Application Note

UV-0018

The Model SAH-769 One-Drop: A Dedicated Accessory for Extremely Small Amounts of Protein and Nucleic Acid Samples

JASCO introduces a new measurement method for an extremely small amount of DNA samples, or any other sample, by using the model V-630BIO spectrophotometer with the model SAH-769 One-Drop accessory.

The SAH-769 measures 5 or 0.6 µL of sample dropped on the disk cell with a 1- or 0.2- mm optical path, respectively. The precise optical path is secured by covering the liquid sample with the cover glass integrated with the unit. The cell and cover glass can be washed by simply wiping them clean with laboratory wipers. The simple method for the measurement of proteins and nucleic acids allows users to measure large numbers of samples promptly. The shorter optical path length configuration allows measurement of high concentration samples without further dilution.

The V-630BIO, the main unit of the system, utilizes a monochromator with a diffraction grating and a double-beam optical system to ensure high stability for extremely reliable measurements. The V-630BIO can be operated by the intelligent Remote Module (iRM) color touch panel control module or utilizing the cross-platform Spectra Manager software designed for the Windows operating system. In either case, the software includes standard programs for life science analyses. The [Protein/Nucleic Acid Measurement] program measures the sample absorbance at 260 and 280 nm to calculate the protein and nucleic acid ratio. The [Temperature Control Measurement] program with optional Peltier thermostatted cell holders can be utilized for the DNA melting analysis experiment.

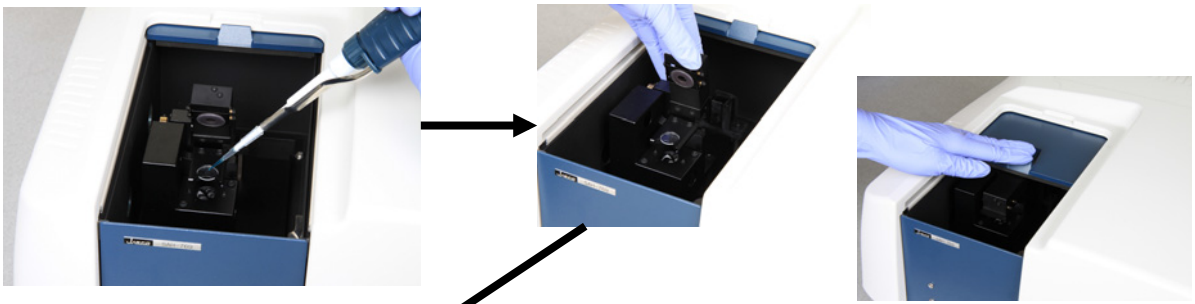
System Configuration

V-630BIO	Spectrophotometer for life science field	
SAH-769	One-Drop	
	Dedicated disk cell	1-mm optical path with 5 µL of sample volume
	(Optional disk cell	0.2-mm optical path with 0.6 µL of sample volume)

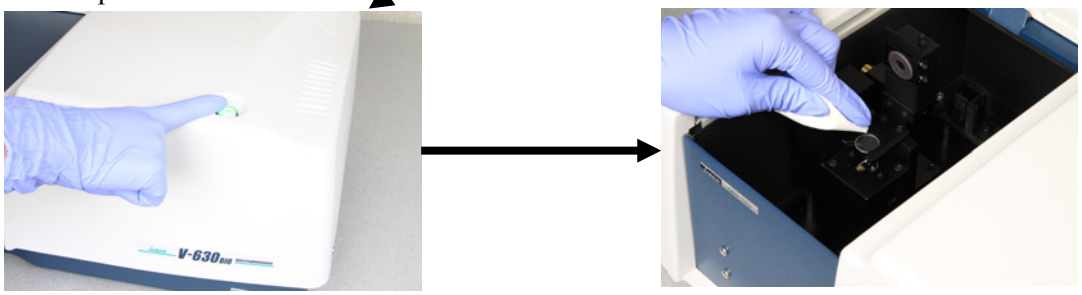
Measurement Procedure

1) Drop sample on the cell

2) Close the cover glass and the lid of sample compartment



3) Start sample measurement



The measurement takes less than 20 seconds.

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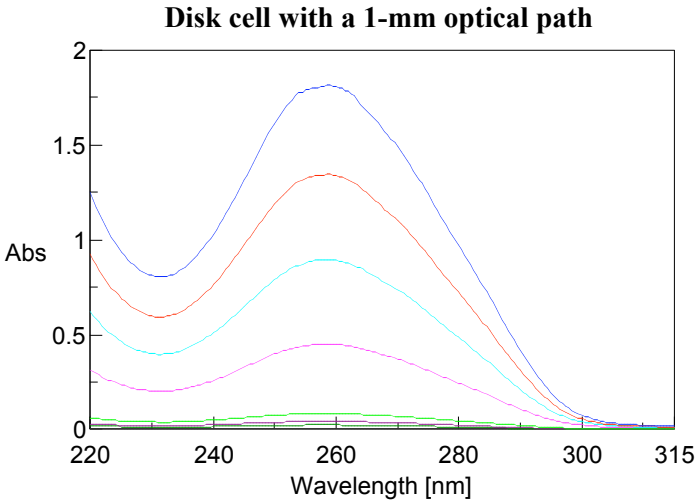
Measurement Results

Precision of Quantitative Analysis

Solutions of Calf Thymus DNA (KH_2PO_4 / NaOH buffer at pH7) at several concentrations were measured by using cells with 1-mm and 0.2-mm optical paths. The spectra (collected with identical instrument parameters) using each cell are illustrated in Figures 1 and 2. The graphs 1 and 2 illustrate the calibration curves created using the absorbance maxima at 260 nm. Both calibration graphs demonstrate good linearity.



Measurement Parameters
Data interval: 0.5 nm
Measurement range: 220 to 315 nm
Band width: 1.5 nm
Response: Medium
Scan Speed 200 nm/min

Figure 1. Absorbance spectra of DNA solution [optical path: 1 mm]

Graph 2 Calibration Curve [Optical path : 1 mm]

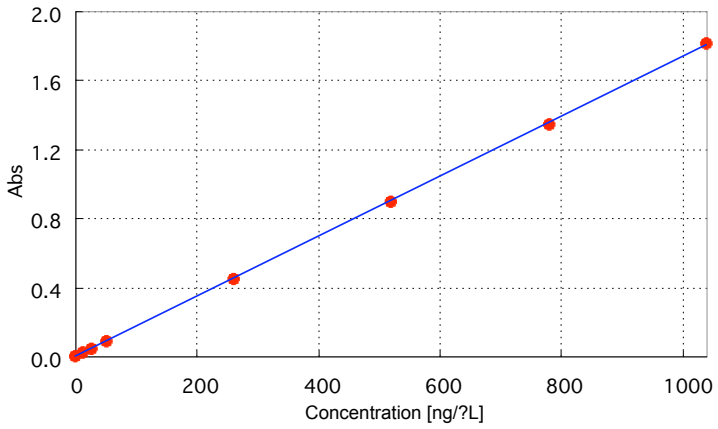


Table 1 Sample Conc. and Abs [OP: 1mm]

Legend	Conc. [ng/μL]	Abs
—	0	0.0005
—	13	0.0228
—	26	0.0417
—	52	0.0838
—	260	0.4500
—	520	0.8970
—	780	1.3443
—	1040	1.8137

y = 0.0017x - 0.0032	
Correlation coefficient	1.0000
Standard deviation	3.09

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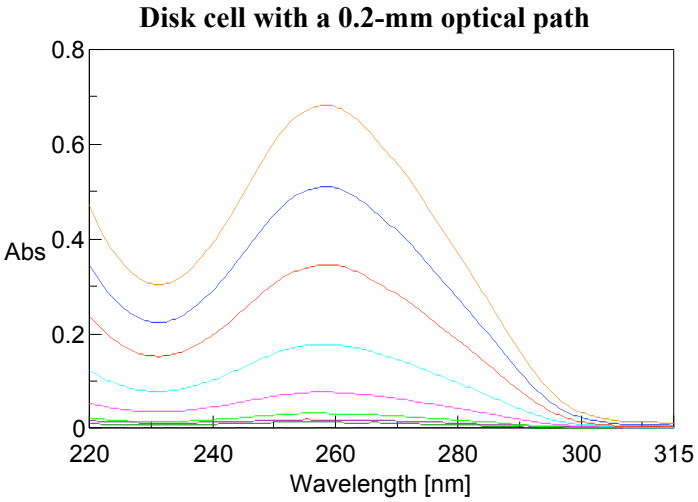

Figure 2 Absorbance spectra of DNA solution [optical path: 0.2 mm]

Graph 2 Calibration Curve [Optical Path: 0.2 mm]

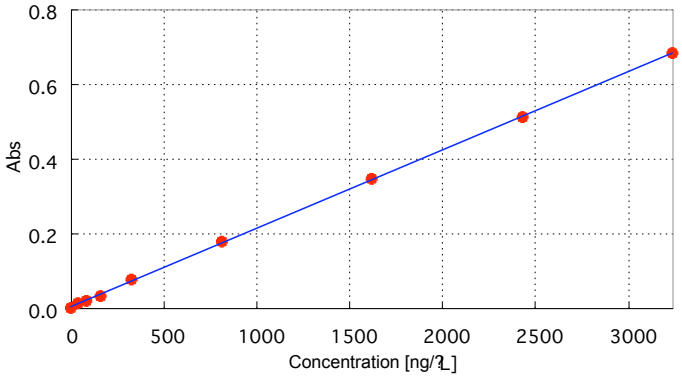

Table 2 Sample Conc. and Abs [OP: 0.2 mm]

Legend	Conc. [ng/μL]	Abs
—	0	-0.0009
—	40.5	0.0134
—	81	0.0180
—	162	0.0313
—	324	0.0766
—	810	0.1774
—	1620	0.3456
—	2430	0.5103
—	3240	0.6823

* Detection and quantitation limits are calculated as 3.3σ and 10σ, respectively.

y = 0.0002x + 0.0029	
Correlation coefficient	0.999880002
Standard deviation	18.4930641

Contamination of Samples

The disk cell and cover glass were wiped clean after measuring the absorbance of a 5-µL high concentration DNA sample. Then, a 5 µL solvent was measured to evaluate sample cross-contamination of the disk cell. The results indicated in Table 3 indicate the wiping is enough to wash the sample from the cell.

Table 3: Carry over of DNA sample

	DNA sample		Solvent
Absorbance	1.8832	→	0.0002

Wiping sample

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