Ensure the Safety and Quality of Cannabis- and Hemp-Based Products

Minimize risk, maximize profitability, and grow lab productivity

Perform Comprehensive Cannabis and Hemp Testing with Agilent Instruments and Solutions

Setting up a cannabis testing lab from the ground up is a major undertaking that requires expertise in many areas, including business, process and data management, chemical and biological testing, and a rapidly changing regulatory and statutory environment. The required testing necessitates a suite of analytical tools that include chromatography, mass spectrometry, and quantitative polymerase chain reaction (qPCR).

Agilent has developed a total package of analytical methodologies and eMethods that every cannabis- or hemp-testing laboratory needs. We have a team of cannabis application experts ready to help deploy and customize the optimized eMethods to accelerate your laboratory success. Employing the world's most robust instruments, software, services, consumables, and sample preparation supplies, our cannabis testing workflows reduce lab downtime and ensure the throughput needed to keep up with sample volume.

Agilent is focused on delivering products and services that accelerate startup. Our core values for cannabis testing labs are to help maximize sample throughput, minimize instrument downtime, and future-proof laboratories against a changing regulatory landscape.

Cannabis and Hemp Applications

Minimize risk, maximize profitability, and grow lab productivity

From routine analysis to cutting-edge research, Agilent's portfolio works seamlessly for maximum efficiency and performance.

Pesticides and mycotoxins

Potentially harmful pesticides may be present in cannabis crops and extracts. It is therefore crucial that analytical monitoring of pesticide levels in cannabis takes place in order to ensure consumer safety and comply with regulatory standards.

Potency

Many countries around the world have legalized the use of medicinal or recreational cannabis or cannabinoid products. In these regions, quality and safety testing is required prior to retail distribution. Wherever cannabis or hemp products have been legalized, total potency and total cannabidiol quantitation is mandatory. In California, other cannabinoids like cannabinol (CBN) and cannabigerol (CBG) are also regulated and must be quantified.

Terpenes

Terpenes contribute to the flavor and fragrance of cannabis. Terpenes have also been used as a means of more accurately identifying and characterizing cannabis cultivars.

Heavy metals

Contamination with heavy metals such as arsenic, lead, cadmium, and mercury can be dangerous. Cannabis products must therefore be rigorously tested to ensure consumer safety.

Microbial testing

The presence of dangerous pathogens in cannabis poses a potential threat to consumers, so products must be tested to ensure consumer safety and comply with regulatory standards.

Residual solvents

Cannabis concentrates derived from the plant may contain solvents used in the extraction process. Residual solvent testing is required to ensure these volatile chemicals do not exceed levels deemed to be harmful.

Confidently Perform Analysis of Flower, Extracts, and Final Products

Potency and cannabinoid content testing

In regions that have legalized medicinal or recreational cannabis, determining the total amount of tetrahydrocannabinol (THC) and other phytocannabinoids, such as cannabidiol (CBD), is required by state or country regulation. Producers, extractors, and processors need to analyze their oils, tinctures, concentrates, edibles, and beverages for total cannabinoid content to confirm label claims and for in-process optimization of their manufacturing output. In addition, forensic testing labs must also authenticate hemp products to determine whether they meet regulatory requirements for low THC—or they are actually marijuana.

Potency testing is typically performed by LC with UV detectors. However, analysis with mass spectrometry is becoming more common. These tests can determine total THC and CBD content, as well as profile and quantify other cannabinoids that may be present.

Dedicated cannabinoid testing: Agilent Infinity II LC systems

Methodology on the Agilent 1220 Infinity II LC system tests for 11 common cannabinoids. It includes all required consumables and training, so you can be up and running in just a few days. We can also deliver this same methodology on the Agilent 1260 Infinity II LC system or, for high-throughput labs, the Agilent 1290 Infinity II LC system.

Real-time potency determination: Agilent Cary 630 FTIR

This system takes laboratory-grade potency measurements of cannabis products—including concentrates and distillates. Total THC and total CBD measurements can be acquired within minutes with essentially no sample preparation and minimal user training.

MassHunter software

MassHunter software has unique features that transform data into insights. With qualitative and quantitative analysis tools, MassHunter allows you to use the same software across GC/MS, ICP-MS, LC/MS/MS and GC/MS/MS instruments.

OpenLab software

Agilent OpenLab secures laboratory data as part of the overall quality management system, as specified in ISO 17025. To ensure consistent, accurate, and reliable results, OpenLab ECM enables a lab to secure all electronic content and make it quickly available during an audit. The solution also enables labs to centralize data, preventing loss or tampering at a single workstation.

Agilent 1220 Infinity ll LC

Agilent 1260 Infinity II LC

Agilent Cary 630 FTIR

Pesticide and mycotoxin testing

Determining residual amounts of potentially dangerous pesticides and mycotoxins in cannabis products is critical, and challenging. You must identify parts per billion (ppb) levels of these chemicals against a background of phytocannabinoids, terpenes, and other endogenous chemicals. The selectivity and sensitivity required for determining residual pesticides and mycotoxins in these complex matrices can only be achieved through a dual platform approach utilizing both LC/MS/MS and GC/MS/MS.

Reliable quantitation: LC/MS/MS

The Agilent 1260 Infinity II binary LC with multisampler, coupled to the Agilent 6470 triple quadrupole mass spectrometer or Ultivo triple quadrupole LC/MS system, is ideal for pesticides screening. It harnesses Agilent MassHunter software to meet demanding quantitation limits (for example, the large target lists like those in California and Canada) that will only get more stringent over time.

Sensitive target analysis: GC/MS/MS

The Agilent 8890 GC system or the Agilent Intuvo 9000 GC system, coupled to the Agilent 7010 triple quadrupole GC/MS system, can test for many targets in regional pesticide lists. They are suited for compounds that are not amenable to electrospray ionization sources (ESI) used in LC/MS/MS. Contrary to popular claims in the testing industry, all pesticides cannot be analyzed effectively by LC/MS/MS alone, as ESI is not a universal ionization source.

Optimized for laboratory productivity

The approach of using both LC/MS/MS and GC/MS/MS allows laboratories to optimize their workflows to attain the highest level of productivity possible. By using the correct tools for the job, Agilent provides:

– Maximized sample throughput
– Minimized instrument downtime
– Future-proofed laboratories
– Orthogonal power to confirm results
– The ability to run more samples and generate higher revenue, all in the smallest amount of lab space possible

Heavy metals and nutrients testing

Hemp and cannabis are known to readily concentrate and accumulate heavy metals, some of which may be harmful when ingested, inhaled, or absorbed. Exposure to metals such as lead, cadmium, arsenic, and mercury, poses serious safety concerns. Therefore, metals testing is required to ensure the safety of cannabis and hemp products before they reach the market. This system can also be used for soil, irrigation water, and plant nutrient testing.

Robust, high-throughput monitoring: Agilent ICP-MS Cannabis Analyzer

Our Cannabis Analyzer combines the powerful Agilent 7800 ICP-MS system with its standard High Matrix Introduction (HMI) system, plus an optional Agilent SPS 4 autosampler. It comes complete with an optimized analytical method, ICP Go software interface, ICP-MS MassHunter software, and a consumables starter kit. The analyzer package includes expert assistance to help with setup, method transfer, and operator training.

Agilent 1260 Infinity II
LC with Ultivo LC/TQ

Agilent 7010B
triple quadrupole with
Intuvo 9000 GC/MS

Agilent 7800
ICP-MS system

Residual solvents and terpenes profiling

Agilent protocols for testing residual solvents and terpenes meet regulatory requirements and are designed for high-throughput laboratories. These methods combine the Agilent 7697A headspace sampler, the 8890 GC system or the Intuvo 9000 GC system, and the Agilent 5977B GC/MSD system.

Residual solvents

Potentially harmful volatile organic compounds (VOCs)—like acetonitrile, methanol, and butane—used during extraction and manufacturing must be removed or reduced to an acceptable level. Residual solvents testing requires headspace GC systems with mass spectrometry. The Agilent GC/MSD headspace analysis method is built around the California residual solvent target list and limits of quantitation, so you can meet regulatory mandates with confidence.

Terpenes

Cannabis plants synthesize terpenoids such as limonene, linalool, and pinene. These compounds define the plant's aroma and character. Terpene profiling and quantitation is generally not regulated unless there is a specific labeling claim. The analysis of terpenes, therefore, serves as a quality test.

The Agilent Intuvo 9000 GC/5977B liquid injection method identifies and quantifies 40 common cannabinoid terpenes.

Agilent Intuvo 9000/5977B GC/MSD with 7697A headspace sampler
Headspace sampling ensures an inert sample pathway for superior GC/MSD performance without analyte degradation or loss.

Microbial screening

The presence of microbiota, such as *Aspergillus spp.* and *E. coli*, in cannabis products can pose a threat to consumers. Early detection of these species is critical to prevent crops from reaching high levels of contamination. A common technique for detecting these pathogens is culturing in growth media plates. However, plating techniques are highly organoleptic and are susceptible to false positives and negatives.

qPCR microbial testing: fast, accurate, and scalable

Agilent has partnered with Medicinal Genomics to provide selective, sensitive quantitative PCR (qPCR) assays for identifying and quantitating microbes, yeasts, and mold per regulatory standards.

The Agilent AriaMx Real-time PCR system and the Medicinal Genomics Microbial Testing Platform create a validated workflow that includes decontamination, an internal control, and multiplexed reactions. In multiple states in the U.S. and in Canada, this workflow was used to test up to 46 samples at a time for *Salmonella, Shiga toxin-producing E. coli*, mold, and four *Aspergillus* species with speciation in one 96-well plate. This workflow can be processed manually or automated with the Agilent Bravo platform.

For more information, visit
medicinalgenomics.com/complete-microbial-solution/

Agilent AriaMx Real-time PCR system

Agilent Bravo NGS A Liquid Handler

Looking for great instrument value with no compromises?

Our certified pre-owned instruments deliver like-new performance, reliability, and speed at an affordable price. Agilent-trained technicians refurbish each instrument using genuine Agilent factory parts, so you can be sure that each module meets our rigorous specifications. And every instrument comes with the Agilent 12-month warranty for ultimate peace of mind.

Give your lab a head-start with ready-to-run eMethods

Agilent eMethods deliver comprehensive, end-to-end workflows that every cannabis- or hemp-testing laboratory needs. Each eMethod is designed to accelerate your startup time by condensing the vast amount of technical information into optimized analytical methods and protocols.

Each eMethod includes:

- Information about the most suitable instrument and configuration

- Optimized analytical methods for sample introduction, separation, detection, and data analysis

- A list of expertly selected sample preparation protocols and consumables

- Best practices for sound implementation

Your lab will benefit from eMethods by:

- Minimizing risk and effort in the design/planning of analyses

- Eliminating delays—no missing or incompatible components

- Maximizing profitability—quick startup with ready-to-run methods

- Increasing lab productivity through the use of efficient protocols

eMethods and analyzer are available in the following application areas:

Potency | Pesticide residues and mycotoxins | Residual solvents | Heavy metals | Terpenes
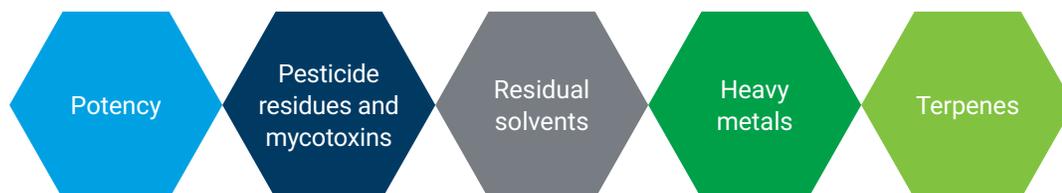
For more information, visit explore.agilent.com/cannabis-testing-emethods

Let Agilent be the single source for your cannabis testing workflows

Consumables you'll need to analyze your cannabis samples

Cannabis is a unique plant that requires unique sample preparation and analytical techniques. Agilent can help your lab with columns, supplies, and sample preparation solutions using methods that have been optimized and verified by our scientists along with various resources, such as:

- **Pre-configured Kits.** Save time and hit the ground running with pre-configured kits for Cannabis and Hemp potency and pesticides and mycotoxin testing of Cannabis flower. The kits include columns and supplies for HPLC and GC as well as all the sample preparation products and step-by-step guidance to analyze 400 cannabis samples.

- **Chemical Standards.** Agilent cannabis testing standards allow customers to analyze cannabinoids and common contaminants in food, recreational, and medicinal products. Our portfolio of cannabis testing standards includes individual and mixtures of cannabinoids, pesticides, residual solvents, heavy metals, and terpenes that are common in cannabis products.

- **Ordering Guide for Cannabis and Hemp testing.** Curated list of verified columns, supplies, and chemical standards required for potency, pesticides and mycotoxin, residual solvents, terpenes, and metals analysis. The downloadable list is grouped based on analysis so you can order what you need in the quantities you need.

- **Application Compendium and User Guide.** These guides make it easy for you to get started quickly by providing step-by-step guidance on how to prepare your samples as well as optimized method parameters for method set-up.

For more information, visit
explore.agilent.com/cannabis-kits

Set up your lab for success

Maximize instrument performance with Agilent CrossLab services. Our industry-leading services—tailored to meet your needs—can help your lab extend uptime, produce reliable data, stay compliant, and have predictable service costs. And because a skilled team is a key driver of lab success, we also offer comprehensive learning opportunities from beginner to expert.

Think you can't afford leading-edge technology from Agilent? Think again.

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