Genova Protocol: P09-008A

DNA measurements using the TrayCell

Introduction

One of the most common applications of a UV/Visible spectrophotometer is to measure the concentration of nucleic acids. Often there is very little sample available and the researcher may not wish to dilute it further in order give sufficient volume for measurement in a standard quartz cuvette. The TrayCell is a fibre-optic, ultra-micro cell designed for measurements of extremely small sample volumes of DNA, RNA or protein. The dimensions of the TrayCell are equivalent to a standard cuvette and so will fit in all Jenway spectrophotometers.

There are two caps supplied with the TrayCell. Using the 1mm or 0.2mm cap creates a defined optical light path of 1mm and 0.2mm respectively. This generates virtual dilution factors of 1:10 or 1:50 in comparison to a measurement with a standard 10mm cuvette. This means that a sample giving an absorbance reading of 1.0 in a 10mm path length cuvette will give an absorbance of 0.1 using the 1mm cap and 0.02 with the 0.2mm cap. Therefore it is important that the sample to be measured using the TrayCell is sufficiently concentrated to give a reading of at least 0.05 absorbance units for reproducible measurements.

Materials required

TrayCell (part code JEN/105-810-UVS)

Method

1. Turn on the Genova and allow to warm up.

2. From the main screen of the Genova select DNA/RNA MODE and then the required measurement mode.

3. Select SETUP. In general, when using the TrayCell the sample is undiluted, however it is necessary to enter a “virtual dilution” due to the reduced path length created by the caps. In the DILUTION line, enter 0001+0009µl if using the 1mm cap or if using the 0.2mm cap, enter 0001+0049µl. Adjust the units and resolution as required. Select EXIT.

4. Place the TrayCell in the sample chamber. Pipette a drop of the blank solution directly on the optical window on the surface of the cell and place the cap on top. The required sample volume for the 1mm cap is 3µl to 5µl and for the 0.2mm cap, 0.7µl to 4µl.

5. Close the lid of the Genova. Press CAL and the instrument will calibrate at the required wavelength(s).

6. Open the lid and remove the cap from the TrayCell; it is not necessary to remove the TrayCell from the cell holder. Wipe the surface of the optical window using a lint-free swap or lint-free wipe and pipette a drop of the sample to be measured on top. Wipe the cap as above and place over the sample.

7. Close the lid. Press READ and the instrument will measure at the required wavelength(s). The sample can be recovered from the TrayCell if required.

Notes

A minimum concentration of 25µg/ml dsDNA is required for the 1mm cap and 125µg/ml for the 0.2mm cap. The table below summarises the requirements for other nucleic acids.

	Sample specific factor	1mm cap (µg/ml)	0.2mm cap (µg/ml)
dsDNA	50	25-850	125-4,250
ssDNA	37	18-630	90-3,150
ssRNA	40	20-680	100-3,400
Oligo	30	15-510	75-2,550

Table 1: Range of nucleic acid detection for the TrayCell with 1mm or 0.2mm caps. Sample specific factor refers to the concentration in µg/ml which gives an absorbance of 1 at 260nm in a 10mm path length.

For further information refer to the following Application Notes:

A09-003A DNA measurements using the TrayCell (Genova)
A09-004A DNA measurements using the TrayCell (6715)
A09-005A Test of sample volume using the TrayCell

The protocols described here are for guidance only. Be aware of any hazardous compounds, take precautions where necessary and dispose of any waste in the appropriate manner.