



Elemental Scientific Inc Technical Note-8

SC-Probe accuracy for micro volume samples

Limited sample availability, either due to difficulty in sample collection, rarity of sample type or expensive reagents often results in sample volumes $< 500 \mu\text{L}$ to be analyzed. One such example is the determination of Metal/Ca ratios in foraminifera where small sample volumes of $400\mu\text{L}$ and low DL requirements are the norm. For this application samples are prepared for analysis in $500 \mu\text{L}$ micro-centrifuge tubes. Here we demonstrate how probe calibration of the SC series auto sampler improves auto sampler reliability and accuracy.

Instrumentation & Sample Intro

- SC-2 auto sampler
- $100 \mu\text{L min}^{-1}$ Sample probe
- PFA-ST MicroFlow nebulizer

SC-Series Autosampler

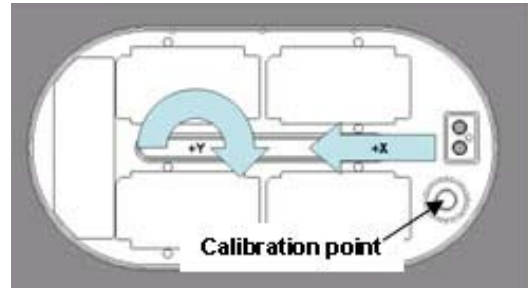
SC-auto samplers can hold the widest range of both large standard racks and/or micro racks, with vials ranging from $500\mu\text{L}$ to 250mL . Two calibration procedures ensures accurate probe positioning for micro-vials. The SC-2 auto sampler can accommodate 4 racks of $500 \mu\text{L}$ vials each containing 60 places allowing for 240 consecutive automated analyses.

Calibration 1 - Autosampler

Clearly the most important function of an auto sampler is to ensure the probe accurately finds the sample tube. When analyzing samples in micro tubes this requires high resolution probe accuracy. The result of missing one tube is not only the loss of one sample, but often the remainder of the run. When the probe misses it may bend and miss the rest of the samples or aspirate air that can stop the free aspiration (see Tech note 7).

Micro-centrifuge tubes have a 7 mm opening, resulting in low tolerance

for error in probe accuracy. Therefore, accurately finding 240 7mm openings requires high resolution probe calibration. The probe position for the



SC-2 auto sampler can be calibrated to sub millimeter resolution in the X, Y and Z dimensions. To do this the probe is sent to a calibration position where the tip is aligned, via software control, with a calibration point on the sample platform. The calibration values are then applied and saved.



Calibration 2 - Rack

To further ensure probe accuracy in micro-centrifuge tubes the first vial position in each rack can also be calibrated. The probe is simply sent to the first position then centered in the



tube using X Y software control. Finally, the Z depth of the probe is set via the software to within 1 mm of the

bottom of the tube. This ensures the sample does not run out of solution resulting in dismembered air bubbles that stop free aspiration. Once calibrated, automated analyses of 240 sub $500\mu\text{L}$ volume samples is routine.