

Application Note 04

Small Volume Injections

Small Volume Injections with SR8500 Syringe Pump

Our SR8500 syringe pump includes a feature for performing small volume injections referred to as recycle mode. The recycle mode is ideal when a research project is sample volume limited. This unique feature is typically used either for immobilization of ligand or to obtain equilibrium or kinetic data from analyte injections when only minimal sample volume is available for injection (1 - 50 μL).

Experimental

A small volume of sample can be aspirated by the pump and then recycled to conserve on sample. To accomplish this, a short piece of tubing is connected to the flow cell outlet (4" long x 1/16" OD x 0.005" ID, volume = 1.3 μL). This tubing is submerged directly into the sample container (e.g., a microcentrifuge tube) and the sample is aspirated into the flow cell at a particular rate. The sample is then pumped back and forth in the flow cell at a defined recycle rate. The range of available volumes and rates is as follows:

- Aspirate Volumes: 5, 10, 15, 20, 30, 40, 50 μL
- Aspirate Rates: 1, 2, 5, 10 $\mu\text{L}/\text{min}$.
- Recycle Volumes 1-10 μL
- Recycle Rates 25, 50, 100, 200, 500 to 6000 in 500 increments ($\mu\text{L}/\text{min}$.)

Results

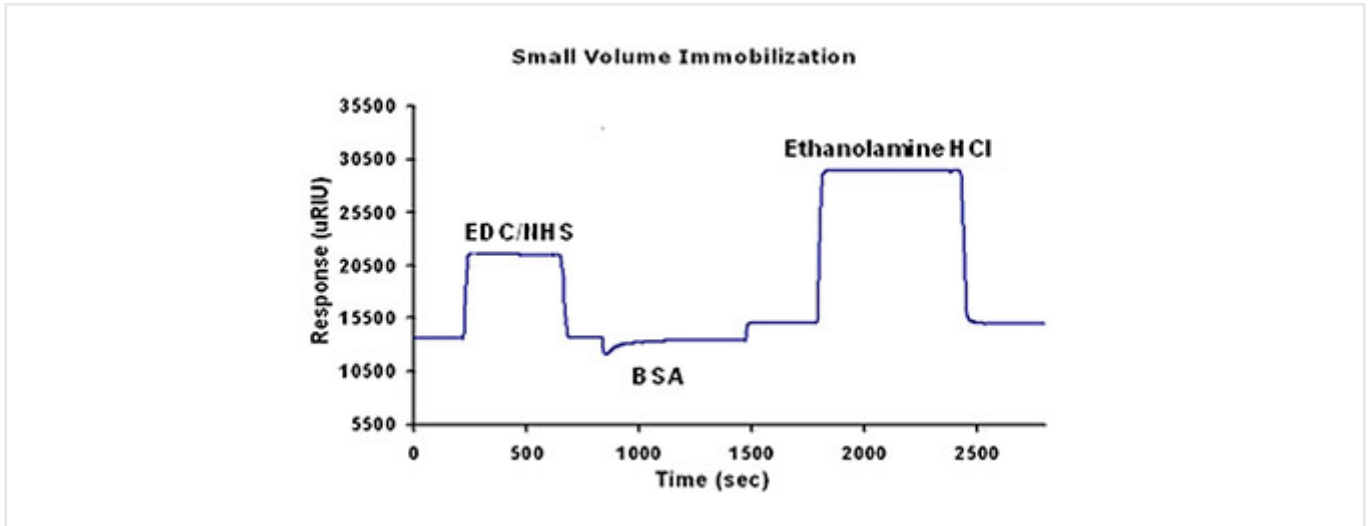


Figure 1: This Figure presents the immobilization of bovine serum albumin (BSA). Specifically, BSA is amine coupled to a planar mixed alkanethiol surface. A sample volume of 10 μL of BSA is aspirated at a rate of 10 $\mu\text{L}/\text{min}$ into the flow cell. The BSA sample (recycle volume of 1 μL) is then pumped forward and reverse at a recycle rate of 500 $\mu\text{L}/\text{min}$. The immobilization of BSA was carried out for 630 sec.

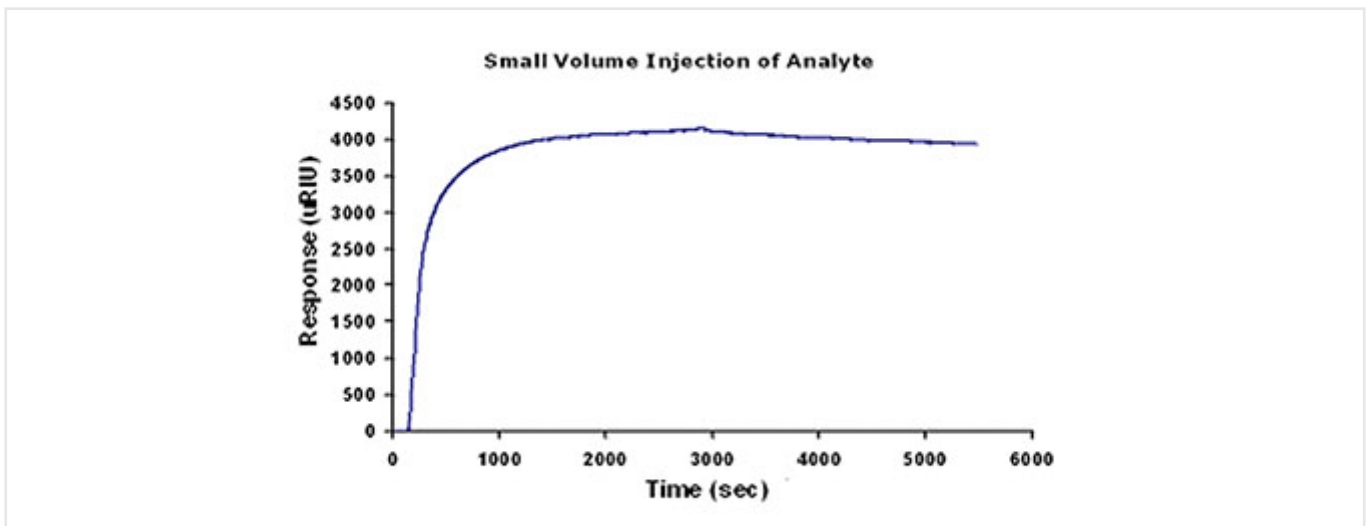


Figure 2: This Figure presents the binding of anti-bovine serum albumin (Anti-BSA) to BSA despite an extremely low sample volume. Specifically, a sample volume of 15 μL of anti-BSA is aspirated at a rate of 10 $\mu\text{L}/\text{min}$ into the flow cell, and then a recycle volume of 1 μL is used at a recycle rate of 500 $\mu\text{L}/\text{min}$ for the association binding curve. The association time is 2800 sec and the response approaches equilibrium.

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