



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



EXPERIENCE
TRUE FLAVOR
WITH LIVE TERPENES



ETHOS™ X
Microwave Terpene Extraction



ENHANCING FLAVOR OF YOUR PREMIUM PRODUCTS

Cannabis-derived terpenes are valuable compounds that provide the strain-specific variations of scent and taste for final products. For vape pen producers, terpenes enable a direct connection to the specific strain of cannabis that is extracted, providing the distinctive flavor and effects that their consumers demand. Terpene quality has a direct impact on how consumers both experience and perceive quality of the products they engage with. Extracting terpenes from fresh or fresh-frozen material is long considered the optimal approach for preserving the natural terpene profile. Traditional technologies for terpenes extraction, such as steam distillation, butane, and hydrodistillation come with significant limitations. The limitations vary by technology and often encompass one or more of the following challenges: incompatible with fresh or frozen materials, require solvents, and/or needs an inefficient and time-consuming purification step. Milestone's ETHOS X 2.0 and ETHOS XL microwave extraction solutions enable you to efficiently extract live terpenes, free from the limitations of more traditional approaches.

NATURAL AND FULL FLAVOR PROFILES

HIGH TERPENE YIELD EXTRACTIONS

ZERO PURIFICATION

SOLVENT-FREE EXTRACTIONS

HIGH PROFITABILITY

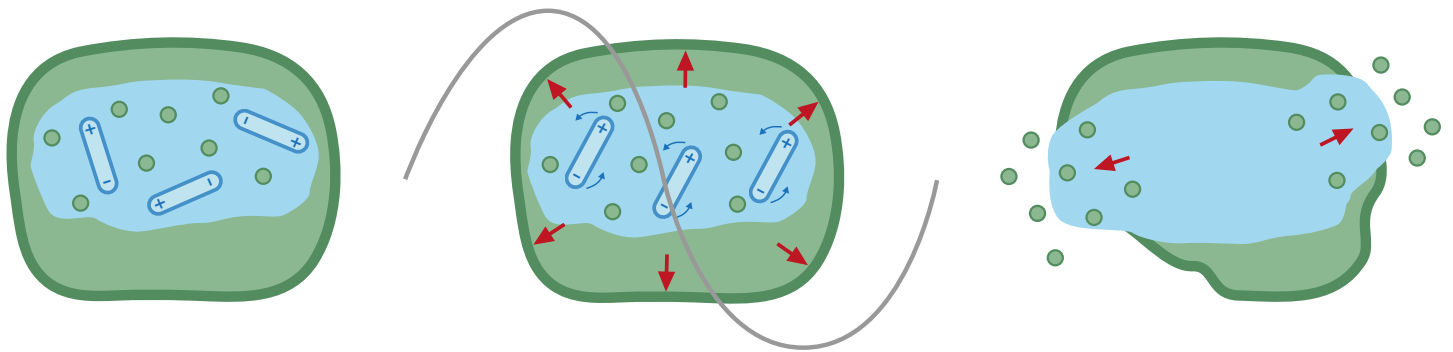
FAST AND GREEN EXTRACTION



SOLVENT-FREE MICROWAVE TERPENES EXTRACTION

THE SOLVENT-FREE MICROWAVE EXTRACTION

To address the limitations of conventional extraction techniques Milestone has developed the ETHOS X line of products for microwave terpene extraction. The ETHOS X family takes advantage of the 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 terpenes which are then evaporated with the in-situ water of the botanical.



The microwave selective heating process

THE EXTRACTION PROCESS

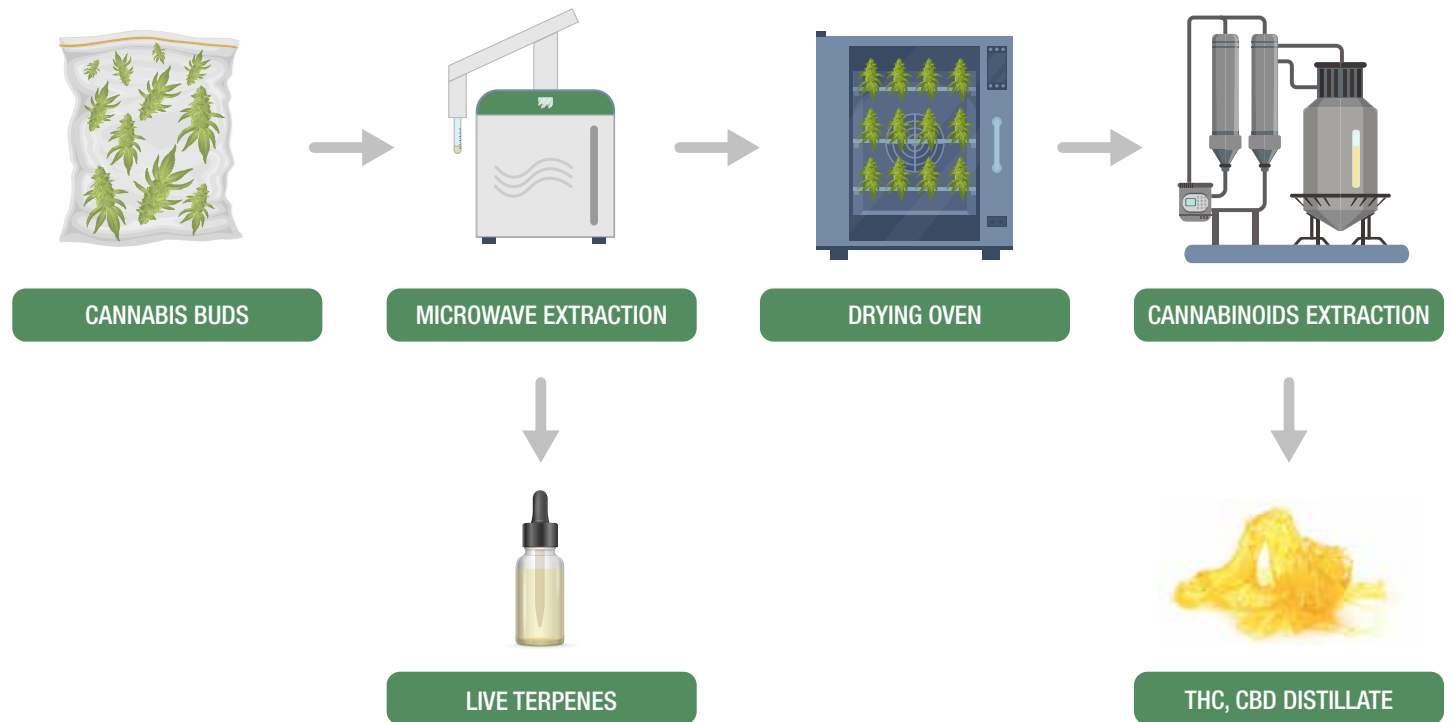
After loading the reactor with material and setting the extraction parameters using the dedicated interface, the extraction process can be described in three steps. *Step 1:* The system applies microwave heating to the plant material to quickly evaporate target compounds and water content. *Step 2:* The vapor then re-condenses into a dedicated water-cooled apparatus, which automatically separates terpenes from water according to density. *Step 3:* The water is then removed and the terpenes are collected.



Extracted live terpenes in the burette

| EASY TO IMPLEMENT

The ETHOS X product family is a great complement to any extraction technique for cannabis distillates since it selectively extracts the terpenes without compromising the subsequent cannabinoids extraction step. The system's extraction process captures the coveted live resins present in fresh flowers, without degrading the cannabinoids that are present. Microwave extraction can easily be integrated into any workflow, regardless of the distillate extraction technique utilized.



| A GREENER APPROACH TO EXTRACTION

The technology of the ETHOS X family embraces the values and benefits of the green extraction approach, in fact it does not require the addition of organic solvents, it enhances the heating efficiency and avoids by-products. Other extraction techniques use large volume of organic and flammable solvents that require intense purification process and the extracts suffer of undesired taste. The patented microwave approach maintains the integrity of the terpenes profile, providing superior freshness of the flavour and avoiding clean-up processes.



ELEVATE

THE QUALITY OF YOUR
CRAFT PRODUCTS



High efficiency

The condensation module, which comprises two condensers and a burette, ensures complete condensation of the terpenes, reflux of the water into the reactor and fast separation of the oil.

Enhanced reproducibility

The built-in temperature sensor controls the distillation flow and ensures faster extraction processes.

Full control

The system's terminal, controls all extraction parameters, ensuring safe and efficient extraction. The built-in methods ease its implementation into your lab's workflow.

Streamlined workflow

The 15 L reactor accommodates large quantities of material (fresh, fresh-frozen, and even dry) and can be quickly swapped between runs to minimize downtime.

Fast extraction

The high microwave power delivered, in combination with the rotating reactor, expedite the extraction process and ensure even heating. A typical process takes between 60 and 90 minutes.

ETHOS X 2.0 WORKFLOW

The ETHOS X 2.0 is our latest generation of benchtop systems for solvent-free extraction, dedicated to cannabis processors. Simply introduce the material into the 15 L vessel and place it into the cavity to begin the extraction process. By pressing "start" the reactor will be automatically sealed and connected to the distillation module. The condensation module along with the water chiller ensures to collect the first drop of terpenes in just few minutes.



Load reactor



Enter parameters



System condenses terpenes



Collect live terpenes

ETHOS X 2.0 TECHNICAL DETAILS

Material type: **Fresh, fresh-frozen and cured**

Sample mass: **2-2.5 kg**

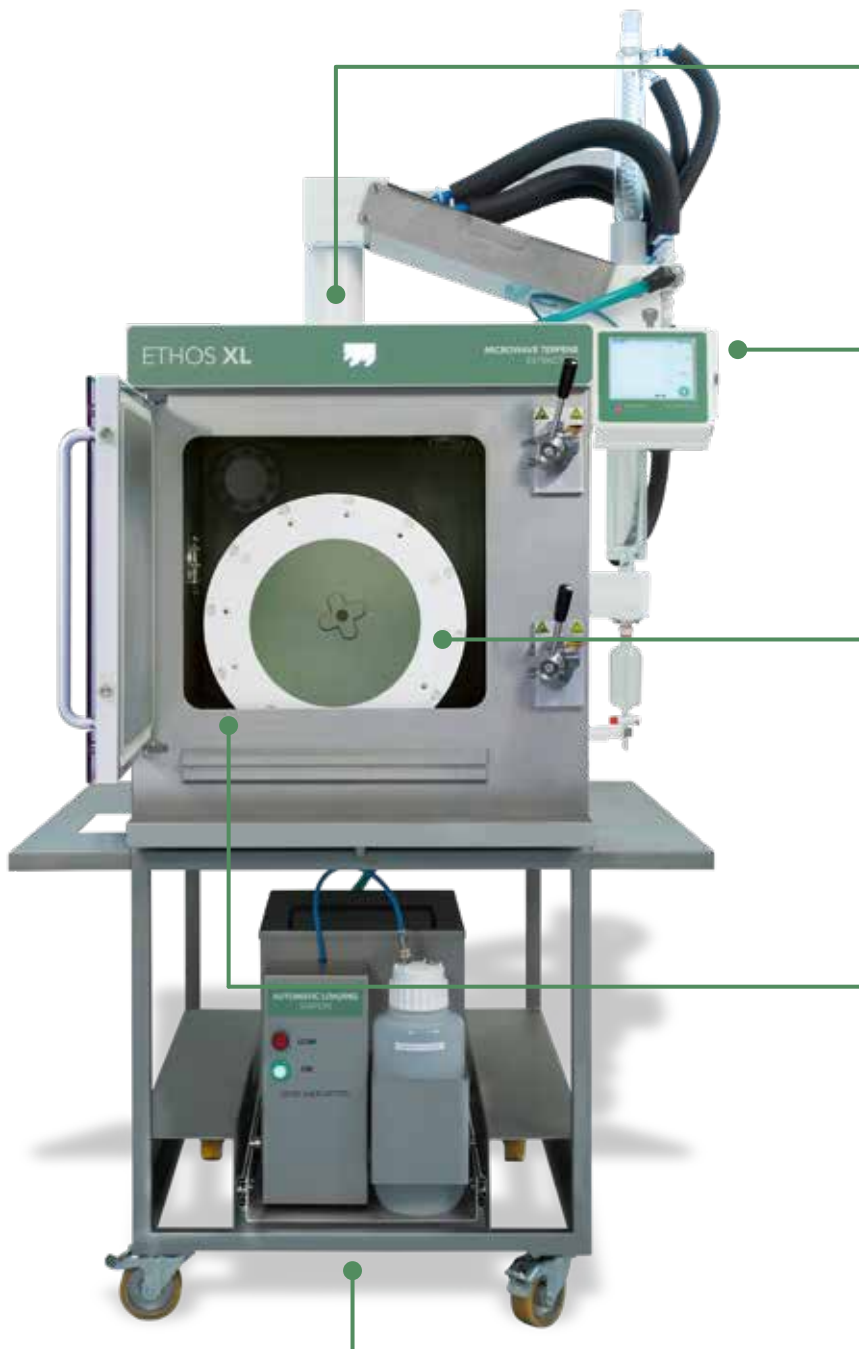
Typical weight per shift: **10-12 kg**

Heating type: **Microwave (1800 W)**

Condensation module: **Two condensers**

Cooling system: **External water chiller (2000 W)**

STREAMLINE YOUR PRODUCTION CAPACITY



Reliable yield and quality

The built-in temperature sensor continuously control the entire extraction process, ensuring consistent high-quality, high-yield extractions.

Advanced control

The advanced user-interface precisely controls the extraction process and ensures full traceability.

Highest production capacity

The 45 L drum accommodates larger quantities of material for improved terpene production. The built-in water bath along with the rotating mechanism improve extraction efficiency and terpene quality.

Superior productivity

A combination of microwave and conventional heating enables a quicker extraction process. While microwaves act directly on the botanic material, the heating pads located on the cavity walls, shorten the warm-up and expedite distillation flow.

Industrial design

The ETHOS XL perfectly integrates into the processor's workflow. Its advanced design enables it to serve as a workhorse for high volume facilities.

ETHOS XL WORKFLOW

The ETHOS XL is designed for high volume cannabis and hemp processors. After cannabis flowers have been loaded into the drum, the system automatically feeds water into the water bath and starts the heating process. The built-in temperature sensor regulates the microwave energy to ensure optimal distillation conditions. At the end of the run, the dedicated burette makes it easy for the operator to collect the extracted terpenes.



Load system



Enter parameters



System condenses terpenes



Collect live terpenes

ETHOS XL TECHNICAL DETAILS

Material type: **Fresh, fresh-frozen and cured**

Heating type: **Microwave (4500 W) plus conductive heating (1800 W)**

Typical weight per run: **10 kg**

Typical weight per shift: **40 kg**

Condensation module: **Four condensers**

Cooling system: **External water chiller (7000 W)**

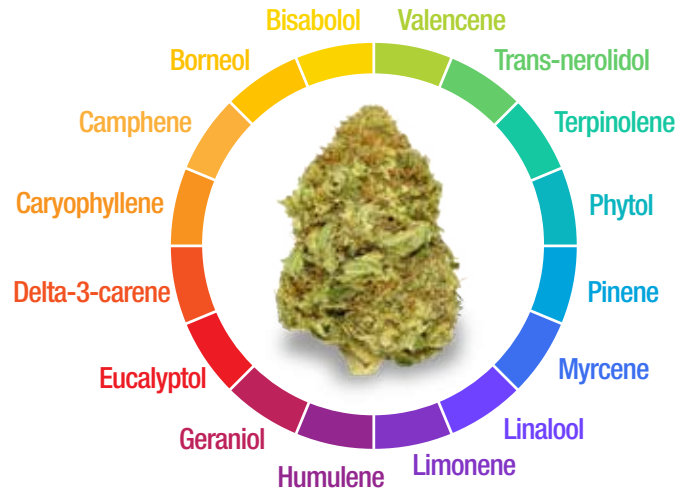
TRUE FLOWERS TASTE

The microwave terpene extraction process captures natural, pure terpenes that match the cultivar characteristics and genetic expressions of the plant strain. Terpenes are a key ingredient in vape cartridge blends, and to their ability to deliver improved flavor and taste that consumers demand.

QUALITY AND YIELD

The quality of your products depends on the ingredients in your blend. For vape pens, live terpenes are critical for improving taste and quality. Microwave optimizes the extraction step, enabling you to improve the value of your products, streamline your process, and eliminate any purification step.

Cannabis Strain	Terpene Recovery (w/w%)
Inzane in the Membrane (INZ)	0.889%
Sour Chunk (SCK)	0.605%
Wappa (WPA)	0.412%
ACDC	0.874%
Banana Diesel (BNA)	0.252%
Blueberry (BRY)	0.625%
Dank Schrader (DSC)	0.514%
Dutch Treat Haze (DHA)	0.817%
Fast Buds (FFT)	0.516%
Kalalau Kush (KKU)	0.661%
Slurpie (SLR)	0.219%
Stevie Wonder (STW)	0.394%
INP	0.586%



FLOWER



MICROWAVE
TERPENE EXTRACTION



PREMIUM FINISHED PRODUCTS










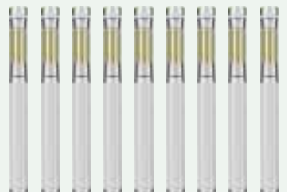


- Bisabolol
- Borneol
- Camphene
- Caryophyllene
- Delta-3-carene
- Eucalyptol
- Geraniol
- Humulene
- Limonene
- Linalool
- Myrcene
- Pinene
- Phytol
- Terpinolene
- Trans-nerolidol
- Valencene

STRAIN-SPECIFIC TASTE FOR YOUR VAPE PENS

| SUPERIOR ROI

Microwave terpene extraction systems can quickly pay for themselves because they extract high yield, high quality terpenes and are easily integrated into any cannabinoid extraction process. The ETHOS XL was designed for high-volume facilities, while the ETHOS X 2.0 is perfectly suited for medium sized processors and craft production.

	 <p>ETHOS X 2.0</p>	 <p>ETHOS XL</p>
MATERIAL	 <p>Fresh/Fresh-frozen</p>	 <p>Fresh/Fresh-frozen</p>
MATERIAL PROCESSED <i>(8 HOURS)</i>	 <p>12 kg</p>	 <p>40 kg</p>
VOLUME OF LIVE TERPENE EXTRACTED <i>(CONSIDERING 0.5% CONTENT IN THE BUDS)</i>	 <p>60 g</p>	 <p>200 g</p>
VAPE CARTRIDGES DAILY PRODUCTION <i>(THC DISTILLATE - 5.5% TERPENES)</i>	 <p>1,090</p>	 <p>3,636</p>

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 has been active in the microwave technologies since three decades and it pioneering the green extraction from natural products using microwave technology. 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.

WWW.MILESTONESRL.COM

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HELPING
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