Processing Efficiency:

Flow rate and completion vs. yield

In the botanical oil extraction industry, manufacturers/suppliers make a number of different claims about the processing speed of their CO_2 extraction equipment, but what is most important?. When evaluating an extraction system, processors and operators should focus on the ***processing efficiency: the rate of speed (flow rate) and 90% completion.*** (For measurement guidelines, refer to the chart below.)

1. Speed of extraction: The flow rate of CO_2 at Pressure X and Temperature Y

2. Time to achieve 90% completion: The amount of time it takes for the extraction system to remove 90% of the available oils per pound of decarboxylated and non-debcarboxylated material.

Most CO_2 extraction systems are capable of removing 90% of the available oils; the difference between systems is the amount of time it takes to achieve it.

Why not yields?

System operators/processors often mistakenly focus on yield in assessing processing efficiency because yield rates determine the ROI calculations. But they are not a true indicator of processing efficiency because the **amount of yield depends on the amount of oil** available in the raw plant material. Therefore, yields vary significantly based on the quality of the material, as well as the operating parameters and the processing time.

90% completion rates of Apeks CO2 subcritical and supercritical extraction systems

Apeks extraction systems				Time to achieve 90% completion per pound	
	pressure psi	temperature (F)	flow rate (L/min)	non-decarboxylated material (minutes)	decarboxylated material (minutes)
5000psi High Production	4000	105	2.5	30	15
	1800	105	2.3	60	30
2000psi Mid-Range Production	1800	105	2	90	45
	1200	75	2	180	90
i.2000-5LD Introductory	1800	105	0.6	120	60
	1200	75	0.5	240	120

Speed of a CO_2 extraction system is a function of pressure, temperature and CO_2 flow rate (the greater the flow, the faster the extraction assuming pressure and temperature remain constant). Low pressures and temperatures (subcritical) produce extremely high-quality extractions but lower yields. High pressure, high temperature extractions (supercritical) are faster because the solvency power is higher; however, more waxes and lipids are produced in the extracted material as a result.

Conversions to compare CO_2 flow rate with other CO_2 extraction systems:

2.5 Liters (L)/min = 0.55 gallons/minute = 2500 grams/minute = 150 L/hour = 33 gallons/hour = 150 kg/hour.

Beyond efficiency: the importance of quality

The ideal extraction process will extract the available oil efficiently *and* with minimal changes to the components in the oil. Apeks Supercritical systems utilize cold separation through our patented Valveless Expansion Technology and Diaphragm Compressor Technology. Other systems without these technologies apply large amounts of heat on the separation vessels. Whereas **cold separation protects the extracted oil** from thermal degradation, as well as **retains higher percentages of THC-A and/or CBD-A.**

For more information on cold separation, click here: Cold Separation.

Cold separation processes protect plant oils resulting in higher-quality extractions like this one from the Colorado Cannabis Company in Denver.

Using an Apeks 2000psi CO_2 extraction system utilizing cold separation, SJR Labs in Gorham, Maine was able to offer 78% THC pure amber cannabis oil in these 2g syringes.

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The Power of CO_2 Extraction