

## Interview With Dr. Erik Paulson Regarding THCA Flower

This interview was conducted by CBD Oracle via email in December 2023 and is provided here for full transparency. Learn more about [CBD Oracle's Editorial Policy](#).

### About Erik Paulson, PhD:

Erik grew up in San Diego, CA, and received his Bachelor of Science in Chemistry from the University of California, Riverside. He continued his studies in Riverside to obtain a teaching credential and then taught high school chemistry in Burbank, CA, for five years. His passion for learning brought him back to San Diego to study organometallic chemistry in the Joint Doctoral Program at San Diego State University and the University of California, San Diego. His projects involved the development of catalysts for the selective migrations of double bonds in organic molecules. Erik's focus since joining InfiniteCAL Labs in 2019 has been the validation and development of potency, residual solvent, and terpenes analyses. [Read full bio →](#)

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**CBD Oracle:** *Is there any meaningful, scientific distinction between THCA "hemp" flower and ordinary cannabis flower?*

**Erik Paulson:** As we all know, there is both a political component to this question as well as a scientific one. Let's start by looking at the definitions. CBD hemp flower, THCA "hemp" flower, cannabis, marijuana, they all come from the plant *Cannabis sativa* L., and they all produce varying levels of THCA, CBDA, and a number of other acidic cannabinoids. In many states (including California), the official name for the high THCA strains of flower is actually *cannabis* (which kinda adds to the confusion), while in others it is called *marijuana*. Low THCA strains are unequivocally considered *hemp* if their THC or Total THC level (depending on the state) is less than 0.3%. The real question is, if you are able to produce flower that is high in THCA but can technically test at less than 0.3% THC, what is that flower supposed to be classified as? Again, it's down to the verbiage. Many have interpreted the Farm Bill language to mean that the flower is considered hemp if the THC content is below 0.3%, *regardless of the THCA content*. This language can also be seen in the regulations of many states, which is why sales of "THCA hemp flower" are, at least currently, allowed in these states. In other states, the THC content is explicitly calculated to include the potential additional THC provided from decarboxylation of THCA, using the formula  $(D9\text{ THC} + 0.877 * \text{THCA})$ , giving you "Total THC", or "Total Potential THC". Using this calculation, any flower high in THCA could not be classified as hemp, and therefore in the states that use this calculation the flower would either be outlawed or controlled under the state cannabis/marijuana system.

I certainly believe there can be an argument that regardless of the interpretation of the language of the Farm Bill that it was not the intention of the drafters of the bill to exclude the main source of THC in the plants from the determination of the plant as hemp or cannabis, but I feel very confident that this will be clarified in the next version of the Farm Bill.

From a scientific perspective, the plant doesn't care what the Farm Bill says. Since these are all forms of *Cannabis sativa* L., starting in the 1970s the flower was categorized into different chemotypes based on which compound is being formed more preferentially. The commonality between them is that THCA and CBDA are both formed from CBGA, the 'mother cannabinoid'. Plants presenting Chemotype I are THCA dominant, because they have the enzyme present that converts the CBGA to THCA (THCA synthase), and they are typically classified as >0.3% THC and <0.5% CBD. Plants presenting as Chemotype II are both THCA and CBDA dominant, containing both THCA synthase and CBDA synthase, and are classified as >0.3% THC and >0.5% CBD. Chemotype III plants are CBDA dominant (CBDA synthase only), containing less than 0.3% THC and >0.5% CBD. Chemotype I is what we would traditionally call cannabis or marijuana, while Chemotype III would be traditional hemp flower, and Chemotype II is essentially a hybrid of the two.

Back when this chemotypic, taxonomic research was being performed in the 1970s is also around the time when cannabis/marijuana was classified as a Schedule I drug. Someone more well-versed in the law can tell me differently, but I suspect that the differentiation between cannabis/marijuana and hemp based on the 0.3% THC number stemmed from these chemotypic classifications. But here's the rub though: the analysis back then was commonly performed on GC (gas chromatographic) instruments, which decarboxylate the THCA/CBDA into THC and CBD. *Therefore, there was no differentiation at the time between THC and THCA because the instruments weren't measuring both of them, they were only measuring the total THC post-decarboxylation.* So language that specifies 0.3% THC in the plant, as opposed to mentioning THCA explicitly, is likely a remnant of that era of cannabinoid analysis.

Most modern cannabinoid analyses use liquid chromatography (LC), which can differentiate the two because the analysis does not cause decarboxylation of the THCA. If there is a scientific distinction between what is called THCA 'hemp' flower and cannabis flower (which again, would come down to a fleeting time period between harvest and the time when decarboxylation would bring the THC level above 0.3%), it would have to be that the genetics are selected for that are more resistant to decarboxylation. There is no biosynthetic pathway to convert THCA to THC, but there may be, perhaps, a way in which the trichomes are designed that could slow down the decarboxylation process. The rest would come down to various factors on how the flower is treated, like temperature of curing, storage conditions, and time prior to testing.

The thing is, you can't stop the train once it's started. As the flower sits on the shelf, even if it was at <0.3% THC to begin with, as it sits the THCA will decarboxylate into THC. As soon as it

crosses that 0.3% threshold, it would be considered cannabis/marijuana flower regardless of what you defined it as before. *However you want to slice it, at its core there is little to no difference between 'THCA hemp flower' and regular cannabis flower.*

**CBD Oracle:** *Is it possible to grow a plant that will test under 0.3% D9 THC + 0.877\*THCA pre-harvest (within 30 days) but have cannabis-like THCA levels after harvest? (e.g. one COA I found had 27% THCA)*

**Erik Paulson:** Here is another shortfall to the defensibility of classifying THCA flower as hemp: The production of all legally cultivated hemp is regulated by the USDA and facilitated by individual state hemp programs as defined by the 2018 Farm Bill. USDA regulations require that all hemp be tested prior to harvest to ensure that the levels of THC are less than 0.3%. The USDA specifically requires the hemp to be tested for 'Total THC', or THC content post-decarboxylation:

"Compliance tests shall measure the total THC concentration in a sample submitted to a laboratory for analysis. The laboratory will perform chemical analysis on the sample using post- decarboxylation or other similarly reliable methods where the total THC concentration level considers the potential to convert delta-9-tetrahydrocannabinolic acid (THCA) into THC."

There is no way that flower testing at <0.3% total THC (to be compliant with USDA regulations) will suddenly jump to cannabis-like THCA levels (15-30%) within the 30 days between testing and harvesting. What is more likely is that this THCA flower is not cultivated or tested in a USDA-compliant manner, which would in itself call the product into question about being labeled hemp in the first place. This argument specifically only applies to THCA flower though. If hemp is grown in a USDA-compliant manner (<0.3% total THC) and then the CBD is converted into THC and other cannabinoids, that is a separate question of legality with its own considerations.

**CBD Oracle:** *If this isn't possible (or is unrealistic), how are THCA products manufactured?*

**Erik Paulson:** This is an assumption, but the products are likely grown using largely the same flower and the same practices as cannabis growers, but the difference is that they are either closely monitored to ensure that the rate of decarboxylation is low enough that the THC levels will not rise above 0.3% upon harvest or before testing, or something that is often the case, the lab testing it makes sure that the number remains under 0.3%.

**CBD Oracle:** *How much experience do you have testing THCA hemp flower? Are there any issues that commonly crop up in testing?*

**Erik Paulson:** Since there is so much in the eyes of, or at least the interpretation of, the federal legality of THCA hemp flower tied up in the 0.3% THC number, there is a lot of incentive to ensure that the number is below 0.3%. If you look at the various companies who sell THCA hemp flower online, the majority of them get their flower tested at four or five labs. There is a lot of overlap between the labs that test THCA products and delta-8 products, both of which require the delta-9 THC to be less than 0.3%. I am not calling out any specific result or any particular lab, but I would question anyone that says that they only send them to these labs because 'they're the only ones who know how to do it right.' What I can say from experience is, we have been asked to test THCA hemp flower that has been purchased by clients for verification tests, and every sample we have tested has been above 0.3% delta-9 THC. Since we are getting flower that may have been harvested weeks or months earlier, I cannot speak to what its original THC content was. I will say that while it is rare, we have tested *some* flower for official California cannabis compliance that has had its delta-9 THC amount lower than 0.3%. As I have mentioned however, once the 0.3% threshold is crossed, the question remains about whether that can still be called hemp.

**CBD Oracle:** *Many people argue that COAs for THCA products are often faked or doctored - do you have any knowledge or experience of this happening?*

**Erik Paulson:** I have not heard of COAs for THCA hemp flower being doctored by the client, and I have not seen one that I suspect has been adulterated after leaving the lab, but I cannot say for sure that it doesn't happen. It is certainly possible that the selection of the lab plays a part in that, because if a lab will give you a result that you see is beneficial to you, you may see no need to doctor or fake a COA. In the end though, the burden of proof lies with the cultivators and distributors: make sure that you are working with a lab that you trust will give you the real result, not the result that you may want to hear.

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