

# AQUATEST a.s.

Analytical laboratories

## Analysis of cannabinoids in plant material, cosmetics and oils



Analytical laboratory No. 1243 – accredited by the Czech Accreditation Institute  
pursuant to ČSN EN ISO/IEC 17025: 2005

## Why is the content of individual cannabinoids in cannabis and cannabis products detected?

Cannabis is the only plant in the world that produces dozens of biologically active substances called cannabinoids. These substances are contained in the resin formed by the plant. Cannabis includes two main species: *cannabis indica* and *cannabis sativa*. The amount of the particular cannabinoids in these plants may vary and they may also have different effects on the organism. While  $\Delta$ 9-tetrahydrocannabinol (THC) is a psychotropic substance, cannabidiol (CBD) is considered to be an antioxidant and a neuroprotectant. In addition to the criminological analysis of THC content in cannabis, hashish, or cannabis extracts, interest in the analysis of other cannabinoids has been increasing recently mainly due to their beneficial medicinal properties used in natural medicines. Effective monitoring of cannabinoids in plants is therefore highly desirable.

### Analysed substances

Our laboratory provides analysis of the most common cannabinoids in a wide range of matrices - from natural plant material to extracts, cosmetic products, oils, ointments and other products. Our laboratory uses the GC/MS method to determine cannabinoids. Our limit of quantification (LOQ), as shown in the below table, was determined based on the practical needs of our customers. If necessary, we are able to analyse significantly lower concentrations.

Analyte (abbreviated)	CAS No.	Analyte (full name)	LOQ * (% w.)	Uncertainty of determination (%)
CBD	521-37-9	Cannabidiol	0.005	20
CBC	20675-51-8	Cannabichromen	0.005	20
$\Delta$ 9 THC	1792-08-3	$\Delta$ 9 Tetrahydrocannabinol	0.005	20
CBG	2808-33-5	Cannabigerol	0.005	20
CBN	64846-18-0	Cannabinol	0.005	20
CBDA	1244-58-2	CBD Acid	0.005	20
THCA	23978-85-0	THC Acid	0.005	20
CBD tot.		Cannabidiol total	0.005	20
$\Delta$ 9 THC tot.		Tetrahydrocannabinol total	0.005	20

The parameters "THC total" and "CBD total" are related to the method of evaluating the analytical results for different purposes. The most represented cannabinoids are acid forms of THC or CBD (THCA and CBDA) in the cannabis plant. By heating this plant, the compounds lose the carboxyl group and produce their neutral forms (THC or CBD). Acid and neutral forms have different effects on the organism. For example, THCA does not act like a drug after ingestion of cannabis. On the other hand, by heating hemp during smoking, THCA changes to THC, which acts as a drug.

For forensic purposes as well as for cannabis certification as a technical crop, legislation prescribes a method of determination in which all THCA or CBDA are converted into a neutral form. For THC, the maximum amount available in the sample in the form of both THCA and free THC is measured. For natural medicine, this approach is not appropriate because acidic and neutral forms have different biological properties. Our determination method makes it possible to determine these forms of matter separately. The parameters "THC total" and "CBD total", which are to be known for the forensic assessment of the sample, are calculated from the results of determination of the acidic and neutral forms (i.e. not a simple sum).

### ***What does the analysis cost?***

We will be pleased to calculate the quotation for you according to your needs. Contact us.

### ***What other analyses can be provided for cannabis and cannabis products?***

If you are interested in the analysis of heavy metals, mould, yeasts, pesticides and other parameters, please do not hesitate to contact us.

### ***Amount of sample***

A relatively small amount of sample is needed, but it depends on its homogeneity. In the case of ointments and oils, about 1 - 5 g of material is sufficient. In the case of plant cannabis, it is possible to analyse roughly the same amount (1 - 5 g) of powdered material, but it must be a representative sample. So if you provide 1 g of cannabis (e.g. bud hemp only), the results cannot be related to the whole plant. If you provide a mixture of bud hemp and leaves, we will homogenise all the material to be representative for the whole sample. In this case, 20 – 50 g of the sample is needed.

### ***Determination of cannabinoids in plant material***

When analysing cannabinoids in cannabis plants, it must be taken into account that their content varies widely in different parts of the plant. The highest content is in female flowers and leaves from the top of the plant. On the other hand, the cannabinoid content in the stem and in the seeds is practically negligible. In general, there is no unified method of sample preparation. It depends more on the purpose of the analysis and the way the results are interpreted.

For the certification of cannabis varieties, the preparation procedure is defined by Commission Regulation (EC) No. 1122/2009 (the required number of plants and the vegetation phase in which the sample is taken). Only the top of female plants are selected for analysis, so seeds and stems are excluded from the sample, which can be a substantial part of the material. The result of the analysis is the THC concentration in the richest part of the plant (flower and upper leaves). On the other hand, in forensic analysis, the whole material is considered to be the entire sample. For example, the whole plant (including the stem, in which the THC content is relatively small compared to the top of the plant) is the sample. Our laboratory can provide both methods and it depends on the customer's requirements. However, if the customer does not specify the sample preparation procedure, the laboratory will homogenize the entire sample provided to the laboratory or its representative portion. Customers usually send us samples in an amount of approx. 10 g. However, only a small proportion of this quantity is needed for the analysis itself. Larger quantities are processed only to ensure the representativeness of the sample. Plants are treated in dry form, dried with a mild heat to a constant weight, but still contain about 15 % moisture. The results relate only to the above-mentioned state.

### ***Legal Aspects of Cannabis Plant Analysis***

According to the legislation, the term "cannabis plant including the top" is generally considered to be a drug. Only approved cannabis varieties (with a THC content of less than 0.3 %) are considered to be drugs. Our laboratory has the authorization to manipulate cannabis samples but has to keep records of their origin and manipulation. Therefore, we have to ask each customer for the following information: who is providing the sample, what is its quantity and designation of approved cannabis variety.

For legal reasons, our laboratory does not accept samples of cannabis with a high THC content.

***Where do I provide the sample?***

The sample can be provided personally or by post to one of the following addresses:

- Laboratory AQUATEST a.s., Geologická 4, 152 00 Prague 5
- Laboratory AQUATEST a.s., Pražská 600, 252 10 Mníšek pod Brdy

The sample must be accompanied by a completed and signed order sheet (<http://www.aquatest.cz/sluzby/laboratorni-sluzby/>).

***Who can I contact for details?*****Ing. Petra Dinisová**

Analyst - specialist

E-mail: [dinisova@aquatest.cz](mailto:dinisova@aquatest.cz)

Tel.: +420 234 607 425

**Ing. Soňa Persichová**

Sales manager

E-mail: [persichova@aquatest.cz](mailto:persichova@aquatest.cz)

Mobile: +420 732 804 770