Chromatography Short Note No AS100S

Using the GERSTEL Multi Purpose Sampler (MPS) as a large volume fraction collector.

Introduction

This short technical note describes the use of a GERSTEL Multi Purpose Sampler (MPS) as a fraction collector. A fraction collector is a device that allows regular or specified samples to be taken from a column eluate or sample stream and stored in a retrievable form for further processing. The storage vessels in this case were 20 ml vials but potentially could be any size depending on the tray configuration of the MPS.
Fraction collectors are generally used to collect samples for further purification, subsequent examination by spectroscopic techniques or for biological testing.
In this case the system was utilised for collecting large volume fractions from an online process to allow sample characteristics under different or varying conditions to be assessed.

Instrumentation

Gerstel Multi Purpose Sampler (Figure 1)
Modified syringe holder featuring three port switching valve (Figure 2)
Cycle Composer Version 1.6.0
Anatune 20 ml x 160 vial tray.

Figure 1. Gerstel MPS being used as a fraction collector.

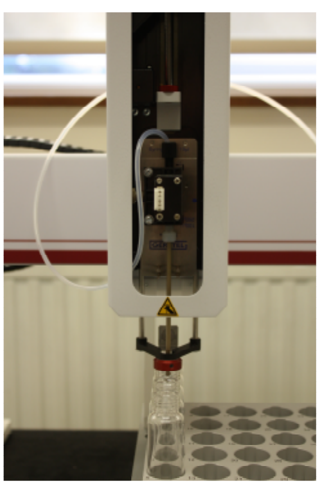

Figure 2. Close up view of modified syringe holder and three port valve.

Methodology

In order to implement a fraction collector capability on the MPS a universal syringe holder had to be adapted by fitting a 24 V three port switching valve on the front of the holder. This valve was controlled using the Power-Out Event of the MPS. The addition of this valve allows a process stream (sample) to be diverted to waste or to collection vessels located on the MPS tray. The MPS movements are controlled using the PAL software package Cycle Composer. The software package features a Macro Editor (Figure 3) which allows the user to program the MPS movements to enable fraction collection for a designated time period at a user configurable time interval.
For the purposes of this study a sample stream was sampled into 20 ml vials for a period of ten seconds at an interval of every minute. At all other times other than the ten second sampling period, the sample stream was flowing to a waste receptacle.

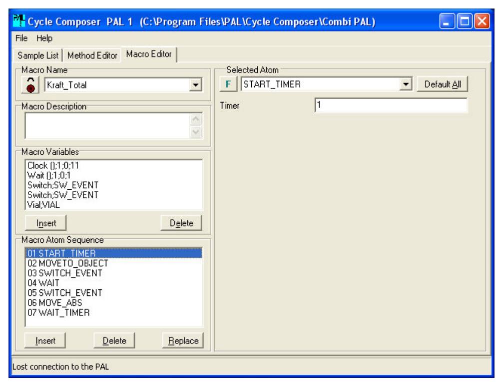

Figure 3. Showing the Macro Editor of Cycle Composer.

Control of the system i.e the number of fractions to collect is controlled by a Sample List to which a Method is allocated to each Sample List entry (Figure 4). Contained within a Method are a series of Macros, in this case seven Macros enabled the automated fraction collection. In order to test the repeatability of the system a bottle was pressured to deliver a constant flow of liquid to simulate a sample stream and then fifteen fractions were collected, one every minute.

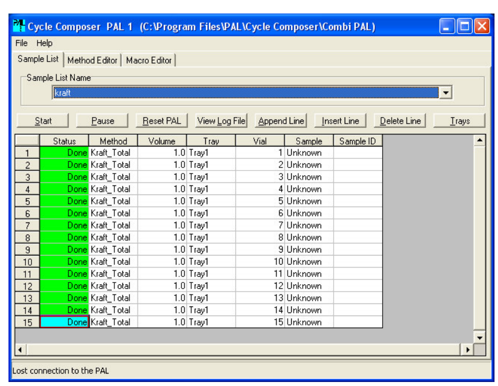

Figure 4. Showing the Sample List entry screen.

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Results

Of the fifteen samples collected the average, standard deviation and relative standard deviation (% RSD) was calculated.

Sample	Initial Weight (g)	Final Weight (g)	Weight Dispensed (g)
1	15.6815	20.8754	5.1939
2	15.7146	21.1579	5.4433
3	15.5690	20.9171	5.3481
4	15.7172	21.6130	5.8958
5	15.6830	21.1078	5.4248
6	15.7116	21.2778	5.5662
7	15.6430	21.2374	5.5944
8	15.6333	20.9107	5.2774
9	15.7490	20.9330	5.1840
10	15.6340	20.6357	5.0017
11	15.6400	21.1591	5.5191
12	15.4825	20.8220	5.3395
13	15.4554	20.8555	5.4001
14	15.7877	20.6932	4.9055
15	15.7421	21.0565	5.3144

At the flow rate delivered by the pressurized bottle an average of 5.36 ml was collected in each vial with a standard deviation of 0.24 and a % RSD of 4.53 which is fully acceptable for this sort of application.

Conclusions

The modified MPS was successfully used as a fraction collector in this study. Acceptable % RSD data was generated for a simulated process stream. The versatility of the trays that can be implemented onto an MPS give the option to collect extremely large fractions of greater than 100 ml. It is also a possibility to add a second MPS rail to the setup to allow for other automated sample preparation procedures such as solid phase extraction, liquid/liquid extraction or centrifugation to be carried out on the collected fractions. The system may also be placed on-line with an analyzer such as a GC-MS or LC for real time analysis of the sample stream.

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