Integrated Second Peristaltic Pump for Improved Sample Throughput and Reduced Matrix Effects

Technical Overview

Introduction

As a simpler, less expensive alternative to Agilent's Integrated Sample Introduction System (ISIS), the Second Peripump Option permits both rapid sample uptake and constant flow nebulization for improved throughput and matrix tolerance and is fully compatible with all the most recent hardware and software improvements on the 7500 Series ICP-MS.

Uncoupling Sample Uptake from Sample Nebulization

With the introduction of its ISIS in 1999, Agilent pioneered the use of constant flow nebulization in ICP-MS. By uncoupling the sample uptake rate (using a separate, high-capacity peristaltic pump) from the nebulizer flow rate (using a small, close-coupled peristaltic pump), very high sample throughput could be achieved without the concurrent overloading of the sample introduction system and plasma. Total matrix load on the plasma could be reduced by a factor of 5x or more over a conventional single pump system with the added benefit of significantly higher sample throughput. While ISIS supported many other functions, including autodilution and matrix elimination, for many users, constant flow nebulization was the primary advantage.

Second Peristaltic Pump Option

Based on the input of dozens of ISIS users, Agilent decided to introduce a simplified, more economical solution for rapid sample uptake and constant flow nebulization: a computer-controlled second peristaltic pump that is fully compatible with recent software and hardware enhancements to improve matrix tolerance and productivity.

The second peristaltic pump option works seamlessly with both Pre-emptive and Intelligent Rinse functions, as well as with the new High Matrix Sample Introduction (HMI) accessory. The result is simple, fully integrated, high sample throughput for even the most difficult samples, with no danger of plasma overloading or sample carryover.

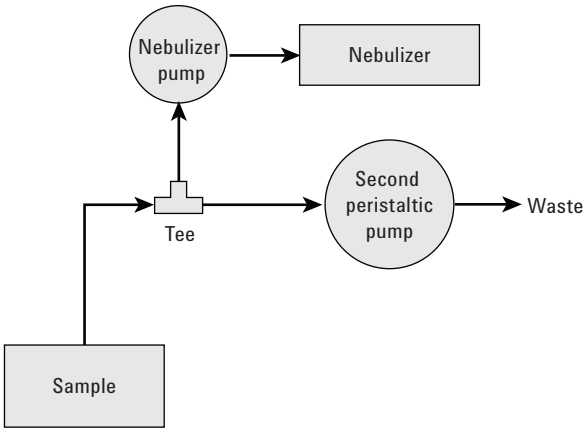

Figure 1. Schematic of the second peristaltic pump arrangement.

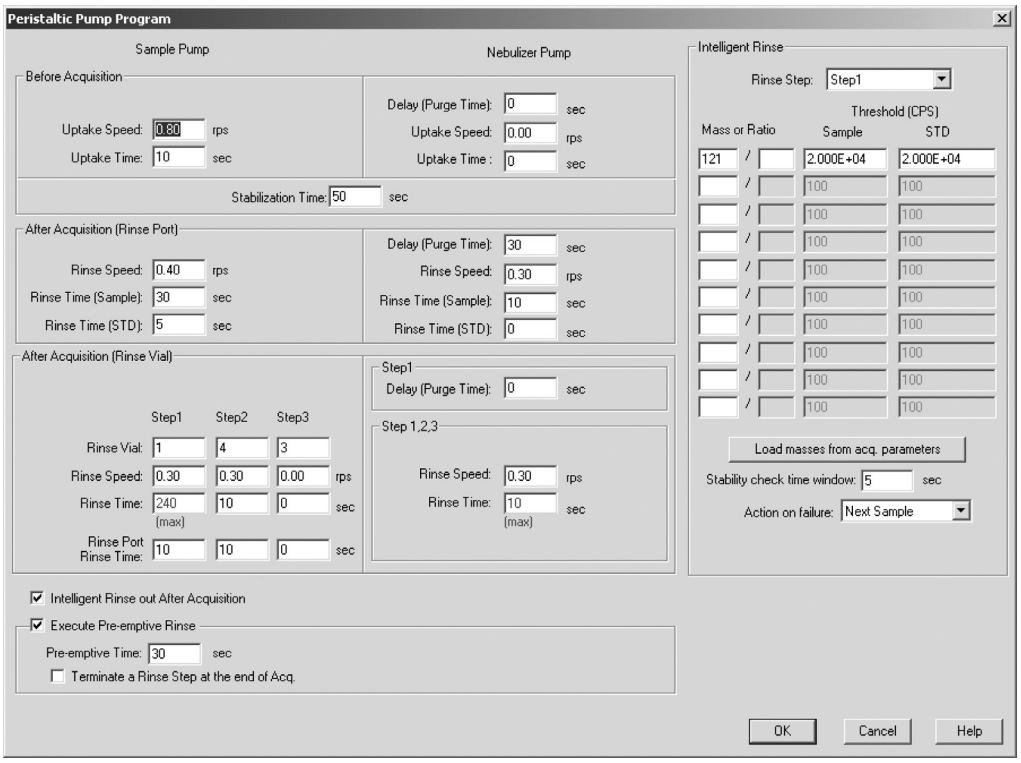

Figure 2. The second peristaltic pump option allows completely independent control of both the sample uptake pump (left) and the nebulizer pump (right) and fully supports all intelligent and pre-emptive rinse functions.

Operation of the second peristaltic pump is simple and fully controlled by the ChemStation software. The second peristaltic pump is used to rapidly pull the sample to the Tee shown on Figure 1. After the sample reaches the Tee, the nebulizer pump transports it to the nebulizer at a constant flow, without the need to alter the pump speed. This constant flow eliminates extended stabilization time and the introduction of excessive sample into the plasma, interface, and mass spectrometer.

The ChemStation pre-emptive rinse feature will move the autosampler probe to the rinse station to begin cleaning the probe and sample line while the nebulizer pump delivers the remaining sample to complete the analysis. In addition, Intelligent Rinse will ensure that rinse time is sufficient by monitoring up to 10 predefined element signals, but avoid excessive rinse times when they are not needed (for example, after a blank). A significant advantage to this system is that high throughput is accomplished without the need to use a six-port valve or additional vacuum pumps.

Ordering Information

Order Agilent product number G3146B to add a second three-channel peristaltic pump integrated into the mainframe. ISIS tubing kit G3138-65006 is recommended with G3146B. It is preconfigured for easy set up. Please note that G3146B is not compatible with G3148B (ISIS).

For More Information

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