Metrohm Autolab B.V.

Autolab Application Note AUT02

Automated Sample Handling and Analysis With NOVA: Standard addition with the Metrohm 800 Dosino

Keywords

Sample processor; Automatic sample handling; Metrohm devices; Automatic burette

Summary

The Metrohm 800 Dosino is the workhorse of any automated liquid handling setup. This instrument can be conveniently used in combination with the NOVA software and integrated conveniently with electrochemical measurements performed with the Autolab systems.

This application note provides information on the combination of the Metrohm 800 Dosino in the framework of a practical electrochemical measurement, performed with the NOVA software.

Metrohm 800 Dosino

The Metrohm 800 Dosino system consists of a Drive Unit and an exchangeable Dosing Unit. The available volumes of the Dosing Unit range from 2 mL to 50 mL (see Figure 1).

Figure 1 – The Metrohm 800 Dosino with a 20 mL Dosing Unit

The Dosing Unit of the Dosino has a total of 4 ports and 1 vent (see Figure 2).

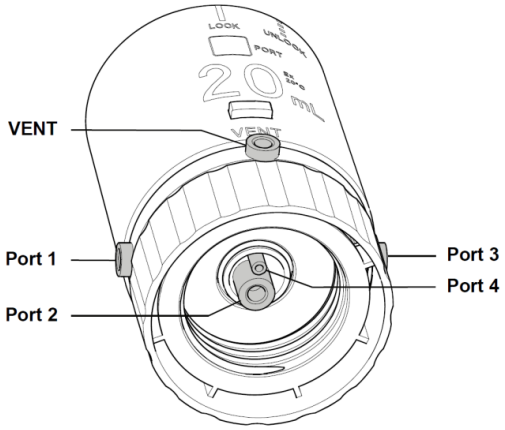

Figure 2 – Overview of the ports of the Dosino

Each port is individually accessible through the NOVA software and can be used to dispense a user-defined volume to the destination vessel or to aspirate a user-defined volume from a source vessel.

To use the Metrohm 800 Dosino, a Metrohm 814, 815 or 858 Sample Processor or a Metrohm 846 Dosing Interface is required.

Software control

NOVA provides direct control of the Dosinos connected to the host computer. The settings for each device are specified in the Liquid Handling Setup of NOVA (see Figure 3).

The setup can be used to provide a name to each Dosino and to define, for each port, dosing parameters as well as a role. If necessary, some of the ports can be disabled.

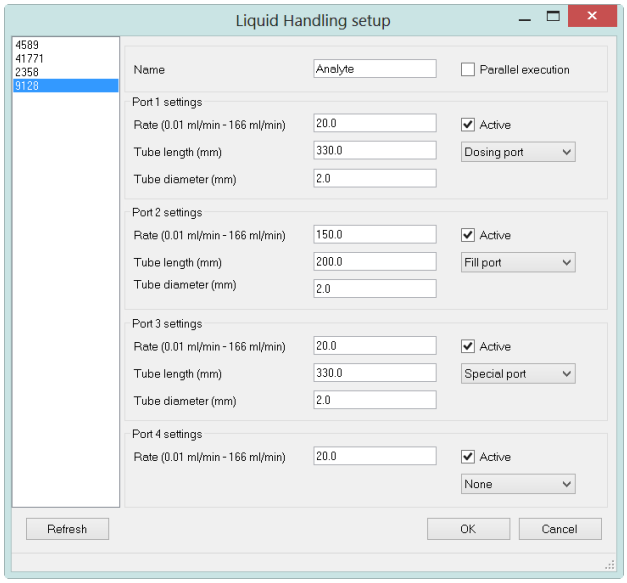

Figure 3 – The Liquid Handling Setup settings of the Metrohm 800 Dosino

When the settings have been defined, each Dosino can be controlled either manually, at any time, or during a measurement.

Manual control is provided by a dedicated control panel added to the Autolab display of the NOVA software (see Figure 4).

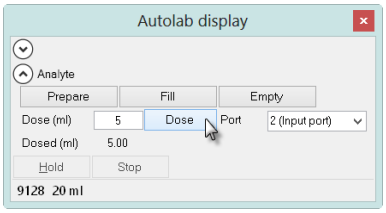

Figure 4 – Manual control of a Metrohm 800 Dosino

Using the manual control panel, the Dosino can be operated from NOVA, either when the connected Autolab is on standby or during an electrochemical measurement.

It is also possible to embed Dosino control commands directly into a NOVA procedure for completely automatic liquid handling. The commands used to control the Dosino can be found in the Metrohm devices group of commands (see Figure 5).

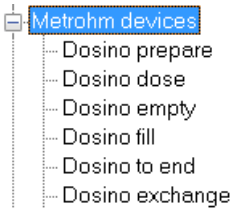

Figure 5 – The Dosino control commands are located in the Metrohm devices group of commands

Experiment example

Figure 6 shows a simple example of a standard addition experiment using a Metrohm 800 Dosino.

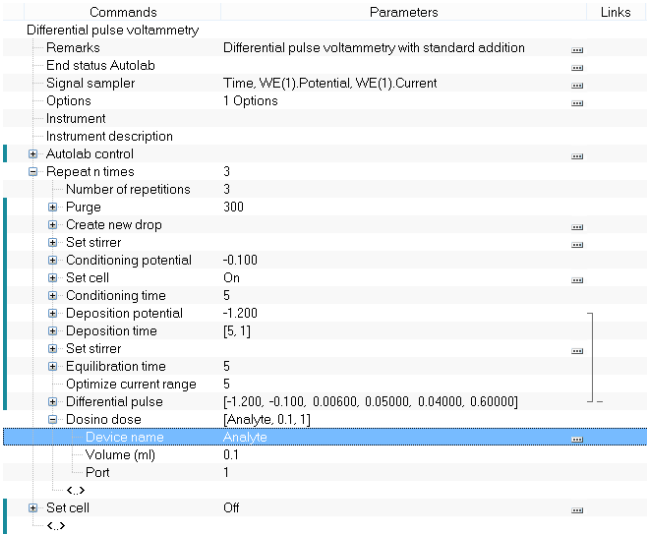

Figure 6 – Example of a standard addition experiment with a Metrohm 800 Dosino

The procedure uses a simple repeat loop (three repetitions). Each repetition performs a single differential pulse experiment. At the end of each repetition, 100 µL of a standard are added to the cell using Port 1 of the Dosino.

Figure 7 shows an example for the determination of zinc in tap water. The measurements are carried out using the PGSTAT302N connected to a Metrohm 663 VA Stand through the IME663 interface. The working electrode is a Hg drop. In this example, 10 mL of tap water (with 10 µL of HNO_3) are spiked twice with 100 µL of Zn standard (200 µg/L). The additions are carried out by the connected Dosino.

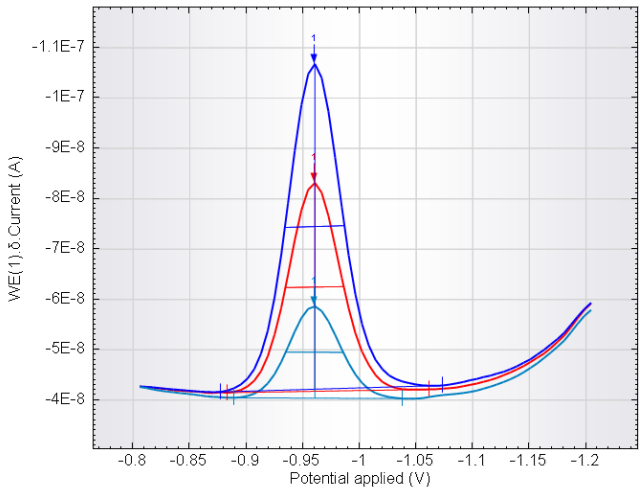

Figure 7 – Differential pulse voltammograms for the determination of Zn in tap water

The obtained curves can be analyzed in NOVA and the peak height can be plotted against the added Zn standard concentration in order to extrapolate the sample concentration (see Figure 8).

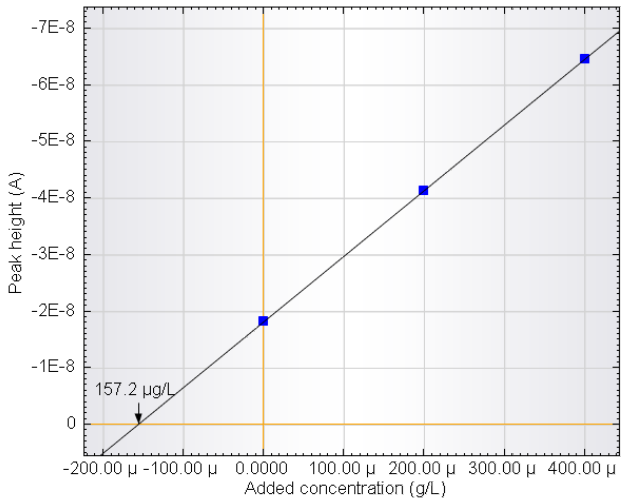

Figure 8 – Peak height versus added concentration plot obtained from the standard addition experiment with the Metrohm 800 Dosino

Conclusion

The combination of the Autolab potentiostat with Metrohm liquid handling systems is straightforward in NOVA. Standard addition experiments can be carried out manually or automatically using the Metrohm 800 Dosino.

Find out more

For more information on Autolab NOVA, visit the Metrohm Autolab website. Additional information and specifications of the supported Metrohm devices can be found on the Metrohm website: http://products.metrohm.com/

Additional information about the support of the Metrohm devices can be found in the External devices tutorial, available on the Metrohm Autolab website: http://www.metrohm-autolab.com/Products/Nova/Tutorials.html

Date

26 June 2014