

CBD (cannabidiol) oil continues growing in popularity during 2020, especially in light of health concerns as the nation struggles with lockdown and a pandemic, and consumers choose to look more toward health-conscious choices and products. CBD's increasing availability and accessibility as a dietary supplement in oil and other forms make it attractive to people experiencing a wide range of health concerns. Many users cite anxiety, mood, and pain or inflammation as the primary concerns that led them to try CBD. CBD's therapeutic effects emerge from its ability to link with endocannabinoid receptors in the brain, which are part of the body's natural regulatory system.

Currently, CBD and [CBD oil](#) can be purchased in various forms, for topical use or oral consumption. CBD products are manufactured and sold as tinctures, edibles, balms, salves, creams, drinks, vaping oils, oral sprays, and pills or capsules. Within these broad categories, the options for potency and levels of processing are many.

Before CBD can really be infused or embedded in these products, however, it must be processed. The nature and quality of the CBD oil will depend not only on the hemp that is grown and harvested, but also on the processing technologies and procedures used. This adds yet another layer of diversity to CBD product lines that the educated consumer must consider before making their final purchasing decision.

Back to the Basics: Raw Hemp Oil and Flowers

Most CBD products are manufactured using CBD oil that has been extracted from hemp plants. It is possible to purchase unprocessed hemp flower buds, which will contain all the phytocannabinoids, terpenes, and flavonoids produced in nature by the hemp plant, but they are more difficult to find, and require more work to realize the benefits of the CBD contained within.

Hemp flower buds must be dried and cured before they can be used. Once they dry they can be crushed and ground up, and then mixed with foods or drinks for fast and easy consumption. Dried and cured hemp flowers can also be smoked or vaped, although a special dry herb vape pen will be required for the latter.

In their natural state, hemp flowers contain relatively low quantities of actual CBD. They are instead loaded with a cannabinoid known as CBDa (cannabidiolic acid), which functions as a precursor of CBD.

When hemp is consumed in raw form, the CBDa it contains will not properly bind or interact with endocannabinoid receptors in the body, which are only "unlocked" by the CBD molecule itself. While some believe consuming CBDa in a "raw" form has some potential health benefits (particularly for minor inflammation), it is not the primary form that provides the most benefit, and CBDa effects are considered to be much more muted than ingesting actual CBD.

CBDa will transform into [CBD](#) if it is subjected to heat, bringing about molecular-level changes through a chemical reaction known as decarboxylation. Anyone in possession of raw hemp flowers can perform this procedure at home, either by smoking or vaping ground-up flower buds or by baking them in the oven for 30 minutes at a temperature of at least 225° Fahrenheit (107°

C). The addition of heat, at a chemical level, cause the "-acid" part of the molecule to separate, enabling the remaining cannabidiol molecule to engage with the receptors in endocannabinoid system. Like a specific shape of a key that allows it to fit into a lock, this "decarbed" CBD cannabinoid can now fit in and engage the receptors in the human body. This CBD cannabinoid is far easier absorbed and utilized by the body than CBDA.

Raw CBD oil can also be purchased, often in the form of tinctures or capsules. When CBD oil is extracted using a low-heat or no-heat extraction process, such as cold pressing or low-temperature CO₂ (carbon dioxide) extraction, CBDA and other acidic cannabinoids will be preserved.

Consuming raw unprocessed flower or oil won't deliver optimum levels of CBD. Raw hemp oil extract could still have its uses, especially if it is combined with another CBD product that has been processed differently and contains greater quantities of CBD. To get the benefits that most CBD users are seeking, the majority of the CBDA should have been converted to CBD through the decarboxylation process.

Going Full-Spectrum: The Ultimate in High-Quality CBD Oil



Hemp flowers and associated hemp oil that has been decarboxylated contain a rich mixture of healing compounds, but they are still somewhat limited in their effectiveness. In addition to phytocannabinoids, terpenes, and flavonoids, these rawer forms of hemp also carry impurities

that have little or no benefits to humans and may interfere with the effective absorption of more helpful compounds. To get the best results from the hemp plant and CBD, it is necessary to perform some additional level of processing to unlock the real benefits.

The highest "gold-standard" achievement in CBD extraction technology is known as full-spectrum CBD oil. Featuring a treasure trove of beneficial cannabinoids, terpenes, and flavonoids, full-spectrum CBD oil represents the actualization of all that the hemp plant has to offer. Full-spectrum oil comes from filtering and light-touch processing of the harvested hemp biomass to concentrate the beneficial components, while removing the unnecessary ones, resulting in a concentrated, highly bioavailable oil that the body can use. It contains not only primarily CBD, but a whole host of other beneficial components from the hemp plant.

In addition to high levels of cannabidiol, full-spectrum CBD also contains THC, at legally acceptable levels of 0.3 percent or less, to comply with current federal law. This is the maximum allowable quantity of THC that can be included in a non-prescription medicine or supplement, but it is more than enough to boost the overall healing capacities of the final product.

To create full-spectrum CBD, the first step is to extract the oil from the hemp using some type of solvent. In the past, toxic chemicals like hexane and butane were routinely used to recover CBD oil at commercial scale, in a process called hydrocarbon extraction. While large-scale hydrocarbon extraction is still done by some manufacturers, carbon dioxide (CO₂) and ethanol are now the solvents of choice.

Carbon dioxide (CO₂) has recently been a more frequently used "clean" solvent, mainly because it is not flammable and produces no toxic byproducts, and results in a very gentle extract of cannabinoids without altering their chemical structure. The CO₂ gas is harvested from the air around us, and the use of it does not affect any greenhouse gas levels or produce emissions. At extremely low temperatures and under pressure, CO₂ behaves as both a liquid and a gas, making it an ideal solvent to extract desired botanicals from harvested plant material. During a process known as supercritical CO₂ extraction, CO₂ is pressurized and sent through the ground hemp flower and stems (called biomass) in an extraction chamber, where it dissolves and absorbs the cannabinoids, terpenes, and flavonoids contained within the hemp biomass. From there it is pushed over into a lower-pressure separation chamber, where the CO₂ changes from liquid form to gas. As it changes into gaseous form, it releases its hemp-based contents, leaving behind a thick, gooey substance referred to as crude oil, which contains a mixture of CBD oil, fats, chlorophyll and plant waxes.



CO₂ is a highly effective CBD oil solvent, but the equipment required to use it can be expensive, with costs that can run from the tens of thousands to hundreds of thousands of dollars. It also requires a little bit of chemistry knowledge, as well as proper chemistry lab procedures. A far less expensive alternative is ethanol extraction, which is prevalent among low and mid-priced CBD oils, but has been emerging as a formidable rival to supercritical CO₂ extraction for market share. In an ethanol extraction, the hemp biomass is soaked in a cold solution of alcohol to soak up the CBD from the vegetative material, then strained and filtered, and the alcohol is evaporated off, leaving the CBD and other cannabinoids behind for recovery.

To prepare hemp flowers for ethanol extraction, they must first be heated (decarboxylation) to create CBD from the CBDA. The plant material will then be soaked in the ethanol and allowed to sit for enough time to allow the ethanol to dissolve most of the cannabinoids, terpenes, and flavonoids. The final product is then filtered to separate the CBD oil and the ethanol from the remaining plant materials. Care must be taken to ensure that the residual ethanol, a contaminant, is removed from the final product, but that can be accomplished quite neatly through evaporation and more filtering.

CBD crude oil produced by CO₂ or ethanol extraction will be rich in all the important compounds that CBD users crave, but it must be further purified and converted into its final consumable form. To remove the fats, chlorophyll, and plant waxes and resins, the extracted CBD "crude oil" must be subjected to a process known as winterization before it is truly ready for human usage.

During winterization, the extracted CBD crude oil is mixed thoroughly with 190-200 proof alcohol (ethanol, or in some cases, methanol) and placed in a freezer. After spending 24 hours or more at temperatures in the sub-zero range, the waxy and fatty materials will freeze and start to separate from the alcohol solution, leaving the solvent mixed with all the desirable phytocannabinoids, terpenes, and flavonoids. The ethanol lowers the freezing point of the mixture, but makes the unwanted particles clump together on top of the solution. The partially

frozen solution will then be filtered through multiple paper or metal filters, to separate the unwanted remnants from the desired ones. In an ethanol extraction, this is typically done as part of the same extraction process, while in a CO2 extraction the winterization is a separate step.

CBD Distillates and Isolates

Winterized full-spectrum CBD oil can be further refined, using a combination of heat, steam, pressure, and solvents to further separate cannabinoids, terpenes, and flavonoids from the solution. Substances in CBD oil have different boiling points, and it is this scientific fact that can be exploited to isolate preferred chemical substances. The boiling point of cannabidiol is in the 320-356 degrees Fahrenheit range, and bringing temperatures up to this dividing line can boil off most of the plant constituents, and leave behind a honey-golden liquid distillate that may contain up to 80% CBD.

CBD distillates are virtually tasteless and odorless. This makes them a great food and drink additive, and they are often used in topical creams and other skin-based CBD solutions as well. The trade-off is, at this level, many of desirable terpenes and minor cannabinoids have been filtered out or "boiled off", and so the oil can no longer truly be considered full-spectrum. By chasing higher levels of purity and increased percentages of CBD content, many of the healthy plant constituents and terpenes have been removed, which is why at CBDPure we do not process our oil to the distillate level.

Despite undergoing purification, CBD distillates will still contain small amounts of other chemical compounds, specifically THC, which can still be virtually eliminated through further processing. At the end point, what will be left is a substance called CBD isolate, which may surpass 99% purity in CBD content. Isolate is produced in the form of a white, crystalline powder and is appropriate for use in tablets, capsules, or tinctures, or as an additive to food or beverages. Just like distillate, this increased level of processing means nearly all of the other minor cannabinoids, terpenes, and other beneficial parts of the hemp plant that contribute to the entourage effect have now been completely removed, leaving only a crystalline white powder of just the single isolated compound, CBD.

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