

# Analysing chocolate using the Pearl™ accessory

**COCOA BEANS** are a versatile foodstuff that produce tasty treats and sweet scents. Confectionaries like chocolate bars can be made with different fat, sugar and water ratios.

Food industries want a fast, reliable and non-destructive method to analyse chocolate chemical composition.

This note demonstrates that the Pearl™ IR transmission accessory can be used to determine the quality and content of chocolate in post-production, for quality assessment purposes.

## Methods and results

A small sample of solid a well known milk chocolate (~10 mg) was warmed gently and pasted onto the bottom ZnSe window of the Pearl™ Oyster Cell. The pathlength of the cell was 25  $\mu\text{m}$  but longer pathlengths are available for weaker absorbing samples.

Figure 1 shows the FTIR spectrum of the chocolate, as recorded using the Pearl™ in a spectrometer and with a resolution of 2  $\text{cm}^{-1}$  over an average of 10 scans.



The fingerprint region in Figure 1 displays the hall marks of cocoa products, most notably the C=O stretch at 1758  $\text{cm}^{-1}$ , typical of an ester and the  $\text{CH}_2$  absorption from fat at

The Pearl™ liquid IR transmission accessory is perfect for chocolate quality-check analysis.

1462  $\text{cm}^{-1}$ . Other significant peaks include the absorption bands at 2924 & 2854  $\text{cm}^{-1}$ .

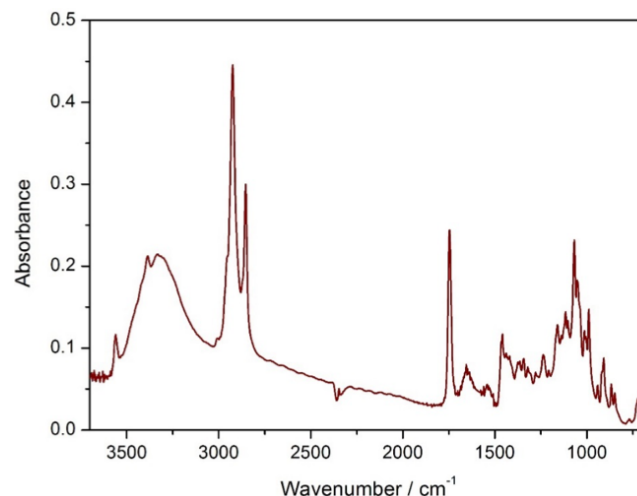


Figure 1: chocolate recorded using the Pearl™

The intensities of these bands can be used to assess the quality of the chocolate.

A published FTIR spectrum of cocoa butter is shown in Figure 2, recorded using the Specac Golden Gate™ ATR accessory.<sup>1</sup>

This spectrum was taken from a study featured in *Analytica Chimica Acta*, which is available on the World Cocoa Foundation's website.

Figure 2 is complementary to the spectrum recorded using the Pearl™. Moreover, the ability to distinguish the fat content for different cocoa butter samples is demonstrated.

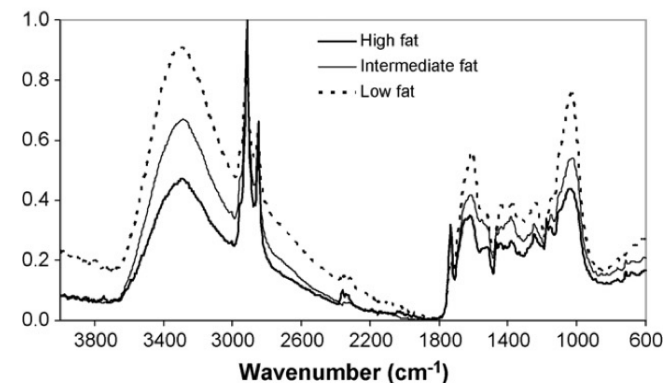
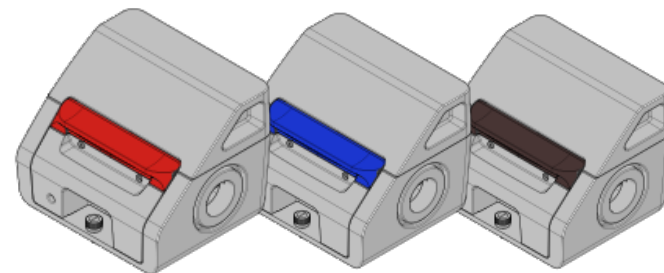


Figure 2: reference spectrum¹ of cocoa butter recorded with Golden Gate™

## Conclusions

Recording FTIR spectra using the Pearl™ is a quick method to determine the chemical composition of cocoa products. Moreover, the Pearl™ offers a user-friendly way of recording reproducible and reliable spectra.



The Pearl™ IR transmission accessory comes in different colours

The recorded spectrum matches quite well with the literature and therefore the Pearl™ would be suitable for the cocoa industry.

## References

- <sup>1</sup> A.Veselá, A.S. Barros, A.Synysya, I.Delgadillo, J.Čopíková, M.A.Coimbra, "Infrared spectroscopy and outer product analysis for quantification of fat, nitrogen, and moisture of cocoa powder," *Analytica Chimica Acta*, 601,(1),77-86, 2007.