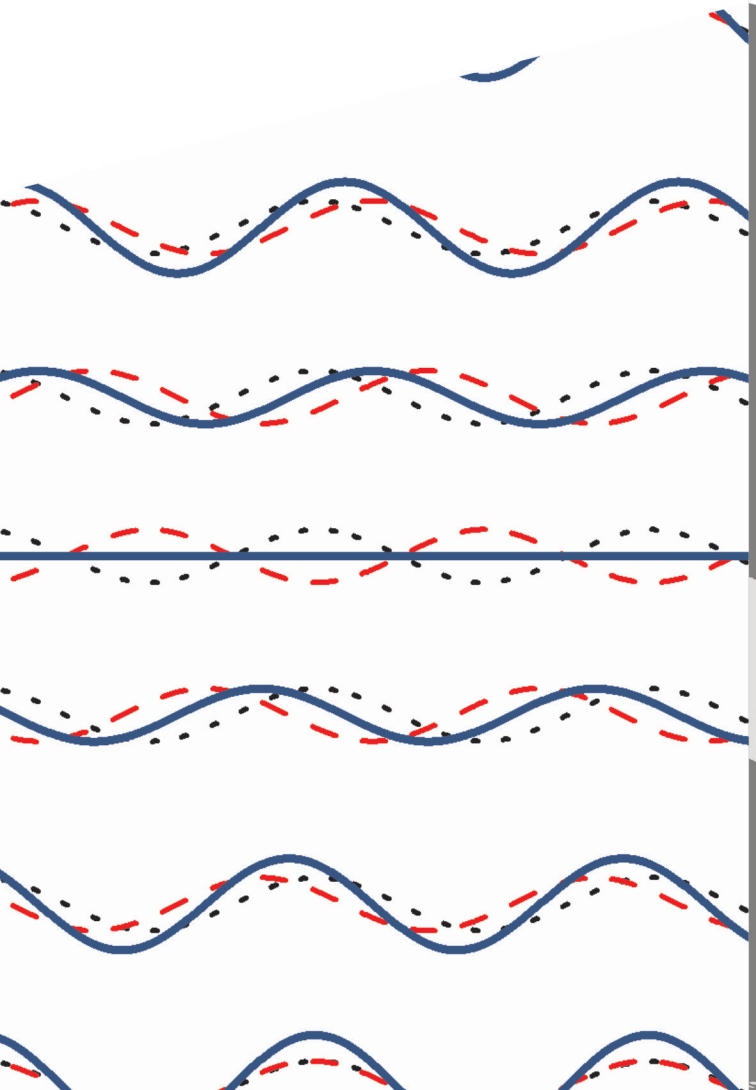
Specac

Application Note

UK: +44 (0) 1689 892902 US: +1 866 726 1126

Determining Pathlength in Parallel Window Liquid Cells



WWW.SPECAC.COM

Contact us for more information

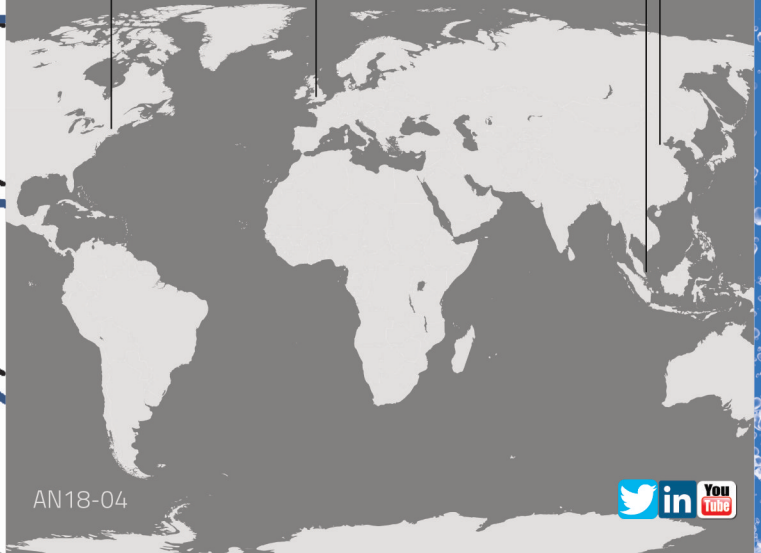
THE QUEEN'S AWARDS FOR ENTERPRISE 2018

London, England +44 (0)1689 892902

Beijing, China frank.li@specac.com

Fort Washington, America +1 866 726 1126

Singapore, Asia kamhar.woo@specac.com



AN18-04

Specac

Introducing THE

PEARL

The Masters of Spectroscopic Accessories Present

For high accuracy pathlength determination parallel window cells are the gold standard.

This application note explains how to determine the pathlength in liquid cells with parallel windows, such as the Specac Omni-Cell or Pearl (when fitted with a parallel window Oyster cell).

When using an empty infrared cell with parallel windows a fringing pattern is observed in the IR spectrum [1]. It consists of a series of regularly repeating fine peaks and troughs of a sinusoidal wave pattern superimposed over the spectrum of the window material is observed (Figure 1). This fringing pattern can be used to determine an exact cell pathlength.

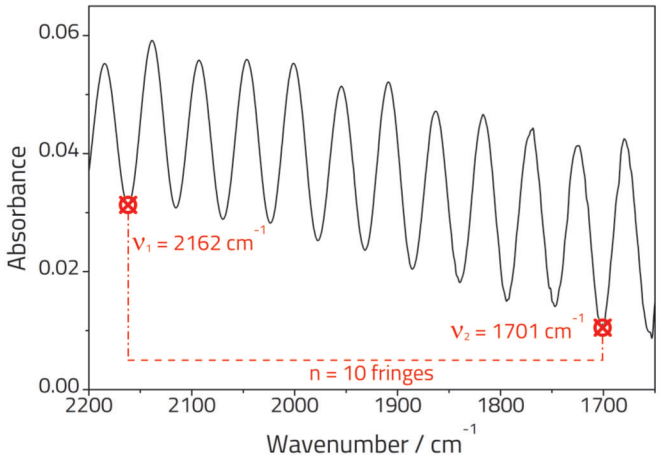


Figure 1: Example spectrum showing the fringing pattern for a parallel windowed cell. Using the calculation shown above this cell was determined to have a pathlength of 108.5 µm.

Filling the cell with a solvent greatly suppresses this effect; As a result, accurate fringe free IR spectra can be recorded with a parallel cell by recording a background with the same solvent as in the sample spectrum.

For applications, such as quantification or calibration, where the pathlength must be known with precision, a parallel cell may be used in this way to give an accurate measure of pathlength while avoiding fringes in the sample spectrum itself.

METHOD

Remove any cells and accessories from the sample compartment and collect a reference background.† Then load the cell and collect an infrared spectrum of the empty cell. From the fringing pattern obtained the-pathlength of the cell can be calculated from the following formula:

$$P = 5000\ n\ /\ (\nu_1 - \nu_2)$$

Where:

P = pathlength in micrometers

n = number of fringes

ν_1 = wavenumber at first peak (in cm^{-1})

ν_2 = wavenumber at second peak (in cm^{-1})

†NOTE: If using the Pearl system, a background can be recorded with the Pearl accessory in place. Ensure that the Oyster cell is removed and the sample tray closed before collection of the background.

Specac's Omni-Cell™

Get in touch: Collaborate with Specac

Are you working in a field that uses or, could use our FTIR, polarizer, heated platen or, hydraulic pressing equipment?

To promote your research with us and have us create a similar Application note, please contact collab@specac.co.uk with a simple brief detailing:

a) what your work involves

b) what equipment you currently/can use

c) why your work is important

References

[1] Griffiths, P. R., de Haseth, J. A., Fourier Transform Infrared Spectrometry, John Wiley & Sons, 2007, ISBN: 0470106298.