Optical Properties of Oleoresin with Capsaicin in Visible Window Using Diffuse Reflectance Spectroscopy

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1. Introduction

Optical properties could be used for different purposes. Jongguk Lim *et al* developed a method for predict the amount of capsaicin in red-pepper powder using Visible and near infrared spectroscopy, based optical properties of capsaicnoids [1]. Also González-Zamora Alberto *et al* propose a spectrometric method for quantify capsaicnoids in chiltepin hot pepper [2]. All this techniques are based in the knowledge of optical properties of this substances. The main objective is establish a theoretical model that relate diffuse reflectance signals with the capsaicin at different concentrations. In this research is proposed a simple method for recover optical properties. Based on re-mission function from Kubelka-Munk theory an experiment was performed, for establish a relation between concentrations of an oleoresin with capsaicin and diffuse reflectance signals [3]. The results of this experiment show that reflectance from the mentioned theory, the fit analisys has a goodness approximation.

2. Materials and Methods

An oleoresin with capsaicin for alimentary usage was diluted in pure ethanol. A total of 30 samples were prepared in groups of ten. A relation mass over volume was used to prepare them, the concentrations were from 0.1% to 1%. The experimental setup has a USB400 spectrometer from Ocean Optics© plugged to light source by bifurcated optical probe. The light source has an optical bandwidth from 360nm to 1100nm. First the setup was started in blank placing a quartz cuvette with pure ethanol between spectralon© and the probe, after each sample were measured ten times.
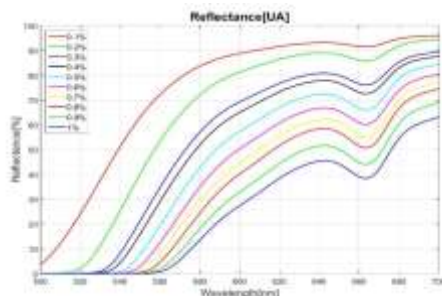
3. Results

Figure 1. Mean of diffuse reflectance curves for the different concentrations.

4. Discussion

When the concentration is low the signals are strong and they increase near to 100% between 500nm to 600nm. But as the concentrations increases curves from 600nm to 700 nm lost intensity but appear a peak of minimum intensity.

Inasmuch as a reemission Kubelka-Munk function is used, is assumed that the concentration are enough lower, so is possible from this theory use the solution to the model that establish a relation with the concentration and reflectance curves.

$$R \cong e^{-\sqrt{2\frac{\varepsilon}{s}c}} - - - (1)$$

For establish a relation among curves and the concentration a Nonlinear Least Square Regression was applied [4]. The Reflectance were normalized for relate concentration vs. reflectance. The ratio $\frac{\varepsilon}{s}$ is takes like one constant. The correlations coefficient are upper than 0.99. So is possible trust in this values, that means the model fit correctly and for lower concentrations the optical parameters are valid and could be used in other experiments, for example measure capsaicin directly in chillies.

5. Conclusions

Was possible get optical properties using a simple setup based on reemission function from Kubelka Munk Theory. This simple optical setup could be used for other material. The advantages of this methodology is that is possible avoid be concerned about the form of the particles analyzed because is diluted the capsaicin.

References

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