

**CHEM SERVICE INC.**

**Over 2,000 Pesticide and Metabolite Standards**



  
**Greyhound**  
CHROMATOGRAPHY  
AND ALLIED CHEMICALS

# CHEM SERVICE INC.

Certified Analytical Reference Standards  
and Chemicals in Small Quantities

**Custom**  
solutions and mixtures

*RELIABLE*

*PROFESSIONAL*



## **Certificate of Analysis with Each Custom Product**

### **GRAVAMETRIC CERTIFICATION**

By weight—Guarantees the analytes in the custom standard to Be made within +/- 5% of specifications

**Or**

### **QUANTITATIVE CERTIFICATION**

With a chromatogram—includes verification of the concentration and peak identification

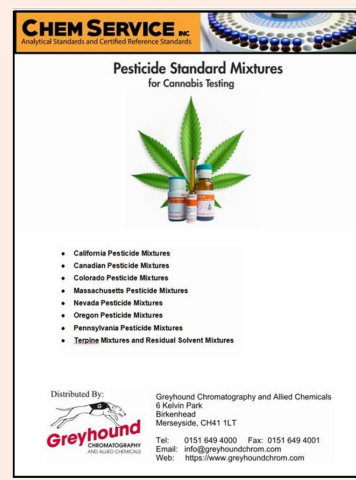
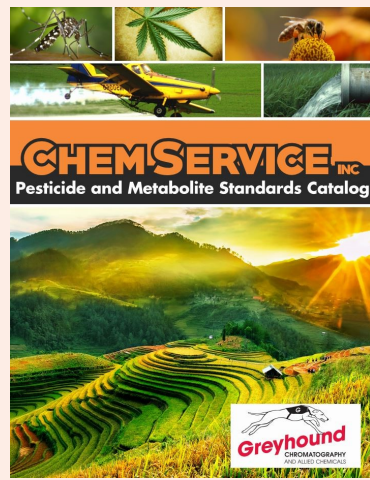
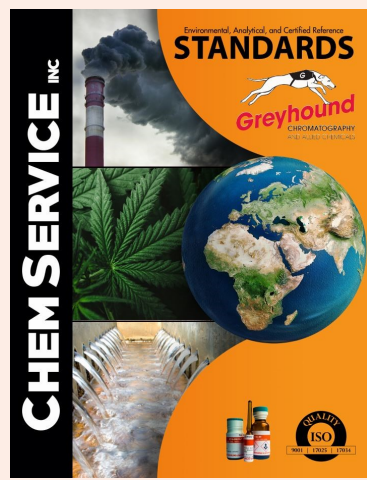
Chem Service provides custom solutions and mixtures to meet your specific analytical needs.

Chem Service provide accurate, precise and economical custom standards mixtures. Certified neat reference standards are used to prepare mixtures. Balances used to prepare stock and custom standards are calibrated to **NIST** traceable weights.

**Chem Service, Inc.** produces high purity standards for use as reference materials and for other laboratory purposes. More than 95% of the Standards Grade materials have a certified purity of 98.0% or greater and do not require purity corrections when preparing solutions for use with EPA, USTM, UST, and numerous other international methods. You can trust that Chem Service high purity standards are a quality product.



**ISO 9001:2015** **ISO/IEC 17025:2107** **ISO Guide 34:2016**



ISO 9001  
Certificate Number: 31610



ANAB  
Accreditation Number: 63520



P.J.L.A. Testing  
Accreditation Number: 63520



P.J.L.A.  
Reference Material Producer  
ISO GUIDE 34  
Accreditation Number: 63520

## Why is Pesticide Testing Important?

Pesticides are an effective tool used by farmers all across the globe to prevent insects, rodents and other pests from eating or spoiling their crops. Although, because these chemical compounds are deadly to these pests, it has been important to ensure that pesticides do not have poisonous effects past insects to humans and other aspects of nature.

However, it can be difficult for communities to police pesticides and it is not as effective to test pesticide use after it has already been applied to a field or farm. For these reasons, there have been a number of international bodies that have joined together to create testing guidelines to ensure that the pesticides used in the U.S., Australia, Africa and anywhere else will not result in unwanted repercussions for humans nearby. Pesticide users and manufacturers can use certified and approved standards to check whether their pesticides meet quality and specification requirements to work effectively without harmful consequences.

## Countries Work Towards a Common Goal

Since the 1960 formation of the Convention on the Organization for Economic Co-operation and Development, countries including the U.S, U.K., Mexico, Japan, Chile and Germany have created a set of pesticide testing protocols. The OECD pointed to nearly 100 testing methods for the testing of these chemicals. The international group both creates guidelines for pesticide uses as well as tests the residue of pesticides in OECD and non-OECD countries to study their effects and determine further usage plans.

Separate from the OECD, the Collaborative International Pesticide Analytical Council, the Food and Agriculture Organization of the United Nations, and the World Health Organization also work to regulate safe pesticide use on an international scale. In a 2005 report published by all three organizations outlining the quality to be used in national laboratories, they explained the importance of using standards from approved international providers.

## Quality Pesticide Standards are Important

Additionally, the WHO Pesticide Evaluation Scheme pointed out that the reason using quality pesticides was important was because it is the only way to ensure safe use.

"Good product quality is essential for effective and safe pesticide use. Impurities formed during manufacture of the pesticide or by interaction in unstable formulations can increase product toxicity to humans and the environment," the organization explained.

## Protecting Bees From Pesticides

As far as humans are concerned, bees are one of the most important insects. Though they aren't the only type of bug that pollinates plants, they are one of the most common. Bees ensure that plants produce fruits and vegetables. Without them, whole industries would die and many would be without a source of food. However, pesticides meant to rid crops of other harmful insects are having an adverse effect on bee populations around the world.



### Are Honeybees the only pollinators affected by Neonicotinoids?

Throughout the world, both entomologists and farmers have been alarmed by honeybee colony collapse. For years, it was not clear whether the culprit was a parasite, cell phone frequencies, genetically modified crops, pesticides or a combination of all these. At least several studies have indicated that neonicotinoids are harmful to honeybees, a finding that the European Food Safety Authority has taken to heart.

However, it is important to remember that honeybees are not the only insect pollinators that can be used in agriculture. Therefore, it is possible that any environmental impact assessment pertaining to the family of neonicotinoids needs to expand to include their effects on other insects.

## Why is it important to test cannabis for pesticides?

Pesticides are commonly used to protect plants against fungi, weeds, animals and insects. Residual pesticides however can cause damage to human health. Cannabis that is grown for medicinal use need to be at manufactured and processed at the highest level. Recreational cannabis also needs to be as pure as it can be. All around the world cannabis is being recognised as having many benefits to health however there are concerns that toxins contained within the cannabis can cause neurodegenerative disease, respiratory disease, cancer, reproductive and fertility problems, diabetes, heart disease to name but a few. These risks may be compounded by heat damage during the smoking process, there are no published papers on the inhaling of heated pesticides.



## Cannabis Solvents Extract the Oil and Can Contain Harmful Residues

Cannabis can have many benefits and as it becomes more legalized across the United States the industry is starting to be held to quality control standards. Like any growing industry though, there is still a lot of room for growth regarding safety and testing. For example, if medical cannabis was put into the same bucket as other pharmaceuticals, every batch would be tested for potency and purity, but that is not always the case.

During the cannabis extraction process to create concentrations for recreation, food, pharmaceuticals and personal care items, solvents and other hydrocarbons can be used that contain potentially unsafe residues. Testing cannabis for both medical and recreational use varies from state to state, but it is important to test for residual solvents that can be potentially harmful to users.

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## What is Organic Cannabis?

It's estimated that the cannabis industry will be a \$20 billion dollar market by 2025. Unfortunately, as suppliers attempt to keep up with demand, the desire to take shortcuts increases with more growers overlooking the use of harmful pesticides or even falsifying 'organic' claims.

Similar to organic fruits and vegetables, organic cannabis is free of pesticides and heavy metals. This means that at no point during the cultivation process were harmful synthetic fertilizers, pesticides, sewage sludge, or genetically modified organisms (GMOs) introduced. Additionally, it means that the plant was never exposed to food ingredients or food processing substances like volatile solvents. However, at the federal level cannabis is still illegal, and there are limitations to USDA regulation. Ultimately this makes it impossible for any grower to acquire the USDA 'certified organic' stamp of approval.

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## How is the analysis carried out?

Generally by GC-MS/MS and LC-MS/MS. Testing for analytes is currently carried out in the U.S to an agreed list defined by individual states. At the time of writing there is not a European regulation of the testing of pesticides in cannabis. Some pesticides destabilise when using high temperature GC methods and are better analysed using LC methods. However, some pesticides destabilise using the LC method and respond better to GC. For an accurate set of data both methods of chromatography should be used.



## Pesticides are a Challenge for Cannabis Growers

Cannabis farmers in the United States have serious chemical problems to contend with when dealing with pesticides, unfortunately we will also have the same problems in the United Kingdom as the cultivation of cannabis for medicinal use increases. At the time of writing there are no regulations on pesticide use in cannabis farming, laws and use vary widely by states in the USA. The picture in Europe is equally confusing as the only regulations currently applied relate to food testing standards. Activists are calling for explicit restriction and regulation of pesticides used by commercial growing operations, this would impact of pesticide use when cultivating cannabis. Cannabis is only legally cultivated in the United Kingdom for medicinal use, available only from a medical practitioner. won't be added until these laws are amended.

Typically, there are two ways pesticides commonly reach crops. Cannabis farms may use pesticides themselves or grow using contaminated soil, or contamination can occur from a nearby farms pesticides reaching the crop. Some states in the US restrict the pesticides that farmers can use on their own operations. They may also restrict other farmers' use of certain pest control chemicals near local cannabis farms. This is also the case in the United Kingdom as agriculture is protected by law.

With more people consuming cannabis from commercial operations, there could be more exposure to pesticides. This is why many pesticide usage on crops needs to be regulated.



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## How is Cannabis categorised?

Cannabis is categorised as medicinal or recreational and is regulated by possession, cultivation and distribution. Regulation is different in every country . [Wikipedia](#) provides a useful overview of current regulation by country. The United Kingdom has classified CBD oil as a Novel Food, its use is regulated and manufacturers who sell CBD oil are required to register with the UK government. There are no regulated standards for testing cannabis, however products sold containing CBD oil are monitored under current food regulations.





**Pesticide Standard Mixtures**  
for Cannabis Testing

**FLORIDA**



**5 MIXTURES**      **67 COMPONENTS**

**Pesticide Standard Mixtures**  
for Cannabis Testing

**COLORADO**



**13 COMPONENTS**

**Pesticide Standard Mixtures**  
for Cannabis Testing

**CANADA**



**6 MIXTURES**      **66 COMPONENTS**

**Pesticide Standard Mixtures**  
for Cannabis Testing

**MARYLAND**



**5 MIXTURES**      **48 COMPONENTS**

**Pesticide Standard Mixtures**  
for Cannabis Testing

**CALIFORNIA**



**5 MIXTURES**      **66 COMPONENTS**

**Pesticide Standard Mixtures**  
for Cannabis Testing

**MASSACHUSETTS**



**9 COMPONENTS**

**Pesticide Standard Mixtures**  
for Cannabis Testing

**NEVADA**



**24 COMPONENTS**

**Pesticide Standard Mixtures**  
for Cannabis Testing

**OREGON**



**59 COMPONENTS**

**Pesticide Standard Mixtures**  
for Cannabis Testing

**PENNSYLVANIA**



**62 COMPONENTS**

## What are Terpenes and How Do They Affect Cannabis?

Terpenes are aromatic compounds that create natural scents like lavender, orange, rosemary, cannabis, and pine. Most commonly found in plants, they can be found in everyday products too. The cannabis plant is well-known for having high concentrations of terpenes which is why so many people associate terpenes with it.



## What Are CBD Terpenes?

While scientists have found over 100 different terpenes in cannabis, some are more commonly used than others. Some of the most common CBD terpenes include:

- Lymonene – known for its citrusy smell
- Myrcene – a powerful antioxidant found in hops, lemongrass, and thyme
- Pinene – therapeutic and known for its rosemary and pine aroma
- Linalool – closely associated with its lavender aroma and therapeutic effect
- Humulene – found in hop, clove, and ginger
- Caryophyllene – known for its spicy aroma closely associated to cinnamon and cloves

Terpinolene – less common, but recognized for its multidimensional aroma of citrus, pine, and flowers



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