SIMPLY
Chromatography

CO_2 CLEAN & GREEN

Manufactured by:

UNITED SCIENCE
www.unitedscience.com
500 Simmon Dr. Osceola, WI 54020

Table of Contents

extraktLAB's full solution is fully customizable, and intended to process botanical biomass into pure, clean extracted oils for use in consumer products.

All of extraktLAB's equipment is designed, manufactured, and assembled in the USA.

extraktLAB

Seed to Shelf Process

GROWING & HARVESTING

growLAB

Cloning

Hydroponic Growing

Planting

Vegetative Growth

Flowering Growth

Harvest

Drying

Lab Testing

Packaging

Storage

PRE-PROCESSING & EXTRACTION

Terpenes

Terpene Collection (Cold Trap)

Extraction

Lab Testing

Vacuum Oven Decarboxylation

Ground Material

Grinding Station

Receiving

Plant Processing

PROCESSING

Lab Testing

Winterization (-20°C)

Crude Oil & Ethanol Solution

Winterized Crude Oil

Dewaxing & Filtration

Oil & Ethanol Solution

Clean Particle Filtration for Oil Refinement

Evaporation

Distillation

END PRODUCTS

Wholesale Full Spectrum Crude Oil

Isolate

Water Soluble

Delta 8 Industrial Lab

Isolate Powder

Broad Spectrum

Delta 8

Re-introduce Terpenes

Isolate Production System

Chromatography

Broad Spectrum Distillate

Winterized Full Spectrum Crude Oil

Distillate

Full Spectrum Distillate

CPGs

Vape

Tinctures

Gummies

Capsules

Analytics Lab

Type of Oil

Sellable Wholesale Product

Consumer Packaged Goods (CPGs)

pure99 Chromatography

pure99 x

pure99 z

What is Chromatography?

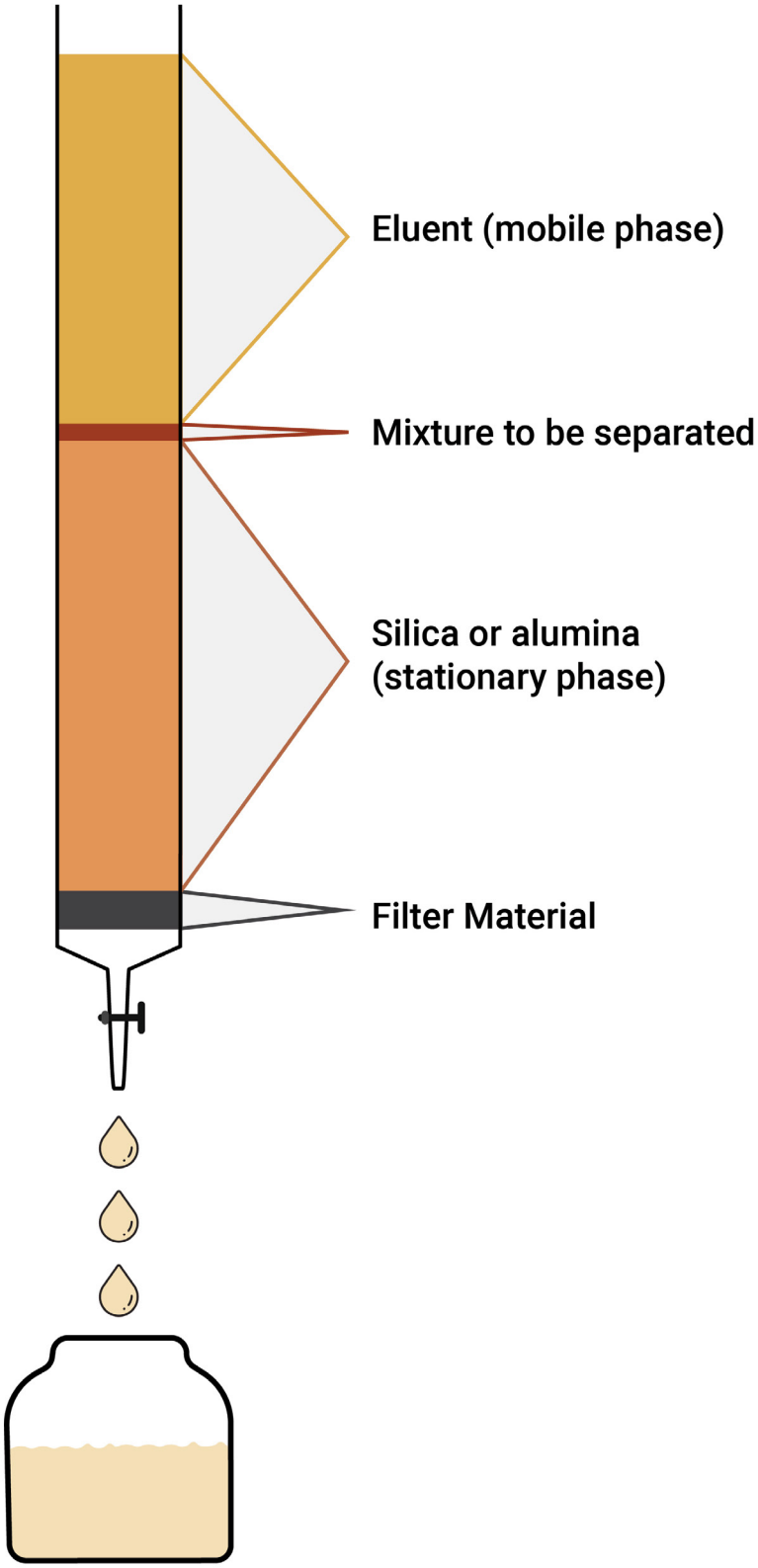
Chromatography is used to separate the compounds of a solution into its individual components.

This separation is accomplished by using a solvent as a mobile phase to carry the components of the mixture through a stationary phase.

The stationary phase is a semi-permeable material and allows the solution and mobile phase to selectively pass through. This means each individual component will pass through the stationary phase at different rates allowing them to be separated before being collected.

Basic column chromatography contains a column layered from bottom to top with a filter, packing material, stationary phase (typically silica or alumina), the mixture in need of separation, more packing material and the eluent used as a mobile phase.

During the separation process, a pump forces the mobile phase and mixture through the column and to pass through the stationary phase. Because of the particle size in compounds – such as specific cannabinoids – each compound will pass through the stationary phase at different rates thus separating them to be collected in stages or sequentially by particle size.



BASIC COLUMN CHROMATOGRAPHY

Types of Chromatography

Chromatography is a very effective method for testing extracts for purity and safety. It is a reliable way to test for pesticides, residual solvents, heavy metals and other unknown substances before removing them from the extract.

WELL-KNOWN TYPES OF CHROMATOGRAPHY

- **Gas Chromatography**
- **High Performance Liquid Chromatography**
- **Flash Column Chromatography**
- **Thin Layer Chromatography**
- **Paper Chromatography**
- **Supercritical Fluid Chromatography**

COMPARING TYPES OF **CHROMATOGRAPHY**

Method	Stationary Phase	Mobile Phase	General Applications
Gas Chromatography	Liquid phase on wall	Gas	Determining volatile compounds
High Performance Liquid Chromatography	Solid phase or bonded phase	Liquid	Determining non-volatile compounds
Flash Column Chromatography	Specific porosity solid (ex. silica)	Liquid	Peptide purification, protein analysis, sample cleanup
Thin Layer Chromatography	Specific porosity solid (ex. silica)	Liquid	Analyzing mixtures
Paper Chromatography	Paper	Liquid	Analyzing mixtures
Supercritical Fluid Chromatography	Siloxane	High Pressurized Gas	Separating chiral molecules

Distinct from liquid-liquid extractions, gas gas or membrane separations, chromatography uses a solid phase or stationary phase and a liquid/gas phase to accomplish the separation.

In the hemp and cannabis industry, chromatography has many uses in terms of creating a safe and legal product. Chromatography can be used to identify and separate the various compounds of the plant such as cannabinoids, terpenes and unwanted plant materials. This is very important for methods requiring THC remediation which we will go into more detail later.

Color Remediation

DRAINDROYD® + carbonX®

The DRAINDROYD® is a large-scale buchner funnel that has been designed to increase the speed of filtration through various decolorization media. carbonX is a mechanically stable color remediation media that can be coupled with the DrainDroyd to remove plant chlorophylls and other plant materials that cause dark, undesirable color in your extracts. The DRAINDROYD® uses a vacuum pump to pull the liquids being filtered through the filter media into a holding vessel where they can be expelled after filtering is complete.

Filtering takes place in a multi-step process.

The **first step** is to place filter paper on the bottom of the drain Droid and place the retaining ring on top of the paper to seal down the edge. Technical grade filter papers are available in 1.5, 3, 5, 10 and 20 micron.

The **second step** is to wet the paper with the solvent you are using & add the carbonX filtration media to the top of the paper.

The **third step** is to turn on the vacuum

The **fourth step** is to start filtering.

The **fifth step** is to wash the filter media with additional cleaning solvent.

The **sixth step** is to expel the filtered media out of the collection vessel for solvent removal.

The media can be removed from the top of the filter paper and discarded after use.

Filtration Media

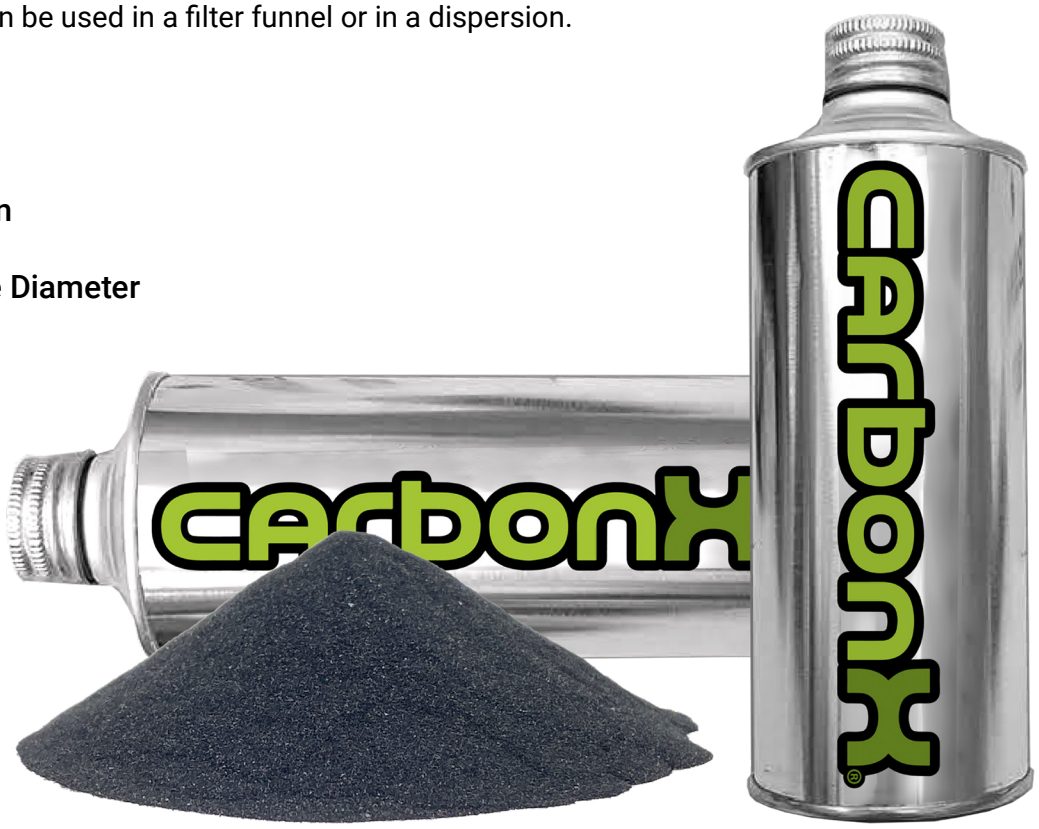
carbonX®

Clean Particle Filtration

carbonX is a mechanically stable material designed to remove dark colors from your extracts. It is radically different from activated carbon because it does not break up or make your hands black when handling. Because it is clean combustion byproducts will not dissolve into your extracts. The material can be used in a filter funnel or in a dispersion.

FEATURES

- **Ultra Strong & Clean**
- **Food Grade**
- **Monodisperse Pore Diameter**



Before & After

To order:
#80-4600 carbonX, 1 gram
#80-4604 carbonX COA (not acid washed)
#80-4606 carbonX Plus (for QUECHERS)
#80-4607 carbonX Quechers, 2mL DSPE, Qty 100
#80-4616 carbonX COS
#80-4617 carbonX Plus, 400g
#80-4618 carbonX Plus, 50g
#80-4667 carbonX Quechers, 15 mL Tubes, Qty 50
#80-4677 carbonX, 16 oz
#80-4678 carbonX, 32 oz

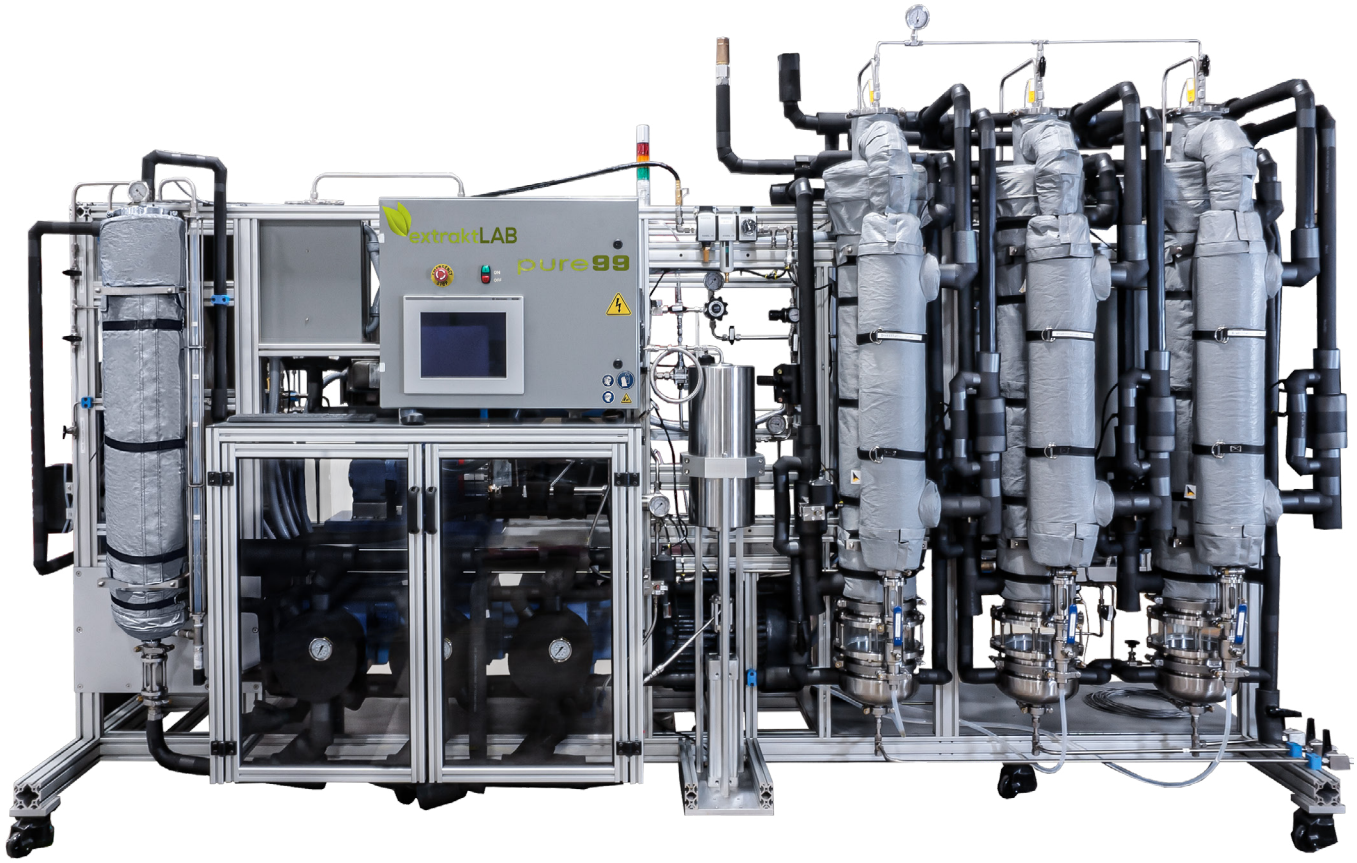
For large operations needing to separate tens to hundreds of kg/month.

pure99®x

Botanical Separations

The pure99-x chromatography system was designed and optimized for on line preparative separations, with integrative closed loop solvent recovery.

Based on decades of chromatography engineering experience, this versatile chromatography system allows you to develop separations methods for each mixture. This system may be used with many different types of eluents and column packings to help you achieve your desired separation. For separations of tens to hundreds of kg per month, the pure99 system is ideal for separations of major components of complex mixtures.



FEATURES

- **Closed Loop Solvent Recycling**
- **High Pressure Column**
- **Large Diameter Column for High Loadability**
- **Binary On Line Solvent Gradient Mixing**
- **Automated Methods & Data Integrity Controls**

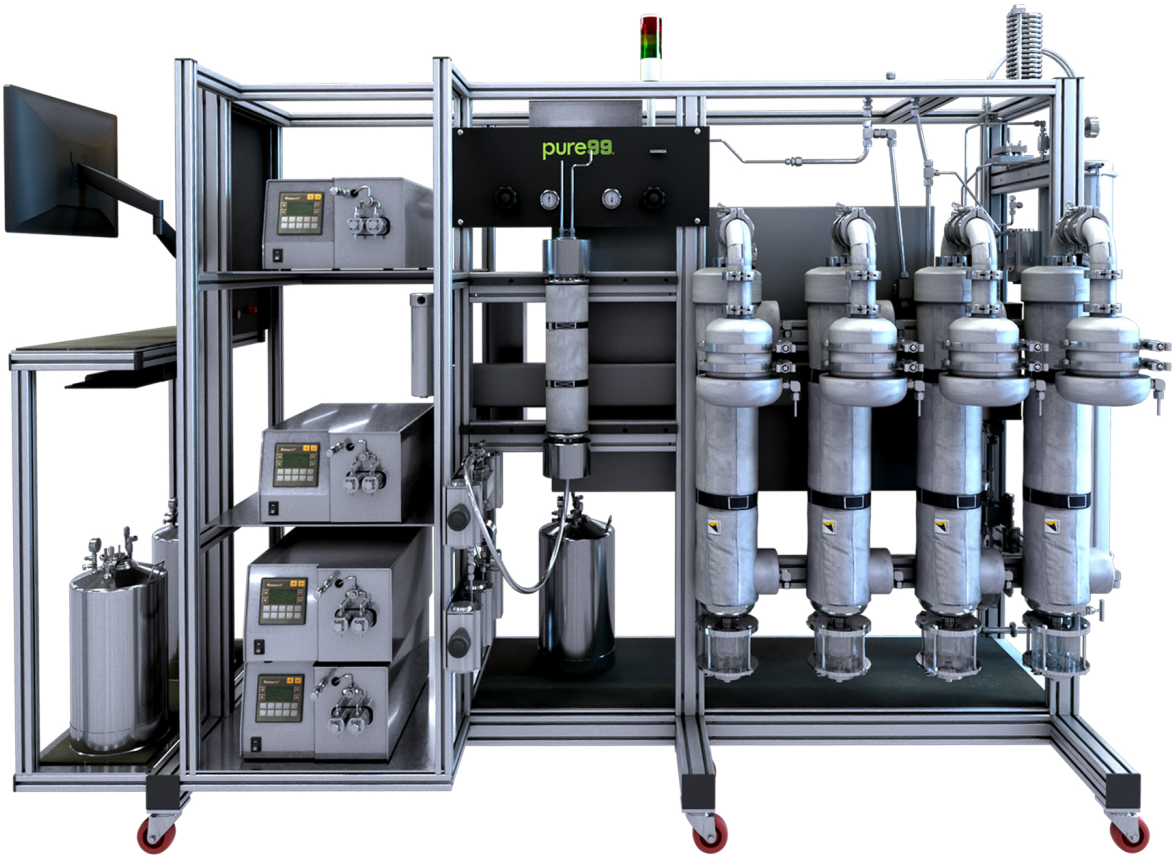
To order:
#10-0087 pure99-Omega (240V) 3ph 50/60 Hz
#10-0149 pure99-Omega (380V) 3ph 50/60 Hz

pure99®z

Botanical Separations

The pure99-z chromatography system is a R&D platform with a high degree of versatility. The nature of R&D lends itself to this equipment getting better and better. **Preparative chromatography is used to separate complex mixtures into their pure components.** The pure99-z was designed and optimized for on line preparative separations, utilizing high pressure injection and a sample loop up to 100 mL.

The pure99-z is ideal for small or R&D facilities, enabling separations of major components of complex mixtures.



FEATURES

- **Closed Loop Solvent Recycling**
- **High Pressure Column**
- **Large Diameter Column for High Loadability**
- **Binary On Line Solvent Gradient Mixing**
- **Automated Methods & Data Integrity Controls**

To order:
#10-0165 pure99z (240V) 3ph 50/60 Hz
#10-0166 pure99z (380V) 3ph 50/60 Hz

**In Development: Images & Information may change.*

Removing THC from CBD

Looking back to the basics of chromatography can provide us with the necessary information on how THC is removed from CBD. When a CBD extract is added to a mobile phase, it begins to dissolve the solution. After the extract is introduced to the mobile phase, it begins the separation process within a chromatography system by passing through the stationary phase.

As mentioned earlier, each compound flows through the stationary phase at different rates, dependent upon the chromatography method used.

CBD extract is blended with mobile phase and passed through the chromatography column stationary phase. THC will pass through the stationary phase first because the particle size between CBD and THC are different.

This allows the THC to be separated from the mixture and collected, followed by a mixture of CBD and THC before a purified CBD extract can be collected. This is one of the most effective THC remediation method used to keep the delta 9 THC content well below 0.3% (effectively 0%), making the end product both safe and legal.

In the image below, you can see the color changes as the compounds are separated and collected. These colors do not reflect changes when further processed and made ready for use in end products.

A crop may test well below the 0.3% threshold established by the FDA – but this is biomass concentration.

Extraction concentration of cannabinoids, THC & CBD included, is much higher than biomass.

Why THC Remediation is Essential?

The issue of Delta 9 THC in your extract is a massive one. Despite a diligent distillation process, there might still be excess delta 9 in the distillate.

You can use a crop testing well below the 0.3% threshold as established by the FDA, but it means nothing when you are extracting because the concentration of cannabinoids in an extract is much higher than biomass. This includes THC and CBD.

There are a few methods designed to successfully deal with delta 9 THC concentration problems.

1. Dilution. You could dilute your distillate to be below the legal amount of delta 9 concentration before adding into end products.

2. Significantly Dilute. When a distillate's delta 9 THC concentration is too high, this may require significant dilutions, which then impacts your product's CBD concentration and makes a less potent end product.

3. THC remediation. This method allows you to selectively remove the necessary amount of THC to specifically formulate products to the desired concentration. **THC remediation ensures a product is totally compliant and safe for your customers to use.**

4. Degradation. Oil extract is often heated to high temps forcing the THC to degrade or convert to CBN. Although this process can be effective, you often degrade all cannabinoids resulting in lower potency overall.

What Chromatography System is Best?

The method of chromatography is an important consideration when choosing the best chromatography system. There are several options on the market, depending on the size of your operation and what your end product is – the best system will be specific to you. It is invaluable to know what you need your chromatography system to do BEFORE purchasing.

extraktLAB specializes in separations solutions and has two ideal pure99 options available for large and small processors.

To Recap

pure99x

An industrial scale high-pressure liquid chromatography machine intended for large scale separations in the botanical extraction industry. The pure99-x has an impressive production rate of ***up to 2kg per hour*** and a built-in solvent recovery system allowing for onboard solvent recycling. Which highly improves separation efficiency making it ideal for continuous, large-scale separations.

pure99z

The perfect solution for small to mid-scale operations needing a chromatography system for testing, complex separations or research and development. The pure99-z is the perfect solution for mid range THC remediation, cannabinoid separation, and product testing - with a production rate of ***600-900ml per minute***.

Ready to talk to our experts? Schedule your jam session at https://extraktlab.com/cbdjamsession/

extraktLAB®

Scan below for your custom experience through extraktLAB.com:

Chemists

Farmers & Growers

International

Investors & Entrepreneurs

Processors

To get your custom quote, call extraktLAB's International Headquarters today:

1 (651) 600.0036

Manufactured by:

UNITED SCIENCE
www.unitedscience.com
500 Simmon Dr. Osceola, WI 54020