



## Application Note AN-NIR-101

# Quality control of dried cannabis

## Chemical-free potency testing within one minute with NIRS

Cannabis has a long history as a recreational drug and medically as an analgesic and antispasmodic agent. Discovery of the major cannabinoids tetrahydrocannabinol, cannabidiol, and cannabigerol (THC, CBD, and CBG) has resulted in increased interest in their medical effects. While THC is psychoactive and classified as an illicit drug of abuse in most countries, CBD has a legally accepted status in many parts of the world for medicinal purposes. CBD is believed to relieve anxiety and stress and to promote better sleep. Because of the different effects and possible legal consequences,

determining the cannabinoid profile of cannabis is of high interest.

Typically, cannabis potency testing is performed by HPLC analysis. While HPLC can detect low concentrations of less abundant cannabinoids, it requires chemical reagents and it is quite time-consuming. This Application Note explains why near-infrared spectroscopy (NIRS) is a superior method for the quantification of THC, CBD, and CBG in dried cannabis because it provides results in less than a minute and does not require any chemicals.

## EXPERIMENTAL EQUIPMENT

A total of 702 dried cannabis samples with varying THC, CBD, and CBG concentrations were used for this study. The Vis-NIR spectra were acquired on a Metrohm DS2500 Solid Analyzer (Figure 1) equipped with the DS2500 Holder. A 400 mg portion of each sample was ground by hand using a grinder, then placed in a NIRS mini sample cup. Afterward, a 4 mm total pathlength diffuse gold reflector was positioned on top of the prepared cannabis sample. Data collection and model development were carried out with the Vision Air Complete software package.



**Figure 1.** Metrohm DS2500 Solid Analyzer with a NIRS transfection vessel shown instead of a mini sample cup.

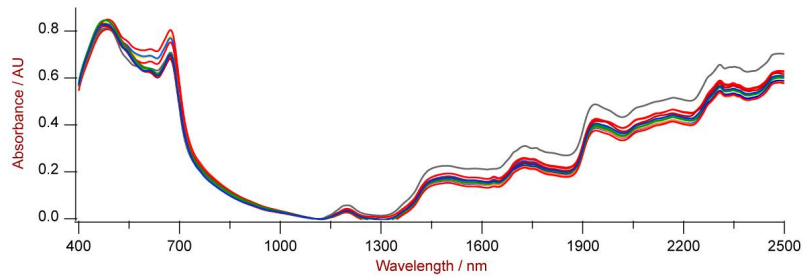
**Table 1.** Hardware and software equipment overview

Equipment	Metrohm number
DS2500 Solid Analyzer	2.922.0010
DS2500 Holder	6.7430.040
Mini sample cups, 10 pcs incl. 100 disposable backs	6.7402.030
NIRS gold diffuse reflector, 4 mm total pathlength	6.7420.020
Vision Air 2.0 Complete	6.6072.208

## RESULTS

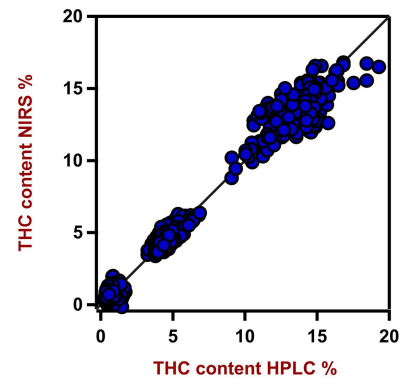
The obtained Vis-NIR spectra (Figure 2) were used to create prediction models for THC, CBD, and CBG content in dried cannabis. To verify the quality of the prediction models, correlation diagrams were created which display a

correlation value ( $R^2$ ) between the Vis-NIR prediction and primary method (HPLC) values. The respective figures of merit (FOM) display the expected precision of a prediction during routine analysis (Figures 3–5).



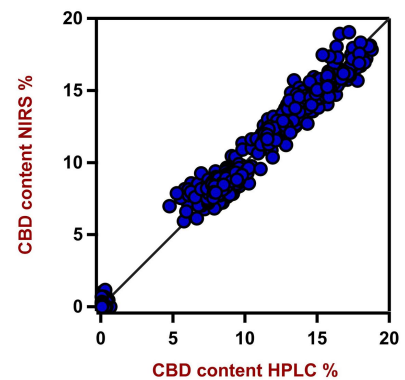
**Figure 2.** Selection of Vis-NIR spectra of different cannabis samples measured with a Metrohm DS2500 Solid Analyzer.

### Result THC



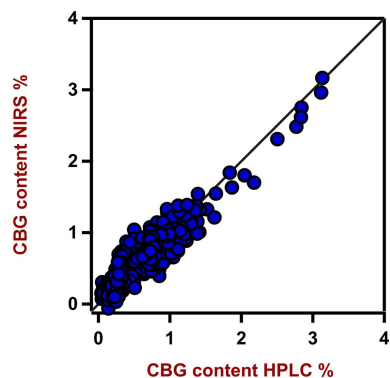
**Figure 3.** Correlation diagram and the respective figures of merit for the prediction of the THC content in dried cannabis using a DS2500 Solid Analyzer.

### Result CBD



**Figure 4.** Correlation diagram and the respective figures of merit for the prediction of the CBD content in dried cannabis using a DS2500 Solid Analyzer.

## Result CBG



**Figure 5.** Correlation diagram and the respective figures of merit for the prediction of the CBG content in dried cannabis using a DS2500 Solid Analyzer.

## CONCLUSION

This Application Note presents a Vis-NIR method that is excellently suited for the fast quantification of the three main cannabinoids in cannabis (i.e., THC, CBD, and CBG). Compared to the standard HPLC method (Table 2), cannabis

analysis with near-infrared spectroscopy saves up to 30 minutes of time per analysis. Additionally, NIRS requires no chemical reagents and is a non-destructive analytical technique.

**Table 2.** Time to result with conventional HPLC method.

Parameter	Method	Time to result
THC, CBD, CBG	HPLC	~10 min (preparation) + ~20 min (HPLC)

## CONTACT

瑞士万通中国  
北京市海淀区上地路1号院  
1号楼7702  
100085 北京

marketing@metrohm.com.cn



### DS2500 Solid Analyzer

固耐用的近外光,用于生境和室中的量。

DS2500 分析是的活解决方案,用于整个生程中的固体、乳膏和液体行常分析。其固耐用的使 DS2500 Analyzer 分析不受灰、湿度、振和温度波影,因此非常用于在劣的生境中使用。

DS2500 涵盖了从 400 到 2500 nm 的整个光范,并能在不到一分内提供准和可再的果。DS2500 Analyzer 足制行的要求,并由于操作便而能助用完成其日常工作任。

由于与完美匹配,附件可以承受任何具有挑性的品型,例如:粒料之的粗粒固体或乳膏之的半固体品,可得最佳果。量固体的候,使用 MultiSample Cup 可以提高生率,可以自批量量最多 9 个品。



### DS2500

本支架使用搭配:

- 小品容器 (6.7402.030)
- DS2500 Iris (6.7425.100)



### NIRS 10 100

用于粉末和粒反射光采集的小号品容器。品容器可用一次性盖封,可避免品失,并使粉末及粒在品容器中均匀分布。

此品瓶可与下列器一同使用:

- NIRS DS2500 Analyzer(号:2.922.0010)
- NIRS XDS MasterLab Analyzer(号:2.921.1310)
- NIRS XDS MultiVial Analyzer(号:2.921.1120)
- NIRS XDS RapidContent Analyzer(号:2.921.1110)
- NIRS XDS RapidContent Analyzer - Solids(号:2.921.1210)



#### **NIRS 4 mm**

液体行透射反射量的金反射器。可与下列合使用:

NIRS DS2500 Analyzer(号:2.922.0010)

NIRS XDS MasterLab Analyzer(号:2.921.1310)

NIRS XDS MultiVial Analyzer(号:2.921.1120)

NIRS XDS RapidContent Analyzer(号:2.921.1110)

NIRS XDS RapidContent Analyzer - Solids(号:2.921.1210)