



**MILESTONE**  
H E L P I N G  
C H E M I S T S



# MAXIMIZE YOUR **CANNABIS** TERPENE PROFILE



ETHOS X: Microwave Terpene Extraction



# THE GREATEST EFFICIENCY WITH THE HIGHEST QUALITY

Multiple US states, along with other countries, permit the use of cannabis for medicinal and recreational purposes, greatly increasing the market for cannabis-related products. THC, CBD and terpenes are the major target compounds in the cannabis plant. Although there are several technologies available to extract THC and CBD, they are not designed to selectively extract terpenes, and thus often lead to loss, damage or only partial extraction of these molecules. Terpenes from cannabis plants are extremely valuable as they are responsible for the strain-specific variation in smell, taste, and effects of cannabis. Due to their unique flavor, they are widely used as ingredients for multiple end-products, such as vape pens and edibles, just to mention a few. Terpenes are also used in the medicinal field as they can enhance the therapeutic effects of THC, CBD, and other cannabinoids.

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HIGHEST QUALITY TERPENES  
FOR A FULL FLAVOR PROFILE

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EXTRACT FROM FRESH  
OR DRIED MATERIAL

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SHORTER RUN-TIMES  
FOR FASTER PROCESSING

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FLEXIBLE CONFIGURATIONS  
TO MEET THROUGHPUT NEEDS

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MILESTONE  
ETHOS X

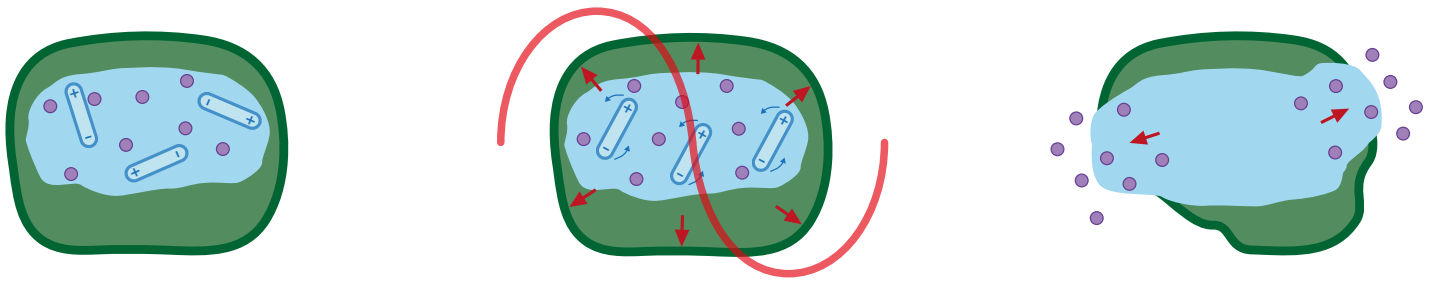




## I MILESTONE ETHOS X

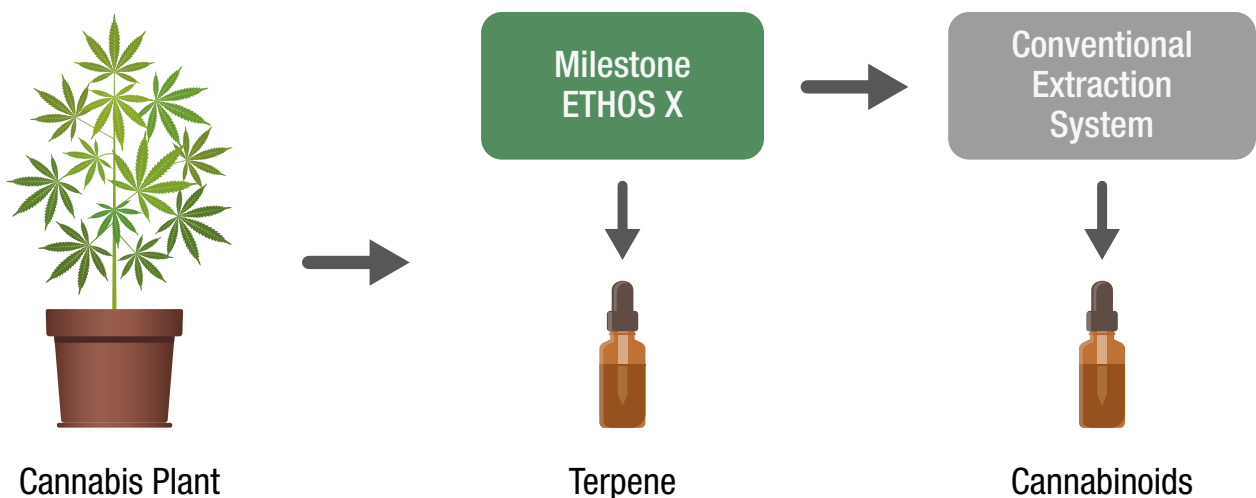
To address the limitations of conventional extraction techniques Milestone has developed and patented (European patents EP 1 439 218, EP 1 618 798 and EP 1 629 725) the ETHOS X for Microwave Green Extraction of Natural Products. The ETHOS X takes advantage of a unique microwave selective heating mechanism. The internal heating of water within the sample distends its cells and leads to rupturing of the glands and oleiferous receptacles. This process frees the oils which are then evaporated with the in-situ water of the plant material.

# PERFECTLY FIT FOR CANNABIS EXTRACTION



*Effect of the microwave selective heating on the plant cells*

The most common extraction techniques used in the cannabis field are: hydrocarbon, ethanol and CO<sub>2</sub> extraction. The ETHOS X is a perfect complement to any extraction technique as it selectively extracts the terpenes without compromising the subsequent cannabinoid extraction step. Most conventional extraction systems work on dry plant material, causing loss of some of the characteristic terpenes, while the ETHOS X is able to work on fresh material providing the most complete and representative terpene profile and maintaining the natural flavor and aroma. The ETHOS X completes the extraction process in only a few minutes without the use of solvent, providing high efficiency, reducing the process costs and ensuring the strain-specific profile of the plant.



*Scheme of typical terpene and cannabinoid extraction processes using ETHOS X*

## THE EXTRACTION PROCESS

Fresh, frozen or even dry cannabis are placed into the ETHOS X vessel; instrument setup takes only a few minutes and the extraction process starts. The microwave heating allows a quick evaporation of the target compounds along with the water content of the plant material; the oils and water re-condense into a dedicated stainless-steel water-cooled apparatus, and are then separated in two phases based on their different densities. The oils (terpenes) are easily separated and collected into a dedicated flask. As the ETHOS X does not compromise the THC and CBD, the terpene-free cannabis can then be processed by any conventional extraction technique to obtain these compounds.

Cannabis material	Fresh, frozen or dry
Sample amount	Up to 3 kg
Typical extraction time	Less than 60-90 minutes

## HIGH-QUALITY TERPENES AT LOW COST

The ETHOS X microwave technology allows for a rapid heating of the cannabis material. The extraction process takes only a few minutes and prevents any thermal degradation often noticed when using conventional extraction methods. High quality terpenes are obtained, resulting in an extract with the characteristic taste of the cannabis strain used in the process. In addition to providing this full profile terpene extraction, the ETHOS X offers a significant return on investment due to its shorter run times and simple operation.

## SCALABLE PRODUCTIVITY THROUGH FLEXIBLE CONFIGURATION

The Milestone ETHOS X microwave cavity has a volume of 70 liters, allowing the use of glass reactors from 2 to 12 liters of volume. All reactors are interchangeable, meeting day-to-day needs with maximum flexibility.



*2, 5 and 12-liter glass reactors*

# EASY EXTRACTION APPROACH TO A FULL TERPENE PROFILE

# MILESTONE HELPING CHEMISTS

Established in 1988, Milestone is headquartered in Italy and has offices in Germany, Switzerland, the United States, China, Japan and Korea. We operate worldwide through a network of over 100 exclusive distributors, all providing our customers premium application and service support. Milestone's mission is to help chemists by offering them the most advanced instrumentation for sample preparation and direct mercury analysis in the world. Our industry-leading technology, in combination with fast, responsive service and applications support, allows Milestone to support our goal of providing you the highest return on investment possible.

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