Technical Overview

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Agilent Cary 630 FTIR for Quick and Real-Time Determination of Cannabinoid Potencies

Introduction

Cannabis products that are currently on the market consist of either the dry material, such as flower buds; the plant concentrates, including waxes and distillates; or infused products, such as foods and candies. The main active ingredients in these products are the group of chemical compounds that provide either a medicinal or recreational effect on the consumers. Of the many different cannabinoids that have been isolated from the cannabis plant, the THC, THCA, CBD, and CBDA compounds are generally those of greatest interest.

As different cannabis products have differing potency levels, knowing the potency of a product is important for determining the correct dosage. At present, a chromatographic methodology is approved by regulatory agencies for testing the potency of cannabis products.

The FTIR spectroscopy technique has long been used to analyze complex spectra and matrices using chemometric methodology. Unique chemical signatures from each compound are used to develop a multivariate calibration model. This is then used to calculate the potency value or quantitate other species of interest.

Major benefits of FTIR analysis

- Real-time potency value
- Sample measurement in seconds
- Non-destructive sample analysis
- No consumables required
- Portable, easy-to-use instrument
- Small laboratory footprint
- Method-driven software guides the user in each step of the analysis

The Agilent Cary 630 FTIR (fourier transform infrared spectroscopy) instrument is a fast, easy, accurate, and economical alternative for the measurement of the potency of cannabis products. It has the ability to achieve measurement accuracy on par with chromatographic standard methods when appropriate chemometric model building is applied.

The Cary 630 FTIR, fitted with a diamond absolute total reflectance (ATR) accessory, has been used to measure both cannabis concentrates (shatter, budder, waxes) and distillates with a THC potency value as high as 93%.

A typical Cary 630 FTIR workflow to create the calibration model and method for cannabis potency determination consists of:

1. Designing the training (calibration) set with samples that encompass possible variations in data and the expected concentration range in the future/unknown samples.
2. Obtaining values from a separate chromatographic method and using these to build the FTIR prediction.
3. Measuring the samples with the FTIR. The Agilent MicroLab software then reports the calculated THC values.

The THC potency values of cannabis concentrates and distillates were determined using a Cary 630 FTIR fitted with a diamond ATR. The results are shown in Figure 1 and compare the potency of cannabis distillates, measured with HPLC, versus the potency predicted by the Cary 630 FTIR instrument.

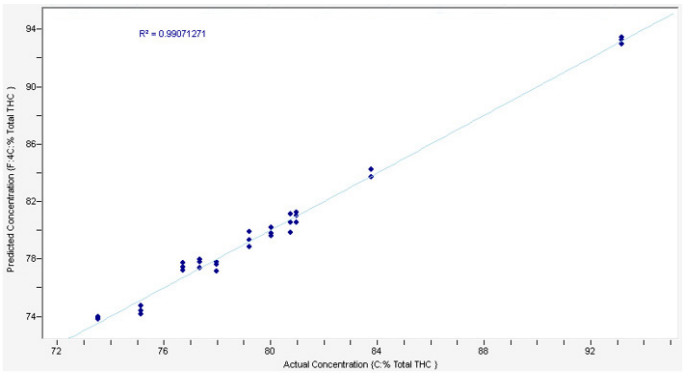

Figure 1. The correlation of the potency value of cannabis distillates measured with the reference technique HPLC on the X-axis and the FTIR spectra predicted value on the Y-axis. R^2 was 0.99.

The results demonstrate that FTIR can, with the appropriate chemometrics model, provide results that are on par with those obtained by chromatographic analysis.

The FTIR technique offers easy measurements, with no sample preparation. This makes it ideal for in situ use. For example, measurements could be taken within an extraction process to provide near real-time data to improve production efficiency. This capability, when added to those chromatographic protocols already in place, can provide a higher confidence in the content and dosage of both medicinal and adult use consumer products.

Agilent products and solutions are intended to be used for cannabis quality control and safety testing in laboratories where such use is permitted under state/country law.

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