



Quantitation of Nucleic Acids



Quantitation of Double-Stranded DNA

- Trace Measurement Using TrayCell and Nano Stick -



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Operating Principle and Features

The UV-1900i UV-VIS spectrophotometer features a space-saving and ergonomic hardware design. The user interface (UI) is displayed on a color touch panel to ensure the system status and operating procedures can be determined easily with a single glance. The Biomethod mode includes six types of built-in measurement conditions: 1. Nucleic acid quantitation, 2. Lowry method, 3. BCA method, 4. CBB (Bradford method), 5. Biuret method, and 6. UV method. These methods can be used to measure samples easily for given analytical objectives. The operation panel screenshot function can be used to easily extract measurement results without connecting to a computer. A 10 mm square cell requires a sample volume of approx. 4 mL, but the use of a TrayCell or Nano Stick cell enables measurement of micro sample quantities of approx. 2 to 4 µL.

Measurement Method

Double-Stranded DNA Measurement Method Using a TrayCell
Double-stranded DNA was prepared to create 27.5, 55, 110, 220, and 440 ng/µL standard samples (diluted with ultrapure water). Actual samples were prepared by ethanol precipitation of the same DNA. With the TrayCell, the optical path length can be changed to either 1.0 mm or 0.2 mm by switching between two types of caps. In this example, a cap with a 1.0 mm optical path length was used to measure 4 µL of dripped sample based on the conditions listed in Table 1 (Fig. 1).

Double-Stranded DNA Measurement Method Using a Nano Stick Accessory
Standard samples and actual samples of double-stranded DNA were prepared using the same method as described for the TrayCell above. The same measurement conditions were also used, as listed in Table 1. 3 µL sample volumes were measured with the 0.5 mm optical path length of the Nano Stick (Fig. 2).

Results

Calibration curves and UV spectral results from measurements using the TrayCell and Nano Stick are shown in Fig. 3 and Fig. 4. Both resulted in calibration curves with high linearity and good measurement accuracy, confirmed by correlation and CV values calculated from 10 repeated measurements of a 440 ng/µL sample.

Conclusion

TrayCell and Nano Stick accessories were used with a UV-1900i UV-VIS spectrophotometer to confirm that micro sample quantities on the order of several microliters can be measured accurately and easily.

Application Examples

- Evaluating DNA purity based on absorbance ratio
- Measuring DNA concentration
- Measuring protein concentration

Wavelength (Calibration curve):	260 nm, 320 nm
Wavelength range:	220 nm to 330 nm
Scan speed:	Low
Sampling pitch:	1.0 nm



Fig. 1 TrayCell



Fig. 2 Using a Nano Stick Cell

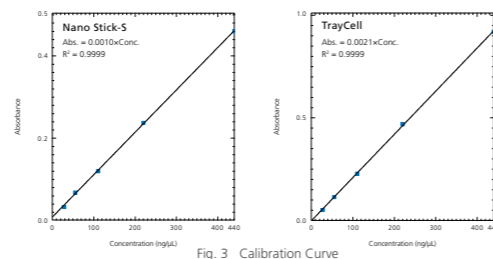


Fig. 3 Calibration Curve

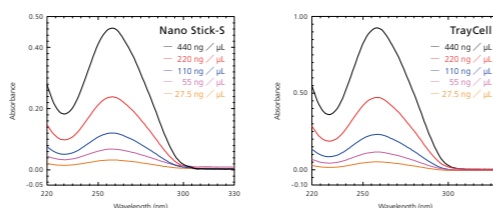


Fig. 4 Absorption Spectra of Lambda-DNA

UV-1900i



- Spectra can be acquired at ultra-fast scan speeds up to 29,000 nm/min.
- Sample volume of as low as 0.7 µL can be measured using a TrayCell or Nano Stick cell.
- Nucleic acid concentration can be easily determined using the built-in Biomethod mode.



Specifications

Instrument	UV-1900i
Sample volume	10 mm standard cell = 2.5 to 4.0 mL TrayCell = 0.7 to 10 µL, Nano Stick = 2 µL min.
Wavelength range	190 to 1,100 nm
Spectral bandwidth	1 nm
Light source	20 W halogen lamp and deuterium lamp Built-in light source auto position adjustment
Monochromator	LO-RAY-LIGH grade blazed holographic grating in Czerny-Turner mounting
Detector	Silicon photodiode
Sample compartment	Internal dimensions: W 110 × D 250 × H 115 mm
Distance between light beams	100 mm
Dimensions	W 450 × D 501 × H 244 mm
Weight	16.6 kg
Output device	USB memory (optional) Extended memory (optional) Data files saved in text format or UVPC format* <small>*Files in UVPC format can be read with the UVProbe file viewer, which is a function of LabSolutions UV-Vis, or with UVProbe software.</small>
Display	24-bit color touch screen Touch pen (standard included) Touch panel protective sheet (optional)