



## THE INDUSTRY INNOVATION BEHIND CHARLOTTE'S WEB™ THC FREE† HEMP EXTRACT

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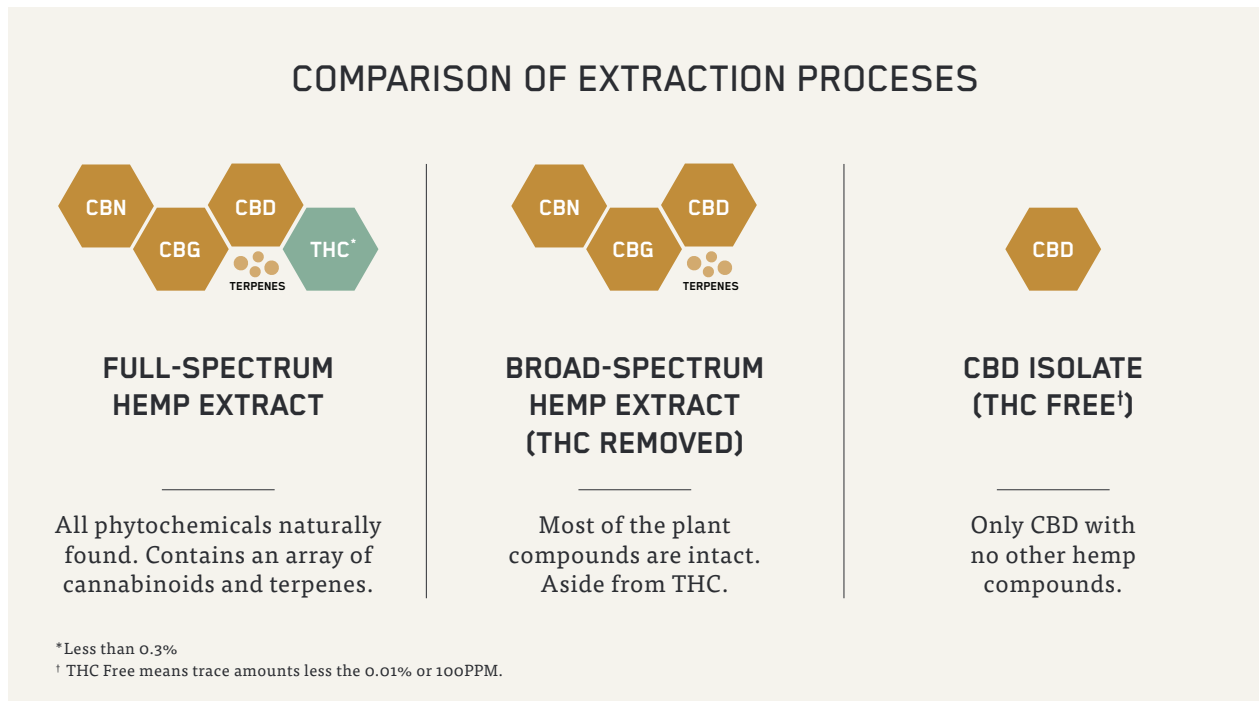


CHARLOTTE'S WEB™  
STANLEY BROTHERS



## BACKGROUND

The passage of the Agriculture Improvement Act of 2018 (known as the 2018 Farm Bill) has meant that cultivating hemp (a variety of *Cannabis sativa L*) is legal in the United States providing that plants contain no more than 0.3% on a dry weight basis of delta-9-tetrahydrocannabinol (THC). Charlotte's Web, Inc. ("Charlotte's Web") unflinchingly complies with this legal limit. Our full spectrum hemp extracts feature an array of minor cannabinoids (in addition to CBD), plus terpenes, flavonoids, phytosterols, and essential fatty acids that naturally occur in the whole hemp plant, and which facilitate the synergy of the entourage effect.



While full spectrum hemp extracts are not intoxicating, some customers would feel more comfortable knowing they are not ingesting any amount of THC even within the legal parameters set for industrial hemp plants. In addition, many employment sectors including government, defense, healthcare, transportation, construction, and emergency response (such as firefighters and law enforcement) screen employees for drug use both during the hiring process and at random intervals thereafter. These kinds of tests are not aimed at detecting CBD, but they do screen for THC. It is possible that even the negligible amount of THC present in full spectrum hemp extract could cause a positive test result under certain conditions.



## RESPONDING TO CURRENT NEEDS AND LEADING THE WAY TO THE FUTURE

The urine enzyme immunoassay is the standard screening cannabis drug test used in workplace settings. It measures THC-COOH, which is a major metabolite of THC. The amount of THC necessary to cause a positive drug test is unknown, particularly with regard to full spectrum hemp extract products. Regarding cannabis itself, however, it is known that, depending on many factors such as the amount and frequency of use, and an individual's genetics, weight, age, and sex, THC can be detected in the urine from days to weeks afterwards because THC-COOH is stored in body fat.



Many industries that routinely screen for drug use are involved in demanding, high stress work. Employees in these sectors would relish the peace of mind of knowing they can receive the benefits of hemp phytocompounds, without having to worry unduly about the risk of failing a drug test. It isn't possible yet to cultivate a hemp plant with 0.0% THC content, but Charlotte's Web has created a hemp extract with THC levels below detectable limits (less than 0.01% or 100ppm) using state-of-the-art, innovative, and environmentally-friendly technology for the refinement process.

## INTRODUCING CHARLOTTE'S WEB™ BROAD SPECTRUM THC FREE<sup>†</sup> HEMP EXTRACT

Like all of our products, THC Free<sup>†</sup> hemp extract, also known as broad spectrum, is sourced from Charlotte's Web proprietary hemp varieties grown using responsible and sustainable farming practices. Such consistency from plant to plant means every bottle of Charlotte's Web™ hemp extract has a similar phytochemical profile batch after batch and year after year. The same phytochemical profile for extracts means consistent and reliable health benefits for consumers. This level of whole-plant standardization is extremely rare and is one of many factors that distinguishes Charlotte's Web within the industry.





### **CREATING THE THC FREE<sup>†</sup> EXTRACT**

The process starts with the creation of our full spectrum hemp extract. The full spectrum hemp extract is derived from Charlotte's Web proprietary hemp varieties, using supercritical carbon dioxide (CO<sub>2</sub>) as the extraction method. The initial crude extract created then undergoes a process known as winterization. Winterization is a purification step that uses ethanol chilled to subzero (°C) temperatures to remove extraneous substances such as waxes and fats. The ethanol, which is then evaporated off by gentle heating under vacuum, is recovered and reused for additional extractions to

prevent waste. The winterized extract is then decarboxylated, a process whereby the naturally occurring acid forms, for example CBDA (cannabidiolic acid), are converted to their active forms, in this case CBD.

This full spectrum winterized extract then goes through further phases of distillation and other steps designed to purify it beyond what is normally achievable with standard supercritical CO<sub>2</sub> extraction. This is done to optimally prepare it for the innovative technology that is used to create Charlotte's Web™ THC Free<sup>†</sup> hemp extract.

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### **INNOVATIVE SUPERCRITICAL FLUID CHROMATOGRAPHY (SFC)**

Supercritical fluid chromatography (SFC) is an innovative, dynamic flow technology commonly used in the pharmaceutical industry to separate, collect, and identify components of complex mixtures of organic substances. The proprietary technique is highly selective for the removal of THC, while simultaneously allowing conservation of other desirable phytocompounds. SCF has two stages, one using silica, a porous solid packed into a column, to separate out THC, and the other phase uses supercritical CO<sub>2</sub>. The result is a broad spectrum product with only the THC removed. CBD, minor cannabinoids, terpenes, flavonoids, phytosterols, and essential fatty acids that naturally occur in the whole hemp plant remain intact.



SFC is an environmentally friendly technology, and CO<sub>2</sub> is considered to be a “green” non-toxic solvent collected as an industrial byproduct. Large-scale CO<sub>2</sub> systems such as SFC are equipped with a recycler so that very little CO<sub>2</sub> is released during the process. In addition to its capacity for selectivity, there are other advantages as well. It is nonpolar, and so readily dissolves lipophilic compounds like THC. Once the process of separation is completed, it can easily be removed from the extract by depressurization and low levels of heat, ensuring that it leaves behind a negligible carbon footprint.

The end-product of the SFC process is a full spectrum hemp extract with levels of THC below detectable limits (less than 0.01% or 100ppm), making it technically a broad spectrum hemp extract. But unlike many broad spectrum products on the market that more closely resemble CBD isolates, Charlotte's Web™ THC Free<sup>†</sup> hemp extract contains an array of other important phytocompounds that SFC technology is able to preserve, which is not the case with other commonly used extraction methods. SFC is a pure and safe way to create a THC Free<sup>†</sup> hemp extract. Charlotte's Web is proud of our ecologically friendly refinement methods, which are, unfortunately, not standard within the industry.

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## CURRENT STATE OF INDUSTRY EXTRACTION METHODS

Numerous broad spectrum hemp extract products are currently on the market, but many companies use less exemplary technologies to manufacture them. These technologies often use toxic solvents and strip out beneficial phytocompounds. Four other extraction methods are commonly used in the industry, each with its own set of drawbacks.

### **Petroleum Based Solvents**

This method uses chromatography in combination with petroleum-based solvents instead of silica filtration. It is a common technique in the industry because it's relatively cost effective. Whereas supercritical CO<sub>2</sub> can be recycled, petroleum byproducts need to be removed by centrifugal filtration, but there is the possibility that petroleum residue remains, potentially posing health, safety, and environmental risks. Solvents derived from petroleum are often toxic. Toxic solvents used in the manufacture of broad spectrum hemp extract or CBD isolate formulas include n-heptane, hexanes, and pentanes.



### **Flash Chromatography**

This method uses water and ethanol instead of CO<sub>2</sub>. It requires high energy consumption, and also generates considerable solvent waste that must be removed from the final product. In addition, it has much lower selectivity than SFC, and may remove desirable beneficial phytochemicals.

### **Heat Degradation**

This is a low-tech, highly imprecise, destructive method that aims to lower THC levels by using heat and oxidative processes to degrade THC into cannabinol (CBN). Heat may cause THC to turn into compounds that are as yet unknown, and therefore have unknown health consequences. It may also create isomers (THC itself is delta-9-tetrahydrocannabinol) such as delta-6-, delta-7-, and delta-10-THC. These isomers are not detected by most methods that manufacturers use to evaluate potency, but they may result in a failed drug test as testing generally does not distinguish between different forms of THC.

### **Dilution**

This method entails diluting the full spectrum hemp extract until levels of THC are undetectable, and then spiking the extract with CBD isolate. The net effect is much lower levels of other cannabinoids and terpenes, with the result that the end-product more closely resembles a CBD isolate than broad spectrum hemp extract. In some cases, to compensate for these missing phytonutrients, isolated cannabinoids and terpenes are added back, a principle reminiscent of removing bran and germ from whole wheat, and then “enriching” the resultant white flour by adding back the missing nutritional components in their isolated forms.

Recent changes in industry standards now mean that adding back isolated cannabinoids or terpenes from other plants disqualifies products from being designated as a true broad spectrum hemp extract.



## BROAD SPECTRUM VERSUS THC FREE<sup>†</sup>

Until recently, “broad-spectrum hemp extract” was an undefined and ambiguous term. The U.S. Hemp Authority has now provided the following definition to help educate consumers and manufacturers: “Broad Spectrum Extract is hemp extract that has been intentionally processed to remove THC such that the quantified THC has been deemed non-detectable.”

Based on this definition, broad spectrum extracts cannot be formulated by the addition of multiple isolated cannabinoids or terpenes from other plant sources, which is the way that some brands have artificially assembled their so-called broad spectrum products.

Charlotte’s Web performed in-house testing on products from well-known broad spectrum hemp extract brands and found that some did not qualify as broad-spectrum pursuant to the current U.S. Hemp Authority definition because they lacked cannabinoids other than CBD, and/or had added terpenes from non-hemp plant sources.

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## WE KNOW EXACTLY WHAT IS IN OUR EXTRACTS

Like all of our products, the Charlotte’s Web™ THC Free<sup>†</sup> Hemp Extract is sent to a third-party laboratory for analytical testing. Certificate of Analysis (COA) for our product are publicly available on our website. A sample test of our THC Free<sup>†</sup> hemp extract showed, for example, notable levels of phytocannabinoids such as CBG (cannabigerol) and CBC (cannabichromene), with THC levels well below 0.01%, or 100ppm. Our THC Free<sup>†</sup> Hemp Extract is flavored with monk fruit. Monk fruit is a natural, fruit-based sweetener with zero calories and a zero glycemic index. It is non-GMO, Kosher, heat stable and vegan. Unlike stevia it has no bitter aftertaste, and pairs well with our mint chocolate flavoring. The product also contains MCT oil, which is refined to remove any potential allergens.

It is not yet possible to cultivate hemp plants with 0.0% THC content, but there is always Charlotte’s Web™ THC Free<sup>†</sup> Hemp Extract. Because Supercritical Fluid Chromatography (SFC), the environmentally clean, state-of-the-art technology for the refinement process, ensures our product contains less than 0.01% THC (or 100ppm), it is ideal for consumers who wish to avoid THC, and for those who need peace of mind with regards to workplace drug screening. The heightened selectivity of SFC also means that customers can continue to enjoy an array of naturally occurring phytocannabinoids along with other phytonutrients, which is not the case with every broad spectrum hemp extract on the market.

## ABOUT CHARLOTTE'S WEB

Charlotte's Web Holdings, Inc is the market leader in innovative hemp extract wellness products under a family of brands which includes Charlotte's Web™, CBDMEDIC™, CBD Clinic™, and Harmony Hemp™. Charlotte's Web continues to be a pioneer by developing a high-tech, innovative refinement process to remove THC from full spectrum hemp extract. We are setting the industry standards for innovation, safety and eco-friendly techniques that do not involve the use of any petroleum-derived solvents. To learn more about Charlotte's Web, visit [www.](http://www.CharlottesWeb.com)

[CharlottesWeb.com](http://www.CharlottesWeb.com) or contact our Customer Care team at **1-888-422-3254**.



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†THC Free means trace amounts less the 0.01% or 100PPM.