

Originally published on the now-defunct Capna Systems blog. Unfortunately, I was not able to save all the graphics and images that were designed specifically for this post. Its performance in the search engine results was strong (Page #1).

## A Guide to THC Distillate - The Purest Cannabis Product

The cannabis market is exploding right now. We're living in historic times; cannabis culture is going mainstream and states are legalizing both medicinal and recreational cannabis.

One of the fastest growing segments of this market is *cannabis concentrates* (including *THC distillate*). In fact, [studies have shown](#) that from October 2014 to September 2016, sales of these concentrates and THC distillate have increased nearly 146%. All told, this makes up 21% of total product sales!

So let's take a look at everything you need to know about THC distillate, including how you use distillation to get the highest quality product possible.

### What Is Distillation?

First and foremost, let's quickly examine [the process of distillation](#). In order to truly understand THC distillates, it's important to grasp the underlying process. To put it in the simplest terms, distillation is essentially [an act of purification](#).

The basic technique used in the distillation process is to heat a liquid, collect the vapors, and then use a temperature differential to condense the vapors into a liquid again.

Don't forget that matter comes in different *phases*, including:

1. Solid
2. Liquid
3. Gas (vapor)

In other words, distillation could be simplified into the following flow chart:

**[Liquid + heat] → Vaporization → [Collecting the vapors + cooling] → condensation**

Ultimately, this means that distillation is a chemical process to separate mixtures by exploiting the different boiling points of its constituent compounds. This notion of distillation as purification is critical to the later discussion; in fact, you'll learn that THC distillate is the purest form of cannabis product.

# Distillation in The Cannabis Production Process

Where does distillation fall in the overall production process? Is it the first step? The last one?

Let's take a moment to consider how a producer can take raw plant material (sometimes referred to as *biomass*) and turn it into a consumer-ready cannabis product.

The first step is always *extraction*. Essentially, you're taking the raw material and extracting unrefined cannabis oil (sometimes referred to as *crude oil*). There are [three primary methods for cannabis extraction](#), including:

1. Alcohol extraction (usually using ethanol)
2. Hydrocarbon extraction (using butane, methane, or propane)
3. Carbon dioxide (CO<sub>2</sub>) extraction

The solution used to extract the crude oil is referred to as the *solvent*. Each of these methods has its respective pros and cons, depending on the needs, budget, and volume of the cannabis extraction operation.

Once you have this extracted crude oil, however, then the next step is distillation. This distillation can be executed using a variety of methods, including either *simple distillation* or *fractional distillation*. Furthermore, two particularly common and effective means of using distillation to fractionate the constituent compounds in cannabis are known as [short-path distillation](#) and *steam distillation*.

## How To Break Cannabis Down

So why is it important to fractionate the cannabis into constituent compounds? What exactly are these constituent compounds? Well, let's quickly review the fundamental components of cannabis:

### Phytocannabinoids

Sometimes called *pCBs*, these are the active compounds that are found in cannabis the plant and provide various medicinal and recreational benefits. According to contemporary studies, there are about 120 different phytocannabinoids, although the two most widely known and used are [tetrahydrocannabinol \(THC\)](#) and [cannabidiol \(CBD\)](#).

### Terpenes

With over 100 currently identified, these essential oils are highly aromatic and each cannabis strain will have a unique composition of terpenes. It appears that they enhance the medicinal and health-boosting properties of phytocannabinoids; as a result, they have been subject to an increasing amount of research in recent years. These oils also give the cannabis plant its unique flavor and smell.

### Flavonoids

A given cannabis plant will have at least 200 different bioactive compounds. That being said, approximately 20 different types of flavonoids have been identified in cannabis, meaning that

they make up about 10% of the plant. Finally, the precise ratio of flavonoids will combine and interact with the terpenes to give each cannabis strain a distinct flavor and smell.

Because these constituent parts have different boiling points, the act of collecting and condensing the vapors allows a cannabis producer to effectively and efficiently distill (or purify) crude oil.

From this process of vaporization and condensation, we end up with *THC distillate* as the desired final product.

## What Is THC Distillate?

So now that we've discussed the underlying basics of distillation, let's get to the specifics. THC distillate is any cannabis distillate that has an exceptionally high level of THC.

On the other hand, a *CBD distillate* would be a cannabis distillate with exceptionally high levels of CBD. In other words, the most prominent (or sometimes only) phytocannabinoid present in the distillate is what ends up giving the product its specific name.

Furthermore, it's crucial to note that distillation results in a highly pure and potent THC distillate. For example, consider the following:

1. THC crude oil usually has a **THC level anywhere between 60 and 80%**.
2. THC distillate has a **THC level from 90 to 99%**.

As you can see, that's a powerful product! This is precisely why THC distillate has become so immensely popular on the cannabis market today.

Additionally, because the process of distillation has boiled all of the flavonoids and terpenes out, the final product is colorless, odorless, and flavorless. That also means that THC distillate is pure, potent, and highly versatile, making it a unique product that is both recreational and medicinal.

Remember, CBD distillate will not cause intoxication for the user since CBD is not an intoxicating phytocannabinoid. In some cases, you may hear people claim that THC is *psychoactive* while CBD is not. This is not, strictly speaking, entirely accurate. Ultimately, CBD is psychoactive because it does affect brain function, but its effects are extremely subtle when compared to THC. As a result, it's most accurate to state that THC causes intoxication while CBD does not.

Because of the incredible purity and potency of THC distillate, it is also sometimes colloquially referred to as *The Clear* or *The Pure*. That being said, THC distillate is completely free of:

1. Chlorophyll
2. Plant matter
3. Terpenes/flavonoids
4. Waxes/lipids/fats
5. Residual solvents

This is why the highest-quality distillate will be totally clear and transparent. However, some distillate producers will reintroduce terpenes/flavonoids in order to give their final THC distillate a specific, refined taste.

It's important to note that terpenes/flavonoids are much more delicate than phytocannabinoids (and have lower boiling points), so the heat associated with distillation usually destroys them long before the phytocannabinoids are vaporized.

However, fractional distillation allows for an earlier stage of separating these delicate constituents in order to add them to the final product later.

## What Is The “Entourage Effect”?

There is a compelling argument in favor of preserving the various constituent parts of the cannabis plant due to a [phenomenon known as the entourage effect](#).

In essence, the entourage effect states that the beneficial qualities of cannabis are potentiated when the various constituent parts ([phytocannabinoids, terpenes, and flavonoids](#)) are all working together. It is, in essence, [a kind of biochemical synergy](#).

This is why cannabis products can be broken down into the following:

1. *Full-spectrum* - all the constituent compounds have been preserved (the “full spectrum” of the cannabis plant).
2. *Isolate* - a single phytocannabinoid (usually CBD or THC) has been singled out and is the sole component of the final distillate product.

In other words, it's possible to find both full-spectrum and isolate THC distillate; it simply depends on whether the producer has reintroduced some of the constituent compounds further along in the production process (following the fractional distillation).

## What Are the Benefits of THC Distillate?

THC distillate has become an incredibly popular cannabis product. As such, it has various benefits that make it highly desirable amongst cannabis enthusiasts and consumers. Let's take a look at these benefits and break each down:

### **It's incredibly pure.**

Remember that THC distillate is free of various undesirable materials, including chlorophyll (which has an overwhelmingly bitter taste), other plant material, waxes, lipids, terpenes, flavonoids, and residual solvent. As a result, the final distillate product is free of any discernible flavor, color, and/or odor. In a sense, it's pure, liquid THC!

In most cases, in order to reach such an impressive level of purity there are several steps that need to be taken. Some producers will use a process known as *winterization* before the actual distillation is implemented.

This method involves taking the raw cannabis material (biomass) and fully immersing it in an alcohol solvent. This is then frozen and the heavier components of the mixture precipitate to the

bottom. This includes chlorophyll, waxes, and lipids. After winterization, a producer can end up with a crude oil product that is somewhere around 60% pure.

Following this initial step, the producer can then use short-path or fractional distillation to further purify the crude oil. It's important to note that phytocannabinoids have extremely high boiling points when compared to the other constituent compounds:

1. THC vaporizes at **157 degrees C (315 degrees F)**
2. CBD vaporizes at between **160 and 180 degrees C (320 and 356 degrees F)**

The fact that these boiling points are so high means that these will be the final constituent compounds that are vaporized out of the initial solution. Remember, distillation is primarily a purification process that uses the different phases of matter to vaporize compounds and then condense them in a separate container.

### **It's super potent!**

This is a big one, considering that some forms of THC distillate are about as potent as you can get. For example, [a 2017 analysis](#) by Summit Research actually identified a form of THC distillate that was 99.58% pure! On the other hand, cannabis flowers are only about 15 to 20% pure.

In fact, most cannabis enthusiasts will warn against neophytes or newcomers using THC distillate since it can be too powerful for anyone who does not have a preexisting tolerance. While there are other cannabis concentrates that are quite powerful, this form of distillate is the only one that combines near-total purity with mammoth potency.

Take, for example, [Rick Simpson Oil](#) - a rawer, less processed version of cannabis oil. While it can have a final THC concentration between 60 and 90%, it's still not quite as potent as THC distillate and is nowhere near as pure.

### **It's both recreational and medicinal.**

In terms of the growing cannabis market, there are two basic kinds of cannabis distillate that are immensely popular with consumers and enthusiasts:

1. THC distillate
2. CBD distillate

While both are medicinal and have various health-related benefits, it's really only THC distillate that has considerable recreational value. While it's true that CBD can have pleasant, calming effects, it's really only THC that triggers the euphoria that so many cannabis enthusiasts love.

Of course, any cannabis producer will have to be aware of the [state laws regarding THC consumption and production](#). Not every state has legalized recreational cannabis, although there is a federal law (formally known as the *Agriculture Improvement Act of 2018* and colloquially known as the *2018 Farm Bill*) that makes [hemp and hemp-derived goods totally legal](#). This includes any CBD products that are manufactured from hemp plants (defined as having less than 0.03% THC by dry weight).

As such, it's important for the cannabis producer to determine if they want to manufacture THC or CBD distillate as well as deciding if it will be isolate or full-spectrum.

**Usage can be low-key and discrete.**

Because THC distillate has no color, taste, or odor, it's exceptionally easy to use without drawing any attention. We all know just how pungent cannabis can smell, and for some enthusiasts or consumers this is not something they want to bring attention to.

As a result, THC distillate can be used medicinally or recreationally in public spaces, at the workplace, or at any kind of social gathering. Not every segment of society has openly embraced the expansion of cannabis culture, so for some users this discretion is key!

**It's free of solvents and impurities.**

As we stated above, THC distillate is emphatically *solvent-free*. This is significant since some solvents can be exceptionally harsh and, in some cases, even carcinogenic (including hydrocarbons like butane or propane). Furthermore, using it in a vape product means that it will not be full of tar and the acrid smoke that comes with inhaling combustible cannabis!

**The effects are immediate.**

Because it's in liquid form and is essentially pure THC, this distillate will be absorbed into the bloodstream exceptionally quickly. For some users looking for instant relief from their various ailments, this can be a godsend.

## How To Use THC Distillate

Not only is THC distillate both potent and pure, but it's also highly versatile. For example, consider the following ways you can use this particular cannabis concentrate:

### Vaping

By using a device known as a *vape pen*, it's possible to vaporize liquid cannabis and avoid the harshness of combusting and inhaling cannabis plant material. Well-manufactured THC distillate is pure and potent enough to be used directly as *vape juice* in a vape pen.

Remember, you can choose to vape full-spectrum (don't forget about the entourage effect) or isolate, depending on your needs or wants. It's important to remember that THC distillate is powerful, so use accordingly!

### Dabs

This is one of the most popular methods for consuming THC distillate. This is somewhat similar to vaping, except that you take the concentrate (usually in a waxy form) and vaporize it on a hot surface (like a bong, for example).

Again, this method is not suggested for newcomers or novices; THC distillate is immensely powerful, so be prudent and careful.

### Joints or spliffs

Some consumers and enthusiasts like to stick with the classics. In these cases, they can add the THC distillate to pure cannabis plant material (joint) or cannabis plus tobacco (spliff). Keep in mind that a standard joint has THC levels in the 12 to 25% range (with 25% being exceptionally strong). Using high-quality THC distillate means you'll have levels near 100%!

### **Edibles or oral ingestion**

Because the THC distillate is so pure, it's possible to use it as a kind of *tincture* and drop it below the tongue. Consider the fact that this part of your mouth is full of mucous membranes and capillaries that will quickly and efficiently absorb the THC in your bloodstream.

Additionally, if terpenes or flavonoids have not been added back into the distillate solution following distillation, then this form of cannabis concentrate won't have any taste. Furthermore, some consumers like to use THC distillate in edibles, although it is most effective when added to a fatty ingredient (like butter, for example).

### **How to Make THC Distillate With Fractional or Steam Distillation**

As mentioned above, there are several distillation methods that are useful for manufacturing THC distillate. For example, using fractional or steam distillation allows for all of the phytocannabinoids, terpenes, and flavonoids to be collected in a single final product.

This final product will not have any chlorophyll, waxes, lipids, and/or residual solvents. Additionally, if done properly or distilled multiple times, this final distillate can end up being at least 99% pure.

However, this process is not simple and will likely require specialized equipment. In other words, this is not a "do-it-yourself" (DIY) method that can be implemented at home. This is distinct, from say, manufacturing Rick Simpson Oil (RSO).

Essentially, these are the general steps for fractional and steam distillation:

1. Take your cannabis plant material (biomass) and combine it with a solvent of your choosing (hydrocarbon, carbon dioxide, or alcohol). Use this solvent to execute an extraction process to pull out the phytocannabinoids, terpenes, and flavonoids.
2. Using distillation equipment that usually includes a *fractionating column* and *condensers* (or water-cooled tubes), you'll need to heat this solution for the terpenes and flavonoids to vaporize. Remember, they have a lower boiling point than the cannabinoids so they'll turn into steam first.
3. You could use fractional distillation or short-path distillation to gather these terpenes and flavonoids via the fractionating column (and cool them with condensers) so that you can gather them in liquid form in a separate container. Once you have them, you can then add them to the final THC distillate.
4. Now that your solution has no terpenes or flavonoids, add more heat and crank up the temperature in order to reach those higher boiling points for the phytocannabinoids.
5. As this solution heats, the phytocannabinoids will vaporize and the steam will hit the condensers (water-cooled tubes) in order to turn back into a liquid.
6. Depending on how many different distillation runs you did, and how precise you were with the vaporization process, you may have several final solutions that can include THC, CBD, and/or terpenes and flavonoids. Let these solutions cool and combine them if you want to create a full-spectrum distillate. Conversely, you can keep the liquid THC separate and create an isolate distillate.

These are just the broad steps. How you precisely execute this distillation will depend on a number of factors, including the type of extraction method you used (type of solvent), the volume of distillate you're looking to manufacture, and the size/complexity of the lab.

## Using Capna Systems to Manufacture THC Distillate

Capna Systems has developed [innovative and state-of-the art equipment](#) that can be used as the foundational basis for a new cannabis extraction facility as well as additional modules in a preexisting setup. Ultimately, the flexibility, modularity, and convenience of Capna technology makes it exceptionally easy to manufacture THC distillate of the highest potency, purity, and quality.

If you're interested in building or expanding your extraction facility, then be sure to [contact our team today](#) or [book a demo](#) to see our equipment in action!

## Sources

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