FRACTION FINDER

Higher Visibility of Fractions in Your Cannabis Processing Using Fluorometry

AROMETRIX

Abstract

Cannabis processors have no way to objectively monitor the quality of their process in real time. Typically, they judge the process quality subjectively, by previous experience, or with eyesight. However, these are not objective controls. Today, human errors are heavily present in processing. Processing is a science that requires skill, experience, and significant training time. In-situ monitoring actively identifies fractions and provides insights on optimal timepoints for flask transfers. Given the growing demand for distillate, these insights could help support efficiency in the lab.

The FRACTION FINDER™ is a system used by oil processors to identify the contents of liquid flowing through a glass tube in-situ and in real-time. It is composed of two key components: the sensor (also known as the optical sensor, or “eyes” of the system) which transmits information to the display (also known as the compute module, or “brains” of the system). The sensor is currently mountable on Liebig glass condensers, but can be mounted wherever there is discernible flow.

The ability to directly track molecules of interest during distillation comes with a few key benefits:

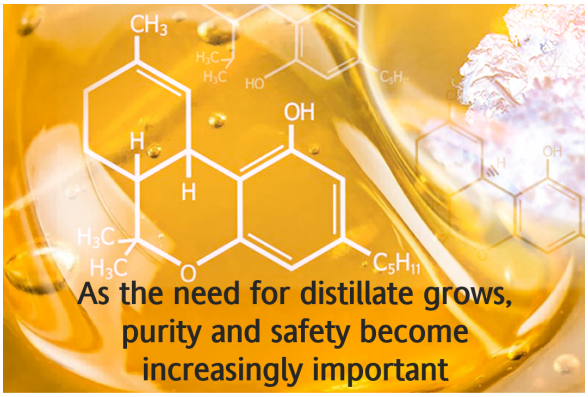
1. The data to improve purity
2. The information to improve process techniques and enhance repeatability
3. The reduction of contamination and by-products

While the spectroscopic technique employed is well known, our innovation is the method of in-situ collection and its use in monitoring cannabis distillate. Our research was conducted in laboratories that use Short Path Distillation and Wiped Film Evaporation.

AN EVOLVING MEDICAL CANNABIS OIL MARKET

Distillate products offer patients suffering from diseases like cancer, PTSD, anxiety, and arthritis a discrete method of treatment. Furthermore, distillate products are portable, easy-to-use, and pure.

According to a survey, 92% of medical marijuana patients say that medical cannabis works. Cannabis distillate products have grown in popularity as an alternative to marijuana plants and opioids.

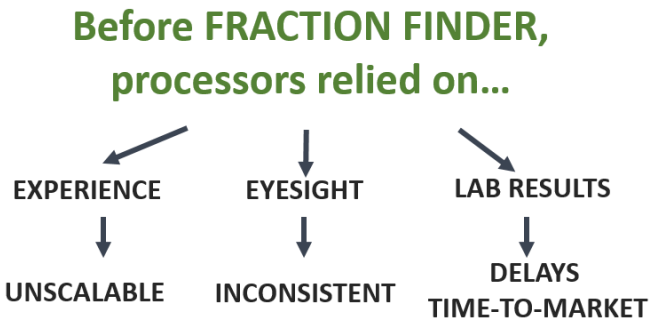


In fact, the distillate market is expected to outgrow every other market in the cannabis industry - it is growing so large that processors are struggling to meet demand. According to research by Arcview Market Research, concentrate sales grew by 49% from 2017 to 2018 with vaping as the main driver with 58% of spending.

As distillate-based medications continue to enter the market, purity and safety become increasingly important. This includes ensuring a controlled, reliable processing method for companies and employees that handle distillation. The demand for medical cannabis is growing as is regulations. There is a need for rapid scale-up and quality control, and the FRACTION FINDER™ can help.

LACK OF OBJECTIVITY DURING PROCESSING

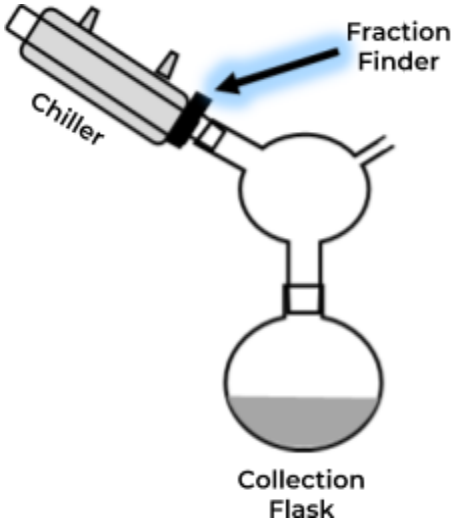
Cannabis processors' main problem is that they have no way to monitor actual cannabinoid flow. Typically, processors judge the process control subjectively, by previous experience, or by perception.



However, eyesight is not an objective control. Today, human errors are heavily present in processing, which can have negative results.

Our solution is the FRACTION FINDER, well-researched, well-tested monitoring technology that displays real-time data on the important components within the flowing liquid. This ensures the production of safer, purer, and more consistent distillate.

AVOID PROCESSING ERRORS WITH FLUOROMETRY



Technology: The FRACTION FINDER™ utilizes autofluorescence resulting from the excitation of molecules present during the distillation of cannabinoids and essential oils. Many large organic molecules (such as aromatic-containing oils) and their derivatives will create a fluorescence response when exposed to electromagnetic radiation while smaller molecules, mostly aliphatic, chemical compounds generally do not exhibit such behaviour.

Measuring the fluorescence response of complex chemical solutions provides contrast between these compounds, allowing for the detection of only the fluorescing constituents without complicated data interpretation and complex analytical chemistry methods.

The trade-off for this simplified detection method is that quantitative measurements and those that require differentiation of similar chemicals are extremely difficult without secondary metrology methods such as HPLC and GC-MS. Therefore, this technique is best used in applications in which general trends in processing are required to make more informed decisions about the efficiency and reliability of the process.

The technology and configuration used in the FRACTION FINDER is a patented solution for use in distillation and extraction. The pending patent will allow ArometriX to uniquely use the device and concepts provided for monitoring extraction and distillation processes.

Current Application: In the distillation of cannabis, the general goal is to separate small-molecule chemicals (solvents) and larger (mostly aliphatic) molecules from aromatic oils (cannabinoids). Because small molecules and aliphatic molecules tend to lack an autofluorescence response, fluorometry is a great tool for monitoring the efficiency and completeness of the chemical separation during the distillation.

By monitoring the fluorescence in real-time immediately prior to the collection flask, manufacturers can use the tool to provide real-time insight into the efficiency and reliability of their distillation process.

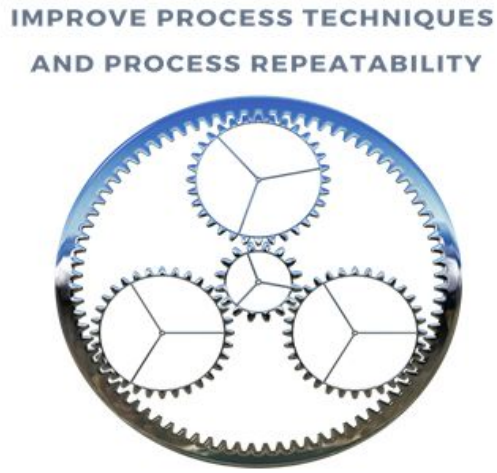
While the primary use for the FRACTION FINDER is to monitor the distillation of cannabinoids to determine endpoints for “heads”, “bodies” and “tails”, the fluorescence resulting from constituent molecules within extract can be utilized in a variety of market verticals, including in applications where real-time monitoring is needed to autonomously control processing equipment.

Our Customers: In its current form, the FRACTION FINDER™ should be used by processors who desire a method to visualize the distillation process rather than simply processing materials via fixed recipes.

These might not not take into account differences in:

1. Extract quality
2. Extract source
3. Process deviations

This visualization provides real-time insight into the distillation so that the processor can make more informed decisions about endpoints within their process, a historical reference of processes over time to ensure quality and repeatability of the processing, and a tool for experienced processors to leverage for training novice processors about the manufacturing process.



Three Key Benefits of the FRACTION FINDER:

1. Train new distillers and scale operations
2. Optimize safety, purity, and value of distillate
3. Specific identification and monitoring of key chemicals

Limitation: While the FRACTION FINDER is a uniquely powerful technology to provide dynamic insight into the distillation process, the technology is not intended for use in identifying specific quantities of chemical constituents in solutions, nor is it intended to differentiate between molecules of highly similar chemical characteristics.

The tool should be used for guidance where processors can utilize the monitoring results to make more informed decision about the progression of the process.

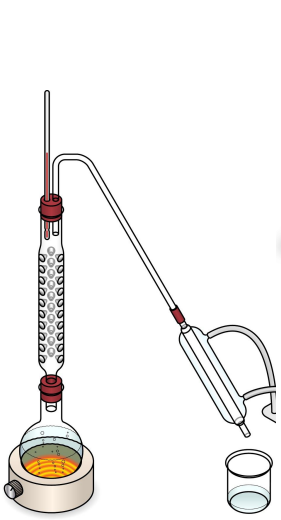
ALTERNATIVE METROLOGY TECHNOLOGIES

Colorimetry: Colorimetry can provide similar qualitative capabilities as the FRACTION FINDER. However, colorimetry severely lacks the specificity that fluorometry has for chemical components that directly correlate to product quality. With colorimetry, color changes within an extract can be the result of anything from inclusions of impurities within the distillate, lack of the chemicals of interest, or simply from a dilution of the flowing liquid. By focusing on the chemical signature of only a few key molecules within the liquid, fluorometry provides greater specificity to the compounds that matter most.

Infrared (IR) absorption: IR is a powerful metrology tool that is often used in chemistry to identify chemicals in solution. IR absorption has the distinct advantage of being able to more precisely differentiate between similar chemicals. As a characterization technique it is incredibly powerful, however, as a technique for in-situ monitoring it suffers from providing "too much information" to the processor. Almost all organic molecules will result in some IR absorption.

When only a small number of chemicals are present in solution, it can be fairly straightforward to differentiate between different chemical constituents, but when the solution has tens or even hundreds of different chemicals, data interpretation becomes incredibly challenging. Furthermore, measurements are generally carried out in a transmission geometry (straight through path), which is prohibitively challenging in a partially filled chiller column. Finally, the length of time to take an absorption measurement is significantly longer than other methods, which provides less information over time.

CONCLUSION



The FRACTION FINDER™ is a system used to identify the contents of liquid flowing through a glass tube in-situ and in real-time. The technology is a powerful tool that can help processors make more informed decisions, thus, improving factors that are especially relevant to them, such as purity, quality, repeatability, and consistency.

From a business aspect, the consequences to a processing company that doesn't embrace Fraction Finder is opportunity cost. This opportunity would include the potential to increase market value of their distillate, scale operations, and reduce training hours for engineers and distillate operators.

ABOUT AROMETRIX

Mission: To develop and market optical metrology technology and products for botanical R&D and extract processing firms to improve process purity. Using these identifying tools results in higher quality target materials, such as plant extract distillates.

Vision: To be the standard for quality monitoring, compliance, and purity of life-transforming plant oils.

Looking to purchase FRACTION FINDER™? Click **here**. Please reach out with any questions:

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