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CLASSIFICATION AND IDENTIFICATION OF TALC POWDER

A portable NIR analyser to identify and classify different types of talc powder as raw material

- Non-destructive and rapid analysis of talc powder
- Identification and measurement of quality parameters in raw material
- Accurate measurements even through plastic bags
- Portable device to be used in the warehouse or at-line
- Very easy to use with intuitive user interface and touch screen

Introduction: spectroscopy technology for talc powder classification

Talc is widely used in industries such as paper, paints, cosmetics, plastics, rubbers, refractory materials, pharmaceuticals, pesticides, agro-industries and ceramics. The most commonly known application has been in the cosmetic industry, however, over the few years, talc used in plastic industry has grown rapidly as a filler [1-3]. Talc acts as a reinforcement agent on the polymer used for the synthesis in plastic industry. This fact is due to its properties such as its stiffness, the heat resistance, and reduce shrinkage. This property is zero-gap parts, which are useful in the automotive bumpers [4].

Near-Infrared (NIR) spectroscopy can be a useful technique since it provides a rapid analysis without the need for samples preparation. Therefore, talc analysis was carried out with NIR spectroscopy and the results obtained were treated with chemometric tools. The chemometric tools applied helps to differentiate and classified between different types of talc powders.

CASE STUDY

Talc powder of seven different types and origins were analysed directly with the NIR spectroscopy VISUM PALM. A number of spectra were collected from each talc samples studied in order to have representative results.

Figure 1 shows the mean spectra obtained for each sample. In the spectra, the most intensive band of talc, which is the characteristics of this compound can be observed at 1395 nm. However, the differences could not be detected comparing directly this specific region for each type of talc powders studied. For this reason, it is necessary to combine the results with chemometric tools in order to separate correctly the different type talc powders.

The chemometric model with the PLSDA was established to differentiate the seven talcs data results obtained from the NIR spectroscopy. Figure 2 shows the representation of the samples on the scores plot of the first and second components. In the figure, we can see clearly that the variance explained is more than 90 %, which means the model is well correlated to the original data.

To create the model, a specific pre-processing was applied to the raw data obtained from the instrument in order to avoid spectra artefacts. The model built allows to separate correctly, differentiating between the seven classes studied.

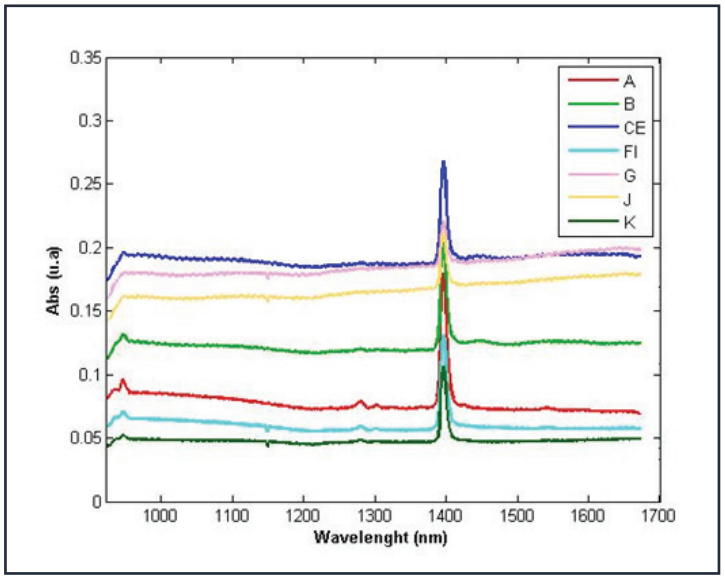

Figure 1. Mean spectra of the seven talcs powder samples.

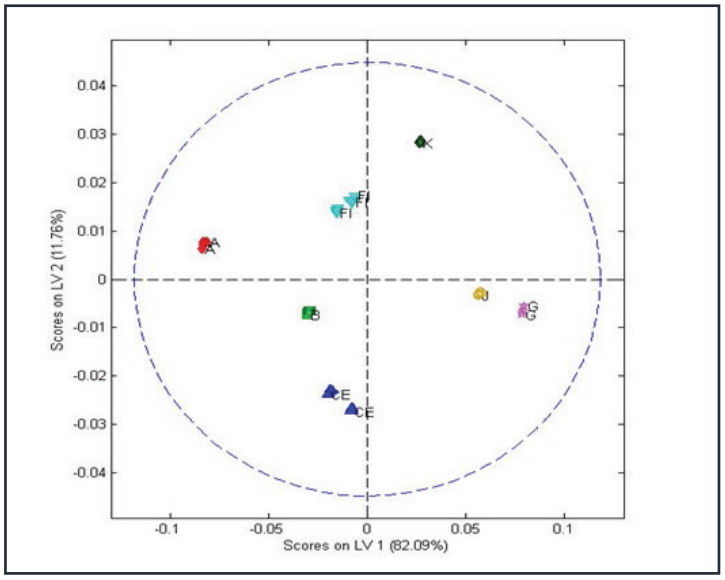

Figure 2. Representation graphical of the PLSDA model for the classification

CONCLUSIONS

> This study shows the advantages of combining the VISUM PALM spectroscopy data results with chemometrics on talcs powder samples. This technique successfully classify and identify talc powders of different types.

REFERENCES

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