

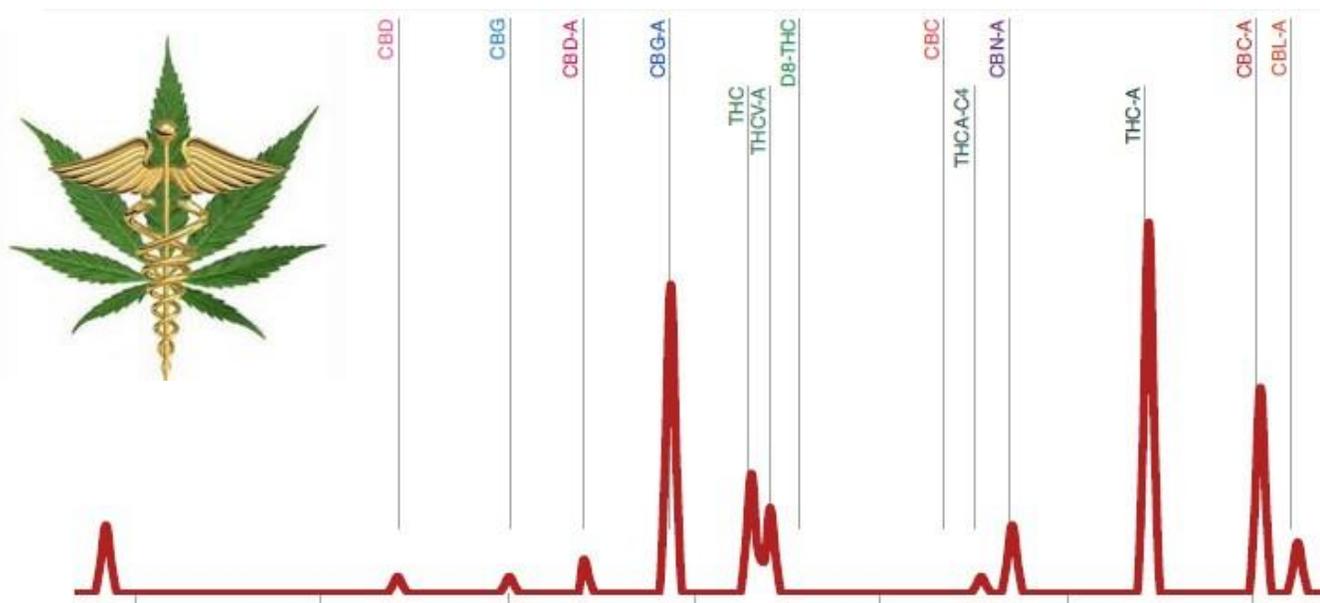
## SFT- NPX-10 Extractor Optimized for Processing Medicinal Marijuana

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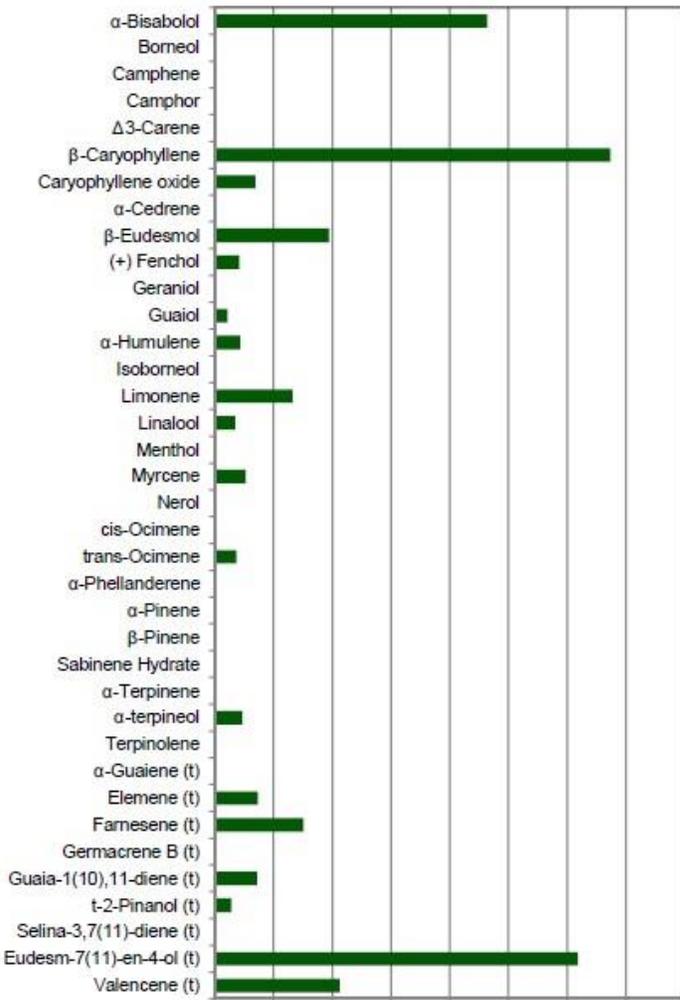
Supercritical Fluid Technologies has announced the introduction of a new version of their SFT-NPX-10 pilot-scale natural products CO<sub>2</sub> extractor optimized for the production of pharmaceutical-grade cannabis oil. The new NPX-10 is designed to simplify extraction by utilizing safe, efficient carbon dioxide. It may be used to facilitate the transition from laboratory scale equipment to large production scale systems.

The need for pharmaceutical grade cannabis oil has increased as researchers continue to investigate the application of cannabis oil for the treatment of various ailments such as muscle spasms, glaucoma, nausea, mood and behavioral disorders, sleep disorders, and chronic pain. With a myriad of cannabinoids present in the marijuana plant that can be used to treat a range of ailments and conditions, the investigation into producing a more effective extraction method and purer product has just begun. Supercritical Fluid Technologies, Inc has developed the SFT-NPX-10 Natural Products Extractor for researchers who want to investigate a higher quality of product using a more efficient and greener supercritical fluid carbon dioxide (scCO<sub>2</sub>) extraction process as the extraction solvent.

**Table 1: HPLC Analysis of Extracted Cannabis Oils Using the NPX-10 Supercritical Fluid Extraction System. Data taken from processing in our California Facility 2013.**



**Table 2 and 3: Active Cannabis Oil Ingredients Identified via LC-MS as Extracted Using the NPX-10 Supercritical Fluid Extraction Unit**

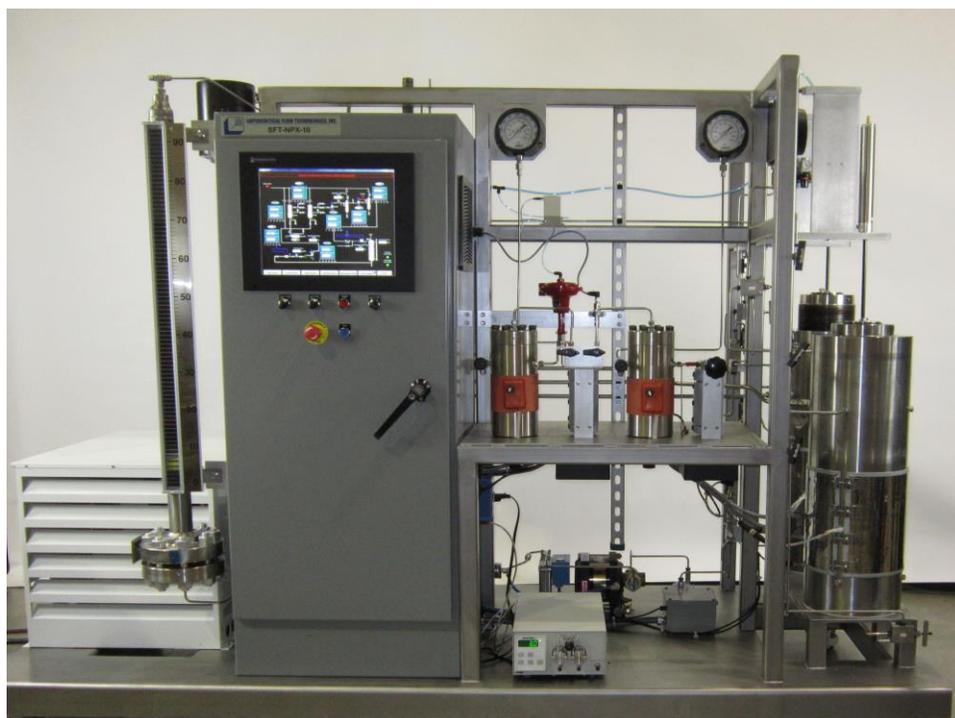


Compound	Ratio	≈ Content
CBG-A	3.5%	2.3 mg/g
CBG	0.5%	0.3 mg/g
THC-A	84.9%	55.9 mg/g
THCA-C4	0.2%	0.1 mg/g
THCV-A	1.0%	0.6 mg/g
THC	5.9%	3.9 mg/g
D8-THC	0.1%	0.1 mg/g
THCV	ND	ND
CBN-A	0.8%	0.5 mg/g
CBN	ND	ND
CBD-A	0.4%	0.2 mg/g
CBD	0.6%	0.4 mg/g
CBC-A	2.1%	1.4 mg/g
CBC	0.1%	0.1 mg/g
CBL-A	ND	ND

Not all essential oils are created equal, and the operating parameters that favor the extraction of particular bio-active compounds, flavanoids, or fragrances vary from plant to plant. For example, although humulus (beer hops) and cannabis are closely related members of the Cannabinaceae family, the conditions under which you can extract their essential oils are not. This being the case, an extractor configured to optimally extract hops is not necessarily have the same configuration as an extractor configured for extracting oil of cannabis. The SFT-NPX-10 SFE allows more ease in the separation of the bio-active cannabinoids and terpenoids from the cellulose, waxes, and colorants than is obtained when extracted with aggressive hydrocarbon-based solvents.

One of the principal advantages of a CO<sub>2</sub> extraction is the ability to fine-tune the solvating power to target specific compounds by varying the pressure, temperature, solvent-to-feed ratio, and flow rate. There is more to medical marijuana than just the two principal cannabinoids (THC and CBD) found in the plant. In fact, multiple compounds have been identified. However, exactly how many of these compounds and in what combination contribute to its overall medicinal efficacy (the entourage effect) is neither understood nor known. What has become known is that nothing less than a whole plant extraction is what makes the medicine all that it can be. Whereas a whole plant synthesis is

not technically or economically feasible, a whole plant extraction (both non-polar oil and the less non-polar terpenes) can be obtained by varying both the pressure and temperature from the extremes from sub-critical (1000psi and 5°C) to supercritical (7500psi-40°C) conditions. Unlike other commercially available systems, this whole plant extraction is exactly what the SFT-NPX-10 has been designed to do and does very well. There is no need to perform a distillation step since, upon dropping pressure, the CO<sub>2</sub> becomes a gas. The extracted material is pure and in its natural state. The CO<sub>2</sub> may be safely vented or optionally recycled for even greater efficiency. Since the solvency power of the fluid is pressure dependent, it is possible to fractionate to obtain multiple compositions from a single raw material. This makes practical some separations that are difficult or impossible to do with traditional liquid solvent and distillation processing.



### **SFT-NPX-10 Dual 10 Liter SCF Extraction Unit**

The SFT-NPX-10 is equipped with a hi-velocity heated micrometering variable restrictor and chilled LCO<sub>2</sub> SCF pump and can process the raw materials 2-3 times faster than traditional organic solvent or steam distillation extraction methods available on the market today. The SFT-NPX-10 system can perform supercritical fluid extractions incorporating configurations including single or dual operation for 5 Liter, 10 Liter or 20 Liter sample extraction vessels with single or multiple separators and operate in a manual or fully automated and integrated control mode.

The NPX-10 comes standard in a manual operation mode but can easily be upgraded to full automation and data acquisition freeing the end-user as it carries out the extraction process. In the full automated mode, all process parameters (pressure, temperature, flow) can be varied as to set point, ramp rate, and hold time from start to finish throughout the operating range from 725-10,000 psi CO<sub>2</sub>, 5-120°C, 0-1kg/min of CO<sub>2</sub> flow. The oil-laden mist produced by the expanded CO<sub>2</sub> is coalesced centrifugally in a first stage separator, and the volatile organic compounds cold-trapped in a second separator. The expanded CO<sub>2</sub> is then filtered to remove any particulates and de-

humidified prior to being routed to a gas booster pump and high-efficiency heat exchanger (chiller) for complete LCO<sub>2</sub> recycle after which the condensate is pumped back into the supply tank as recycled CO<sub>2</sub> for the SFT-NPX-10 Unit.

The SFT-NPX-10 pilot-scale extractor affords the pharmaceutical industry the opportunity to produce pharmaceutical-grade cannabis oil at a higher quality and greater efficiency than is possible with traditional hydrocarbon solvents and distillation processing.

For more information, please call us at 302-738-3420 or visit us on-line at [www.supercriticalfluids.com](http://www.supercriticalfluids.com).

*Supercritical Fluid Technologies, Inc. was founded in 1994 and maintains corporate headquarters in Newark, Delaware, USA. The company specializes in the manufacture of bench top and small scale pilot equipment for supercritical fluid extraction, reaction and high pressure chemistry. The company provides contract research and custom engineering services*