Application Note

UV-0021

Measurement reproducibility using SAH-769 one-drop measurement unit

Introduction

SAH-769 one-drop measurement unit is the premier accessory for multiple-sample quantitation of proteins and nucleic acids. Simply dispense one drop of sample (5 µL for 1 mm path length; 0.6 µL for 0.2 mm path length) on the cell, set the cover glass and start the measurement.

Here, we present the measurement reproducibility of calf thymus DNA using SAH-769 one-drop measurement unit with 1- and 0.2-mm path length cells.

Keywords: One-drop measurement, protein, nucleic acid, reproducibility, detection limit, quantitation limit

Measurement system

V-630BIO: UV-Vis spectrophotometer for routine biological measurements
SAH-769: One-drop accessory
Dedicated cells: 1 mm cell (minimum sample volume: 5 µL)
0.2 mm cell (minimum sample volume: 0.6 µL)

Sample

Aqueous solution of calf thymus DNA

Procedure

A drop of sample was dispensed and measured, and then the measured sample was wiped from the cell. This procedure was repeated ten times.

Parameters

Wavelength: 260 nm
Bandwidth: 1.5 nm
Response: Medium

JASCO INTERNATIONAL CO., LTD
4-21, Sennin-cho 2-chome, Hachioji, Tokyo 193-0835, Japan
Tel: +81-42-666-1322, Fax: +81-42-665-6512

Results

1 mm path length cell

Table 1 Reproducibility of absorbance

Conc. [ng/µL]	0	2.4	4.8	9.6	19.3	38.6	77.2	154.4	308.8	617.5
1	-0.0008	0.0047	0.0084	0.0179	0.0321	0.0676	0.133	0.259	0.516	0.998
2	0.0003	0.0059	0.0093	0.0146	0.0332	0.0677	0.131	0.260	0.518	1.003
3	0.0012	0.0056	0.0083	0.0162	0.0334	0.0705	0.130	0.260	0.519	1.003
4	0.0015	0.0063	0.0072	0.0181	0.0345	0.0679	0.130	0.262	0.512	1.024
5	-0.0002	0.0067	0.0071	0.0166	0.0329	0.0676	0.132	0.264	0.517	0.993
6	-0.0013	0.0053	0.0088	0.0204	0.0331	0.0672	0.130	0.259	0.522	0.996
7	0.0013	0.0049	0.0082	0.0170	0.0336	0.0695	0.129	0.259	0.511	0.996
8	0.0002	0.0036	0.0089	0.0168	0.0326	0.0680	0.133	0.260	0.509	1.006
9	0.0027	0.0058	0.0089	0.0177	0.0315	0.0676	0.134	0.260	0.509	1.000
10	-0.0004	0.0043	0.0069	0.0153	0.0353	0.0692	0.132	0.267	0.509	0.995
A.V. [Abs]	0.0004	0.0053	0.0082	0.0171	0.0332	0.0683	0.131	0.261	0.514	1.001
S.D.	0.0012	0.0010	0.0008	0.0016	0.0011	0.0011	0.0015	0.0026	0.0047	0.0089
C.V. [%]	N/A	17.9	10.3	9.6	3.3	1.6	1.2	1.0	0.9	0.9

Calibration equation: Abs = 0.00163 x Conc. + 0.00366
Correlation coefficient: 0.9998

Table 2 Reproducibility of concentration

Conc. [ng/µL]	0	2.4	4.8	9.6	19.3	38.6	77.2	154.4	308.8	617.5
1	-2.8	0.6	2.9	8.8	17.5	39.3	79.8	157.3	315.0	611.5
2	-2.1	1.4	3.4	6.7	18.2	39.4	78.0	157.7	316.3	614.6
3	-1.5	1.2	2.9	7.7	18.3	41.1	78.0	157.9	316.9	614.7
4	-1.3	1.7	2.2	8.9	18.9	39.5	77.7	158.8	312.4	627.6
5	-2.4	1.9	2.1	8.0	18.0	39.3	78.7	160.0	316.0	608.8
6	-3.1	1.0	3.1	10.3	18.1	39.1	77.5	157.0	318.7	610.4
7	-1.4	0.7	2.8	8.2	18.4	40.5	77.4	157.1	312.0	610.3
8	-2.1	0.0	3.2	8.1	17.8	39.6	79.3	157.8	311.1	616.5
9	-0.6	1.3	3.2	8.6	17.1	39.3	80.0	157.4	310.9	612.8
10	-2.5	0.4	2.0	7.1	19.5	40.3	78.9	162.2	311.0	609.9
A.V. [ng/µL]	-2.0	1.0	2.8	8.2	18.2	39.8	78.5	158.3	314.0	613.7
S.D.	0.75	0.59	0.52	1.00	0.68	0.66	0.95	1.63	2.88	5.48
C.V. [%]	N/A	57.4	18.7	12.2	3.7	1.7	1.2	1.0	0.9	0.9

Detection limit*: 5 ng/µL
Quantitation limit*: 10 ng/µL

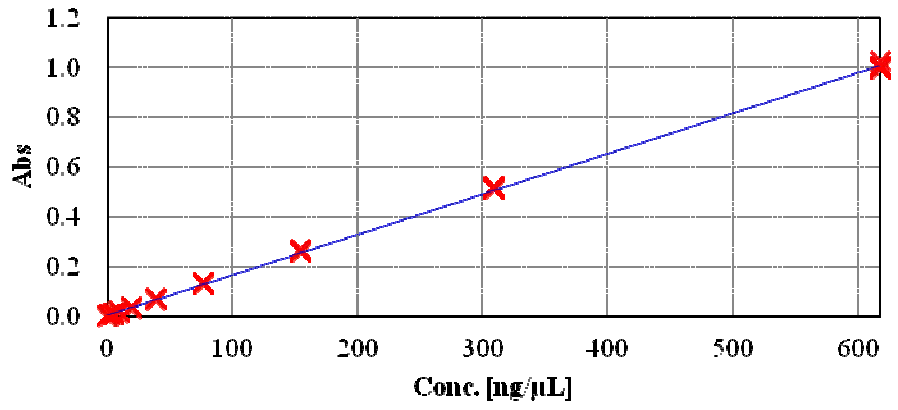

Figure 1 Calibration curve

JASCO INTERNATIONAL CO., LTD
4-21, Sennin-cho 2-chome, Hachioji, Tokyo 193-0835, Japan
Tel: +81-42-666-1322, Fax: +81-42-665-6512

0.2 mm path length cell

Table 3 Reproducibility of absorbance

Conc. [ng/µL]	0	38.6	77.2	154.4	308.8	617.5	1235	2470	4940
1	0.0008	0.0122	0.0196	0.0460	0.0842	0.166	0.326	0.646	1.297
2	-0.0011	0.0165	0.0223	0.0430	0.0847	0.166	0.330	0.645	1.319
3	-0.0001	0.0160	0.0195	0.0427	0.0873	0.170	0.328	0.653	1.320
4	-0.0004	0.0112	0.0176	0.0430	0.0863	0.165	0.331	0.654	1.284
5	0.0069	0.0152	0.0180	0.0410	0.0860	0.168	0.327	0.647	1.307
6	-0.0005	0.0139	0.0184	0.0424	0.0845	0.170	0.326	0.660	1.303
7	0.0006	0.0137	0.0206	0.0450	0.0839	0.170	0.331	0.659	1.312
8	0.0019	0.0127	0.0200	0.0440	0.0875	0.168	0.330	0.658	1.301
9	0.0011	0.0130	0.0212	0.0435	0.0851	0.169	0.338	0.663	1.296
10	0.0007	0.0134	0.0194	0.0426	0.0879	0.171	0.326	0.664	1.308
A.V.	0.0010	0.0138	0.0197	0.0433	0.0857	0.168	0.329	0.655	1.305
S.D.	0.0023	0.0017	0.0015	0.0014	0.0015	0.0020	0.0037	0.0071	0.0110
C.V.	N/A	12.2	7.4	3.3	1.7	1.2	1.1	1.1	0.8

Calibration equation: Abs = 0.000264 x Conc. + 0.00281
Correlation coefficient: 0.9999

Table 4 Reproducibility of concentration

Conc. [ng/µL]	0	38.6	77.2	154.4	308.8	617.5	1235	2470	4940
1	-7.8	35.5	63.7	163.8	308.5	617.6	1224	2438	4909
2	-15.0	51.9	74.0	152.4	310.6	620.2	1242	2434	4991
3	-11.1	50.0	63.5	151.2	320.4	635.6	1233	2467	4993
4	-12.0	31.9	56.3	152.3	316.8	616.2	1246	2468	4856
5	15.7	46.8	57.5	145.0	315.3	625.2	1228	2441	4946
6	-12.4	41.9	59.3	150.3	309.7	635.3	1227	2493	4932
7	-8.4	41.2	67.4	160.1	307.6	632.5	1245	2489	4963
8	-3.4	37.5	65.0	156.1	321.3	625.1	1241	2484	4924
9	-6.4	38.6	69.9	154.4	312.0	629.5	1271	2503	4904
10	-8.1	40.1	63.0	150.9	322.6	637.3	1227	2505	4950
A.V.	-6.9	41.5	63.9	153.7	314.5	627.5	1238	2472	4937
S.D.	8.60	6.36	5.51	5.34	5.58	7.77	14.19	27.04	41.61
C.V.	N/A	15.3	8.6	3.5	1.8	1.2	1.1	1.1	0.8

Detection limit*: 50 ng/µL
Quantitation limit*: 100 ng/µL

*The detection limit is calculated using 3.3σ. The quantitation limit is calculated using 10σ.
σ is the standard deviation in 0 ng/µL of a sample concentration.

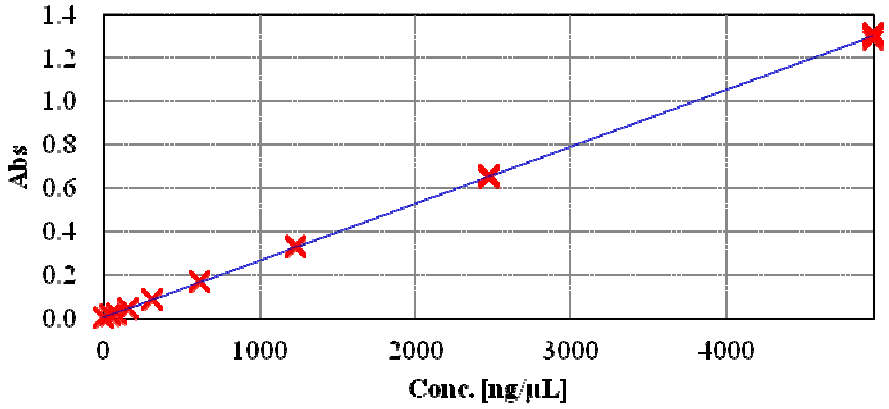

Figure 2 Calibration curve

JASCO INTERNATIONAL CO., LTD
4-21, Sennin-cho 2-chome, Hachioji, Tokyo 193-0835, Japan
Tel: +81-42-666-1322, Fax: +81-42-665-6512