Abstract

Tablet hardness testing using near infrared spectroscopy

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Introduction

This work used NIR spectroscopy and multivariate calibration to determine hardness in tablets containing four active ingredients (isoniazid, rifampicin, ethambutol, pyrazinamide) for treatment of pulmonary tuberculosis produced by UFRN. Current methods of tablet hardness testing are destructive in nature and may not always give an accurate representation of the batch being evaluated.

Materials and Methods

NIR reflectance spectra (in triplicate) of 157 samples were measured using an FT-NIR Bomem MB 160 spectrophotometer in the 800-2500 nm range. Each measured spectrum was the average of 50 scans obtained at a resolution of 8 cm^{-1}. For the same 157 tablets, hardness was measured using the durometer hardness Varian VK200. This order of testing allowed direct correlation of data to a specific tablet sample. Spectra and calibration set, full cross-validation tests were treated and correlated with the hardness results by using The Unscrambler® 9.8 from Camo (Trondheim, Norway). The influence of various spectral pre-treatments [Savitzky -Golay smoothing, multiplicative scatter correction (MSC), first derivative (D1), second derivative (D2) separately and combined] and regression methods (PLS and PCR) on prediction error were compared.

Results and Discussion

The results of NIR hardness prediction were at least as accurate as the laboratory hardness test (RMSEP = 1.17).

Conclusion

These results indicate that the NIR diffuse reflectance spectroscopy method is an alternative, nondestructive tool for measurement of hardness from tablets. This work reports a viable and non-destructive alternative to hardness testing of tablets.

Reference paper as:
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