetooth or USB and is then fully controllable from the ICP Expert software. It is compatible with Agilent's OneNeb, OneNeb Series 2 and glass concentric nebulizers via a Helix fitting.

The IsoMist is a rugged, compact unit that is easily removed for cleaning and routine maintenance.

Figure 2. The removable glass double pass spray chamber is covered in a thermally conductive polymer layer that is easily cleaned.

Specifications

- Temperature range: –10 to +60 °C with 1 °C increments
- Temperature accuracy: + 0.1 °C
- Response time: rapid response, e.g., from room temperature to –5 °C in 15 minutes
- Weight: 2 kg
- Dimensions: (L x W x H) 195 x 100 x 120 mm
- Compatibility: any configuration of Agilent's 5900/5800 ICP-OES and 5100/5110 ICP-OES and with the Agilent SPS 3 or SPS 4 autosampler
- Communication: Bluetooth EDR 2.0 wireless network or a standard USB cable
- PC requirements: a USB port and Windows 7 and 10 64 Bit operating system

Reference

Multi-elemental determination of gasoline using Agilent 5100 ICP-OES with oxygen injection and a temperature controlled spray chamber, Agilent publication, 2015, 5991-6469EN

Ordering information

For more information about our products and services, or to place an order, please consult your local Agilent office or supplier, or visit: www.agilent.com/chem

www.agilent.com/chem

Printed in the USA, October 24, 2019
5991-5729EN

Agilent

Trusted Answers