

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

Introduction

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.



V-630 BIO spectrophotometer



SAH-769 One-Drop

Keywords: One-drop accessory, protein quantification, nucleic acid quantification, V-630, V-650, uv-visible spectrophotometer

JASCO INC.

28600 Mary's Court, Easton, MD 21601 USA
Tel: (800) 333-5272, Fax: (410) 822-7526

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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	16
SAH-769	One-Drop
Dedicated disk cell	1-mm optical path with 5 μ L of sample volume
*Optional disk cell	0.2-mm optical path with 0.6 μ L 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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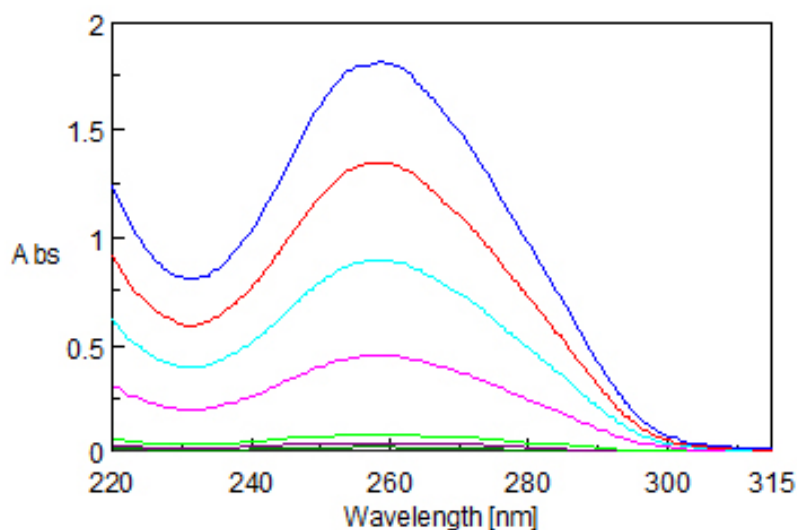
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Measurement Procedure

Precision of Quantitative Analysis

Solutions of Calf Thymus DNA (KH₂PO₄ / 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.

Disk cell with a 1-mm optical path



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]

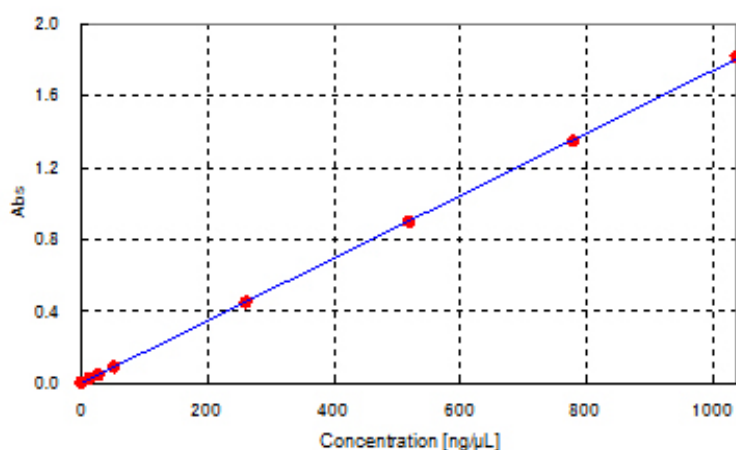


Table 1 Sample Conc. and Abs [OP: 1mm]

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

Detection limit* 10.20 ng/mL

Quantitation limit* 30.92 ng/mL

Disk cell with a 0.2-mm optical path

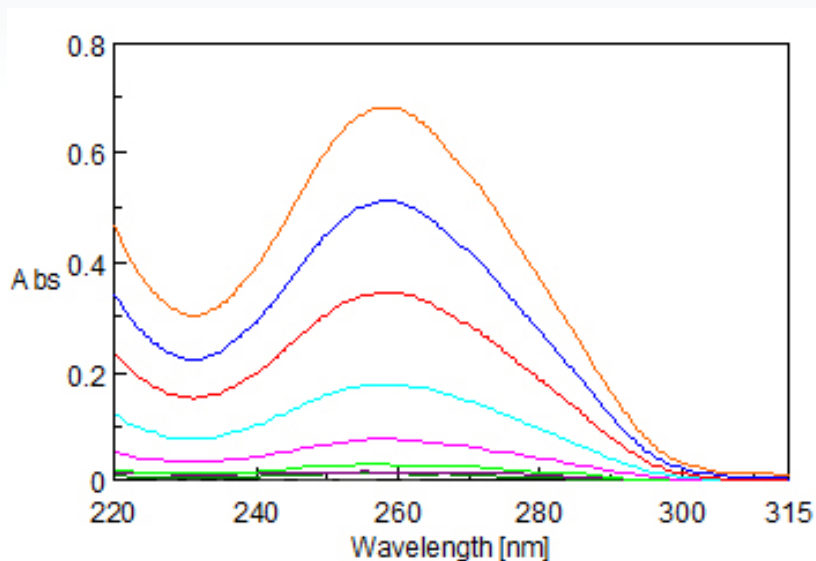
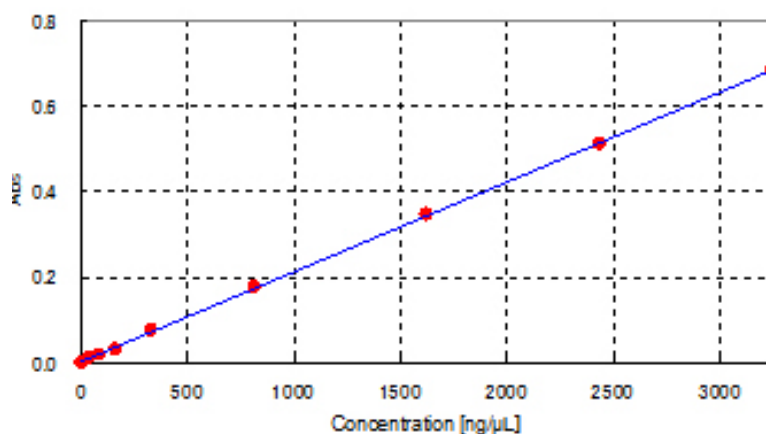


Figure 2 Absorbance spectra of DNA solution [optical path: 0.2 mm]

Graph 2 Calibration Curve [Optical Path: 0.2 mm]



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

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

$$y = 0.0002x + 0.0029$$

Correlation coefficient 0.999880002

Standard deviation 18.4930641

Detection limit* 61.03 μg/mL

Quantitation limit* 184.93 μg/mL

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		Absorbance	0.0002

Wiping sample

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