

Application of Near-Infrared Spectroscopy (NIRS) Technology to detect food frauds



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Introduction

Infrared spectroscopy (IR) is conventionally divided into three wavelength regions: the near-infrared (NIR: 700–2500 nm), mid-infrared (MIR: 2500–25 000 nm), and far-infrared (25–1000 μm) (Figure 1).

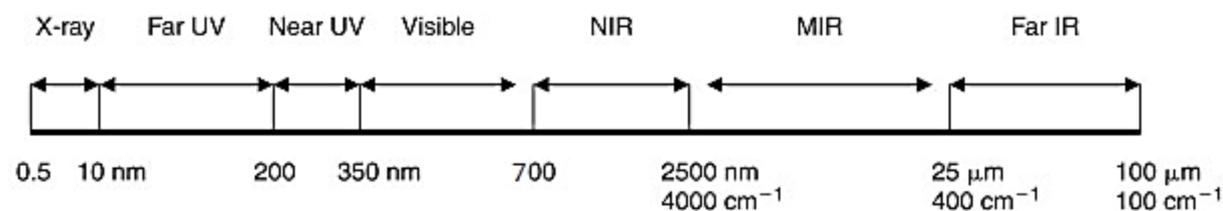


Figure 1: Spectral regions of interest for analytical purposes. Sun (2004).

NIRS Technology has the ability to provide information about the **composition of a sample**.

OBJECTIVE: To expose the advantages of the application of the NIRS technology to detect food fraud

Near-Infrared Spectroscopy Technology

When the molecules are irradiated with NIR these absorb a part of the energy. The other part of radiation is reflected and a **reflectance spectrum** is obtained.

- Every sample has a specific reflectance spectrum (Figure 2).
- The reflectance spectrum depends on the sample composition

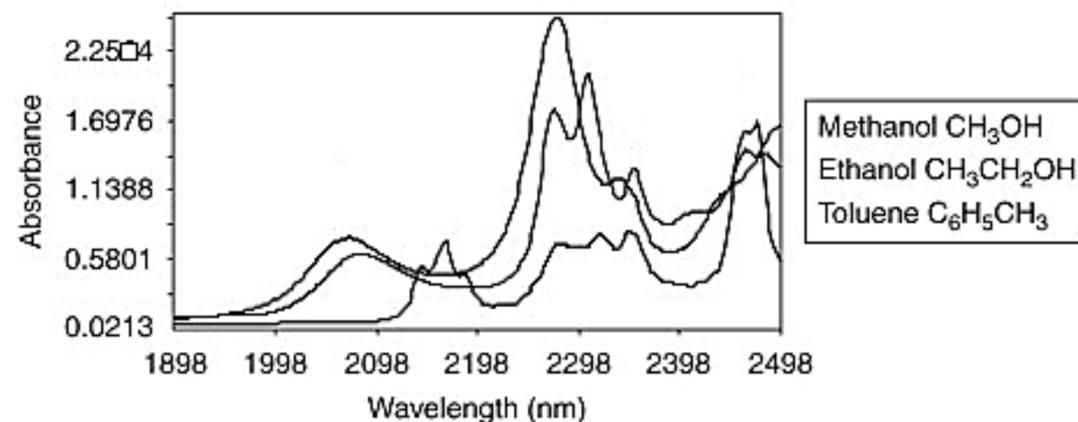


Figure 2: Spectra of ethanol, methanol and toluene in the NIR region between 1900 and 2500 nm. Sun (2004).

Near-Infrared Spectroscopy and Food Fraud

DAIRY SECTOR

Adulteration of milk and infant formula with **melamine** in China (Figure 3).

OILS AND FATS SECTOR

Toxic oil syndrome in Spain.

MEAT SECTOR

Horsemeat scandal in Europe.

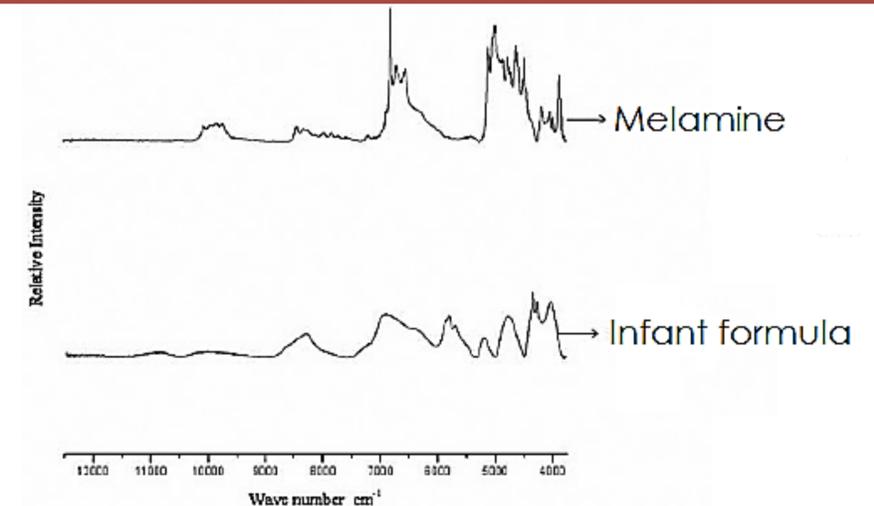


Figure 3: NIR absorption spectra of melamine and infant formula powder. Tiziana and Holroyd (2013).

Advantages

Regarding the sample:

- **MULTI PRODUCT**
- **NON-DESTRUCTIVE** (Figure 4).

Related to the information that it provides:

- IT **PROVIDES CHEMICAL, PHYSICAL AND SENSORY** features
- IT IS **MULTI-CONSTITUENT**

Compared with other methods of analysis:

- **NON-POLLUTING**
- IT IS **FAST**
- IT IS **CHEAP**



Figure 4: Analysis of intact apples. NIRSolutions ,S.L

Conclusions

- ✓ NIRS Technology allows to perform qualitative analysis in order to detect food fraud.
- ✓ NIRS advantages offer a competitive technique against traditional methods.

References

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