

By now, you've not only heard about the powers of CBD, you've experienced them for yourself. You've got CBD for sleep, CBD for pets, and calming CBD salves to soothe achy muscles. But where does all this cannabidiol (CBD) come from? You may be curious about this non-intoxicating cannabinoid you find creeping into just about every wellness product, and how CBD is extracted from the hemp plant.

While it is technically possible to extract the beneficial compounds from hemp at home using nothing more than high grain alcohol, the vast majority of today's CBD products come from a highly purified and exceedingly technical process known as supercritical CO2 extraction.

Yes, supercritical CO2 extraction may sound like it's straight out of a sci-fi thriller, but it's a well-established extraction method, widely used for food, pharmaceuticals, and now, CBD.

## **All About Supercritical CO2 Extraction for Hemp**

As the name suggests, supercritical CO2 extraction starts with carbon dioxide, an essential component for life on earth. Humans exhale it, plants breathe it, and it exists almost everywhere around us.

Normally, in the environment, CO2 exists in a gaseous form, but chemists work with it in a semi-liquid form for extraction purposes. Using pressure and super-low temperatures (aka supercritical), CO2 transforms into something between a gas and a liquid. In this state, it's useful for the extraction of essential oils. Because it's also non-toxic when handled under the right safety protocols, it's perfect for hemp extraction.

But it's not just as simple as adding hemp plants into a container with supercritical CO2. To transform hemp plants into the CBD tincture in your medicine cabinet, lab technicians must follow a series of steps: extraction, winterization, and remediation.

### [Step 1: The Extraction Chamber, Where Hemp Meets CO2](#)

The journey of [CBD oil begins in a commercial lab](#), using specialized extraction equipment capable of withstanding extreme temperatures and pressure changes.

Powdered dried hemp goes into a specialized chamber within a [supercritical CO2 extraction](#) system, and a pump forces the CO2 through. Under extreme conditions (cold temperatures and high pressure), the CO2 dissolves the terpenes, cannabinoids, and other compounds.

When pushed through a pressure release valve, the liquid CO2 and dissolved cannabinoids separate from the leftover plant material. A secondary process completely separates the extracted materials from the CO2 for a purified hemp extract with no leftover non-organic residues.

## Step 2: Winterization, Separating the Beneficial Compounds

Hemp plants contain much more than just cannabinoids like CBD. Hemp contains terpenes, flavonoids, plant waxes, and many other compounds.

Depending on the type of extraction system and what organic compounds end up in the extraction, the consistency can range from that of thick peanut butter to a cloudy liquid. Both need clarification before they end up in a tincture bottle.

Producers separate the non-medicinally valuable compounds (like plant waxes) from the desirable ones (terpenes and cannabinoids) through a process called winterization.

Winterization is relatively simple. The thick and cloudy hemp extraction gets mixed with ethanol (essentially super-refined alcohol), which is then frozen. This process separates the valuable from the non-valuable. Once filtered and the ethanol totally removed, a familiar clarified, full-spectrum CBD oil remains.

## Step 3: THC Remediation (aka Wash and Polish)

And still, the process continues! At this point, we've removed all the aspects of the hemp plant material that we do not require for therapeutic benefit, and have a spectrum of terpenes and cannabinoids remaining.

These compounds offer a complete picture of the original natural plant, but they've been refined and concentrated throughout the extraction. At this point, Zen Garden Organics performs one more step, called "wash and polish," before it's ready for consumption.

Washing is critical for legal CBD products. In the U.S., hemp is legal because it contains less than 0.3 percent THC. But just like the extraction process concentrates CBD content, it can also concentrate minimal amounts of THC.

To ensure our final products contain absolutely no THC, we ensure that every single drop of CBD oil goes through THC remediation, or the "wash and polish" process. As our lab reports confirm, every batch of CBD oil contains zero percent THC.

There are many novel ways to separate different cannabinoids from one another, and almost all rely on chromatography. Manufacturers use reverse phase, flash, counter-current, and a hundred and one variations on the chromatography process, depending on original material, equipment, and goal. Common consumable solvents, like water and ethanol, are frequently applied for THC remediation.

## **Wait, What About Nanoemulsion?**

Nanoemulsion is the revolutionary technology that makes CBD much more bioavailable, but does it follow the same extraction process as normal hemp extracts? Technically, nano CBD

follows all the steps mentioned above, from extraction through to winterization and remediation — with one critical last step.

To transform the traditional CBD extraction into CBD oil particles that are microscopic (we are talking between 100 and 1,000 nanometers in size), we need to apply a proprietary emulsification process.

Nanoemulsion exposes hemp oil to ultrasonic waves. These waves pummel the already tiny hemp particles with molecular pressure to break them down further into tiny-sized specs. This final step drastically improves the water-solubility of hydrophobic cannabinoids like CBD, which means a much more powerful and readily absorbable option.

## **Applying the Power of Modern Extraction Science to Your Everyday Life**

If you've made it this far, you understand the basics of extraction, purification, and remediation with a dash of knowledge about nanoemulsion. So, how will you use this information in your everyday life?

Use your newfound CBD knowledge to guide your shopping experience. Shop with companies like Zen Garden Organics, who offer full transparency on the extraction process, confirmed with [lab test results](#) on the final products.

After all, you want to know what goes into the [CBD oil](#) in your medicine cabinet so you know what is going into your body. Knowledge is the first step to taking control of your health.