



Technical Note 178

DeNovix SmartQC™ vs. NanoDrop™ Acclaro™

Introduction

This document highlights the value of DeNovix® SmartQC™ software found on DeNovix DS-11 Series instruments and explains how it oversees the entire sample measurement process. Multiple algorithms ensure confidence in results while simultaneously providing important information to scientists about possible sample anomalies. This note also compares SmartQC to the Acclaro™ feature of the Thermo Fisher Scientific NanoDrop™ One.

Total Sample Confidence

Identifying co-extracted contaminants and having confidence in the quality control process is of great value in determining the suitability of a sample for downstream applications. DeNovix SmartQC is a unique suite of software features that alerts users to potential sample contaminants and helps to avoid common sample measurements errors (figure 1).

SmartQC Key Features

- Sample Contamination Alerts
- Measurement Surface Cleaning Monitor
- Bridge Testing® - ensures that sample column is always formed
- SmartPath® - always calibrated with no routine maintenance
- Spectral Analysis

Contamination Alerts

Using visual alert icons, DeNovix SmartQC clearly flags samples that do not meet well-established purity specifications. Tapping on an alert icon on the Run screen will provide detailed information regarding the possible reasons for the high or low value.

For nucleic acids, common contaminants such as phenol, protein, carbohydrates, guanidine and glycogen are identified by SmartQC. For proteins, the presence of nucleic acids or buffers that absorb highly in the UV range are typical factors affecting purity measurements.

SmartQC Custom Limits

One important element of the SmartQC software is the use of defined thresholds for the robust method of purity ratio determination.

To ensure that each investigator or lab identifies samples that meet the criteria specific to their studies, DeNovix software enables users to define and save custom limits or use well-established default values. Users may also choose to not enforce any limits. This flexibility allows full compliance to laboratory and protocol standards across all users.

The NanoDrop™ Acclaro™ software also uses a purity ratio alert feature. However, that software does not offer the option to customize or turn off the limits.

The Acclaro™ software presents only one icon on the screen, whereas the DeNovix software presents separate icons for each nucleic acid ratio, making it immediately clear which ratio is out of specification. To add to possible confusion, the Acclaro™ ratio alert information icon is sometimes—but not always—used in conjunction with a deconvolution icon.

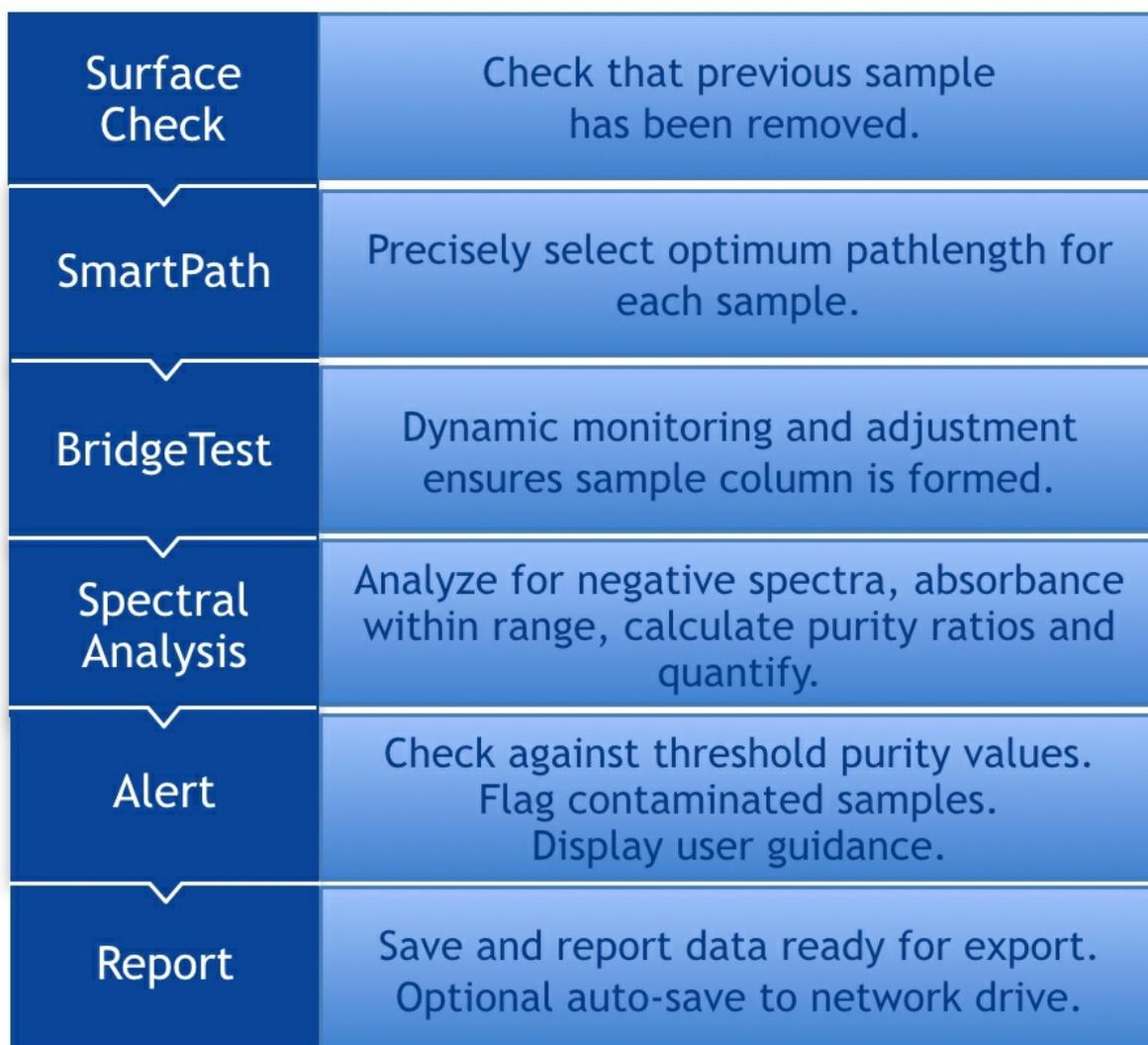


Figure 1: SmartQC automated quality control process.

Deconvolution vs. Alerts

The NanoDrop™ Acclaro™ software includes a deconvolution feature that attempts to present corrected concentration values for samples with significant contaminant levels. In the case of nucleic acids contaminated with protein, the sample needs to be grossly contaminated with 75% or more protein (<25% nucleic acid) for the deconvolution to be enabled. In addition, the deconvolution feature is only applied to samples within a limited dynamic range (25 to 3125 ng/?L). The DeNovix software focuses on notifying users when samples do not meet user-defined criteria, ensuring measurement integrity and enabling the user to make informed decisions.

SmartPath Technology with Bridge Testing

The NanoDrop™ One user guide indicates that the accuracy of the deconvolution algorithm instrument is dependent on whether the instrument's maintenance schedule is followed. SmartPath Technology, a unique DeNovix innovation at the heart of the DS-11 Series, eliminates the need for instrument recalibration and scheduled maintenance procedures. Scientists can have high confidence that every trial performed by a DeNovix instrument provides accurate results.

In addition to identifying potential contamination, SmartQC diagnoses methodological errors that can result in inaccurate absorbance measurements. The software monitors the sample measurement and cleaning process and warns users when a sample has not been removed by a previous user.

DeNovix's SmartPath Technology also includes patented Bridge Testing algorithms. Bridge Testing detects if a sample is not bridging the optical surfaces and automatically compensates to provide a correct measurement in real time. The NanoDrop™ One may alert the user to a sample column anomaly, but it is not capable of making an adjustment to complete the column and will not report a measurement result. The user must reload and use extra sample.

Co-Extracted Nucleic Acids: The Importance of Fluorescence

Nucleic acids, when co-extracted with the molecule of interest (e.g., fragmented DNA, oligo, RNA in a dsDNA prep), cannot be distinguished reliably through measuring absorbance alone. Since all nucleic acid species absorb maximally at 260nm, measuring by only using absorbance could result in an overestimation of sample concentration.

For samples containing contaminants or buffers that interfere with the measurement wavelength in use, fluorescence quantitation—using fluorophores specific for the molecule of interest—is the ideal complimentary method to absorbance quantitation.

The DS-11 Series Spectrophotometer / Fluorometer and FX Module enable both absorbance and fluorescence measurements in one instrument. The combination of absorbance and fluorescence provides greater confidence and accuracy when measuring samples and is a protocol requirement in applications such as Next Generation Sequencing.

Summary

DeNovix SmartQC monitors the complete measurement and quality control process, and it alerts users to potential sample contamination in real time. Onscreen alert icons and specific guidance messages provide valuable insights for troubleshooting nucleic acid and protein extractions.

DeNovix instruments, combining innovative software with complimentary absorbance and fluorescence capabilities, deliver unparalleled sample insight. DeNovix enables today's scientists to make informed decisions when using samples in expensive or time-consuming downstream applications.

Comparison of DeNovix software v 3.17 vs. NanoDrop™ One v 1.14 October 2017. NanoDrop™ and Acclaro™ are registered trademarks of Thermo Fisher Scientific.

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