Choosing a Better Chromatographic Process for CBD Manufacturing

When it comes to chromatography, not all media are created equal, and differences in the properties and manufacturing can directly impact your operation's bottom line. Cannabis Science and Technology sat down with Sean Kennedy, product manager at Purolite, to discuss various factors that can help lead to a simpler operation with cost-effective cannabidiol (CBD) oil production.

Sean Kennedy
Product Manager
Purolite Corp.

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CST: Can you tell me about Purolite and what you do?
KENNEDY: Purolite is a global manufacturer of resin-based technologies, including ion exchange resins, adsorbents, catalysts, and chromatography media, among others. We've been supplying products for more than 40 years to the pharmaceutical, food and beverage, and other industries in need of high-demand separations. It's amazing what these beads can do, and once you learn about them, you'll start to see them pop up everywhere.

We focus 100 percent of our resources on resin technologies. Being a privately held company allows us to be agile and innovative in identifying and producing solutions to meet our customers' needs.

CST: How did you get into the CBD market?
KENNEDY: It was a natural progression. We have been supplying products to other highly regulated industries for many years, which aren't too dissimilar to the emerging cannabis industry. We knew our reverse-phase chromatography family of products would be a perfect fit for purifying CBD, being a very hydrophobic compound, and would offer benefits over other existing methods. After rigorous testing, it did prove to be a solution, and we were excited to get into this newer market and show our value.

CST: How does chromatography provide tetrahydrocannabinol (THC) remediation?
KENNEDY: Reverse-phase chromatography is a proven method to achieve these levels, taking advantage of the slight difference between the CBD and THC molecule to remove THC from the oil effectively. The cannabinoids mixture post extraction is injected into the chromatography media, and a solvent is introduced, which pushes the cannabinoids through the media column.

CBD and THC have different affinities for the media, which affects the speed in which they move through the column. THC moves slower

than CBD, so you can take the cannabinoid mixture out of the column first, before THC starts to show up, and get a remediated blend below regulated THC levels.

CST: Does one type of product work for all CBD purification?
KENNEDY: It does not, and differences in your chromatography media will result in different separation profiles for your cannabinoid blend. It is essential to choose the correct type of porosity for your manufacturing process, since this will ultimately decide the amount of CBD you can process and the purity it will have. High purity, high yield, and minor cannabinoid isolation are all things to consider when selecting a product for your desired CBD makeup. Purolite's Chromalite products offer three ranges of porosities that give you flexibility and options.

CST: What do manufacturers need to know about the equipment they are using?
KENNEDY: It is important that your equipment can handle your chromatography operation. Some chromatography media require higher pressures and multiple solvent concentrations to get an effective separation. Manufacturers need to keep in mind the role multiple solvent concentrations may have on their solvent recovery efforts and the system requirements for higher pressure operation. For simpler operation, Chromalite media can often be used at a constant eluant concentration and often exhibit much lower pressures during the process.

CST: Can you share how chromatography with resins stacks up to the alternatives?
KENNEDY: C18 silica media are also very common in the industry, and they can get the job done. However, the Chromalite products exhibit better chemical stability than C18 media, leading to less frequent media replacement. C18 silica degradations forming silanol groups can also result in less than desirable cannabinoid elution peaks, affecting your final CBD quality. Both points make resin-based chromatography media a more robust solution with great process consistency, making it more cost-effective as a result.

Crystallization or solvent extraction are also alternative technologies. We see customers facing issues with crystallization from a cost standpoint and producing low yields compared to chromatography. Solvent extraction also struggles to reach the purity some customers are shooting for.

CST: Now that you are engaging with CBD manufacturers, are you finding other needs that Purolite can support?
KENNEDY: As the industry is evolving rapidly, we've been seeing customer requests to address minor cannabinoid separations. Our flexibility in the Chromalite product line is perfectly suited to fine-tuning isolation of these minor cannabinoids such as CBD acid (CBDa), cannabigerol (CBG), delta-8 THC, and others. These compounds may also be a little more temperature-sensitive, so being able to fine-tune the separation with chromatography can place less reliance on distillation, which would otherwise lower the yield of these cannabinoid targets.

Another area we're seeing is growing recreational markets that may not be looking for THC removal. These processes may not go down the full path of distillation or chromatography, and we see some additional separation needs such as color removal or metal removal that our core ion exchange and adsorbent products can address with just a simple filtration.

Purolite's vast portfolio of different product chemistries and experience from other industries helps put us in a position to address a majority of the separation needs for the cannabis industry, which is a great position to be in, and it's been really fun learning along with our customers on how to accomplish their goals.

CST: What is the best way for a CBD manufacturer to understand Chromalite better?
KENNEDY: I always suggest trying the product yourself and validating that Chromalite gives you what you need. We offer pre-packed, 200 mL columns of our Chromalite products for CBD purification that can get the testing started quickly. Our world-class experts can also assist in the evaluation and help fine-tune the process as you go along. To learn more about Purolite Corporation and CBD manufacturing solutions, visit www.purolite.com/cbd.