Technical Note 113

Microvolume Mode Carryover Studies

Introduction

Since the first microvolume instrument was introduced in 1999, small volume spectrophotometric absorbance measurements have become the preferred method for nucleic acid and purified protein concentration determinations. The simplicity of pipetting a 1 – 2 µL sample onto a surface, followed by a quick removal using a lab wipe, eliminated the hassle of cleaning cuvettes between sample measurements. To take full advantage of this microvolume ease-of-use paradigm, it is important that the sample measurement surface design facilitates easy cleanup between samples and does not promote carryover.

This technical note will present data demonstrating that the microvolume sapphire and quartz surfaces of the DeNovix DS-11 Series meet the requirements described above.

Method and Materials

The carryover of the DS-11 was assessed using both dsDNA (Affymetrix, cat #14405) and bovine serum albumin (BSA) (Sigma Aldrich, cat #A7284). The first study assessed the carryover of a solution of ~ 5000 ng/µL dsDNA. The measurement sequence was as follows:

- Two replicates of dH20
- Three replicates of dsDNA
- Two replicates of dH20

Fresh 1.0 µL aliquots were used for each replicate measurement. The sample solution was removed between each measurement by wiping the upper and lower sample surfaces with a clean, dry laboratory wipe.

The second study assessed the carryover of a solution of ~20 mg/mL BSA. The measurement sequence was as described above, substituting the BSA for the nucleic acid sample and PBS for dH_20.

Results

As seen in Tables 1 and 2, the blank solution measured both before and after the nucleic acid and protein samples were below the DS-11 lower detection limit.

Ultra high concentration protein samples may require more rigorous wiping between samples. A study using a high concentration BSA sample showed a lack of carryover when surfaces were vigorously wiped using a dry lab wipe between BSA measurements. Subsequent PBS measurements met the expected results of being within the +/- 0.1 mg/mL lower detection limit of the instrument.

Table 1: dsDNA and BSA Carryover

Sample	ng/µL	Sample	mg/mL
dH_20	0	PBS	-0.06
dH_20	-0.9	PBS	-0.05
dsDNA	5157.3	BSA	21.15
dsDNA	5078.2	BSA	20.94
dsDNA	5094.65	BSA	21.07
dH_20	0.65	PBS	-0.06
dH_20	0.9	PBS	-0.1

Table 2: Ultra High Concentration Carryover

Sample (n=5)	Average mg/mL

Sample (n=5)	Average mg/mL
BSA	313.89
PBS	-0.004

Summary

The studies demonstrated a lack of significant carryover for either high concentrations of nucleic acid or protein samples. The DS-11 microvolume measurement surface facilitates easy cleanup to ensure minimal-to-no carryover of high concentration samples.

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