

Chemistry Analysis of Distilled Fresh Hop Oil or...

What's in this Stuff?

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Our Perspective: What we do

Fractionalize oils and extracts for medical/health/cosmetics
Industrial Hemp Extracts
White Label and Bulk Compound Manufacturing

Why do we like fresh hop distilled hop oil?
It's legal in all states and countries, globally!

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Distilled hop oils made from fresh hops capture whatever is in the field at harvest



Known compounds in Lupulin resin

- Over 400 identified compounds.
- Only a handful are even measured for brewing
- 140 of these belong to aromatic organic hydrocarbons known as **Terpenes**

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Terpenes vs. Terpenoids

Terpenes are hydrocarbons (only carbon and hydrogen elements)

Terpenoids have been denatured by oxidation (drying and curing of flowers) or chemically modified.

Terpenes are common constituents of flavorings and fragrances.

Hops – member of the *Cannabaceae* family

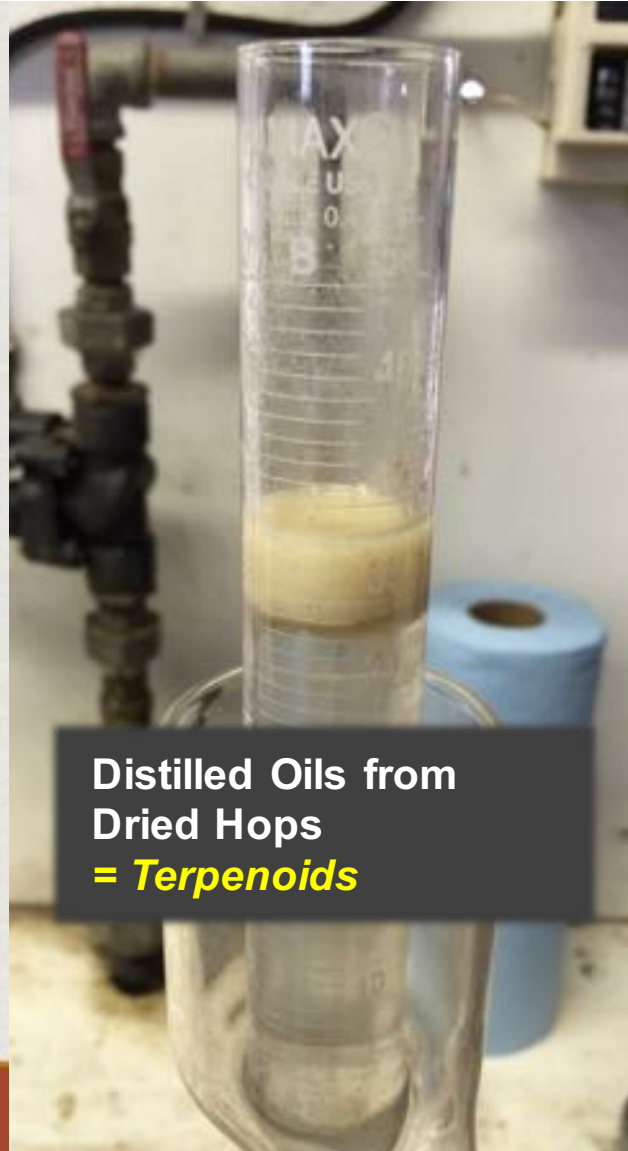
Same terpenes found in distilled hop oils are found in Industrial Hemp and Cannabis

Terpenes not considered Cannabinoids (CBDs) however

Distilled Oils from
fresh hops
= *Terpenes*



Distilled Oils from
Dried Hops
= *Terpenoids*



Viscosity:

Significant differences
found:

FRESH Distilled:

Very light, transparent, VS.

DRIED Distilled:

Heavy, thick, opaque

The Difference?

Mostly in the amount of
volatile myrcene captured

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Comparative Oil Profile: Dried/Processed vs. Distilled/Fresh

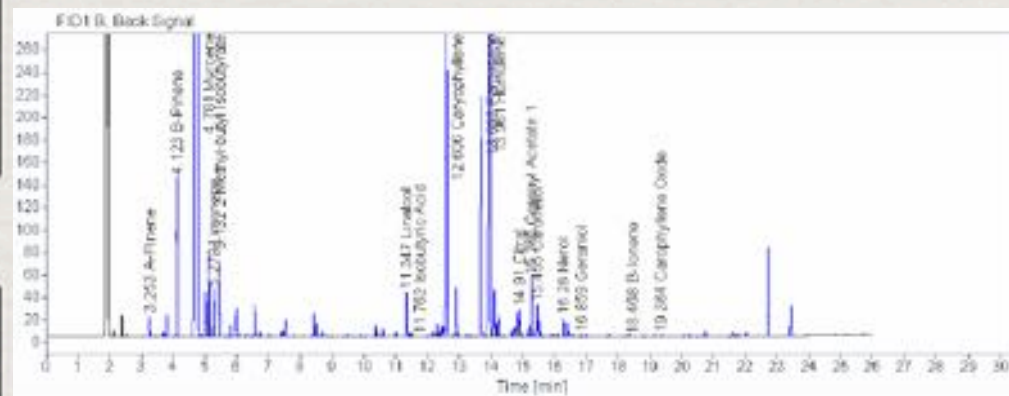
	Dried/Processed Hops	Distilled/Fresh
Myrcene:	45-60%	79.7%
Farnesene:	0-5%	1.92%
Caryophyllene:	5-9%	2.66%
Humulene:	14-20%	5.64%
Linalool	0.3-0.6%	0.33%
Geraniol	0.2%	0.02%
B-Pinene	0.5-.8%	1.16%

CASCADE: Compare Fresh vs Dried

- Myrcene levels in **fresh** hops is approx. double vs. **dried**
- **Myrcene**: the largest fraction is also *the most volatile* aromatic oil
- **Flash Point** (evaporation point) of myrcene: @104F
- Hops traditionally dried between 125F and 159F
- **Conclusion #1**: much myrcene evaporates during hop drying
- **Conclusion #2**: That's why the aroma profile is so intense/different

Description		FID1 B, Back Signal	
RT [min]	Area	Area%	Name
3.253	35.28174	0.13	A-Pinene
4.123	313.47379	1.16	B-Pinene
4.781	21452.44336	79.70	Myrcene
5.132	135.63391	0.50	2-Methyl-butyl isobutyrate
5.279	73.65973	0.27	Limonene
11.347	88.34354	0.33	Linalool
11.762	1.88051	0.01	isobutyric Acid
12.606	716.17126	2.66	Caryophyllene
13.697	517.53473	1.92	Farnesene
13.961	1518.85657	5.64	Humulene
14.910	62.86739	0.23	Citral
15.285	118.87105	0.44	Geranyl Acetate 1
15.455	74.86665	0.28	Citronellol
16.280	43.34105	0.16	Nerol
16.859	5.42658	0.02	Geraniol
18.468	0.53190	0.00	B-ionene
19.364	3.93866	0.01	Caryophyllene Oxide
Sum	25163.1224	93.4883	

Gas Chromatography (Actual GC Spectrum Analysis) Cascade Fresh Hops



- 93.483% was measured / identified
- Means about 6.5% are “other compounds”

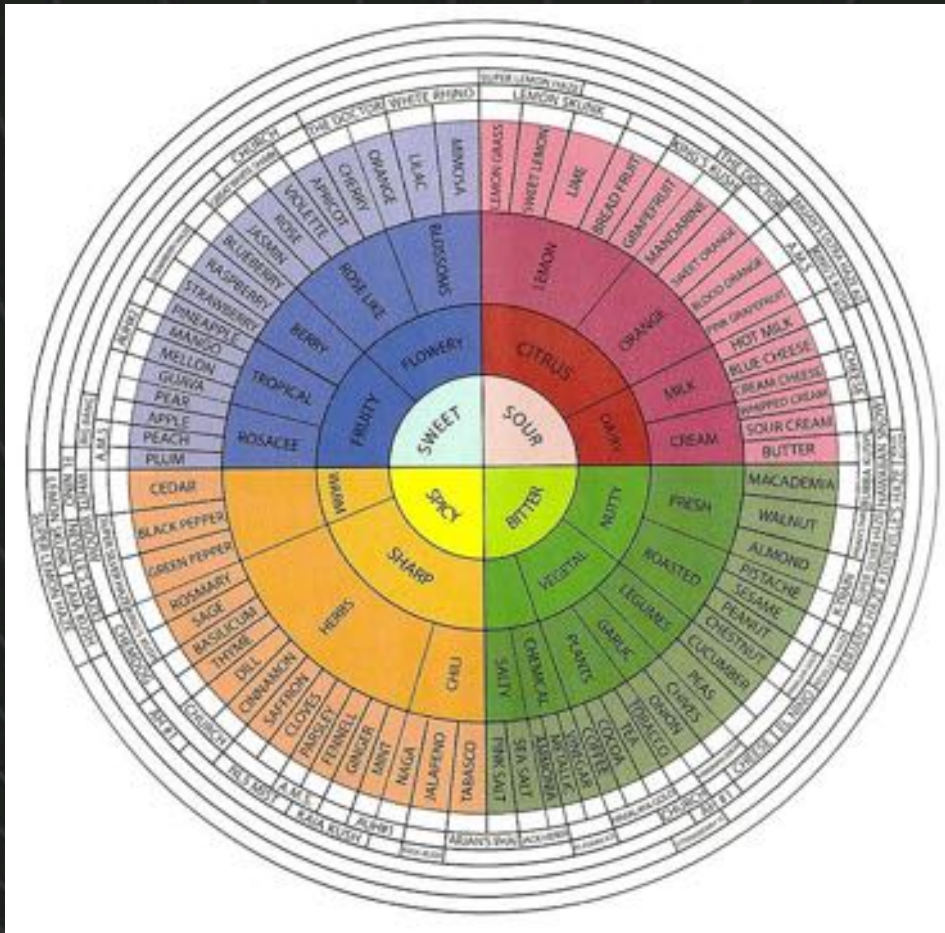
Bottom Line

Fresh hop Distilled Oils (an essential oil) will have a fresh hop aroma.

But “fresh” is a different aroma/flavor profile vs. dried pellets

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Does this Wheel look a little familiar?

- Flavor wheel developed by Green House Seed Co.
 - “Buy Award-winning cannabis seeds online!”
- **Similarity between hop terpenes and cannabis terpenes**
 - Mapping out terpene profiles
 - Predict aroma and flavor profiles
 - Identify specific terpenes
 - *Sedative, relaxing effects* (Myrcene)
 - *Mental alertness* (Pinene)
 - *Mood uplift* (Limonene)

Distilled fresh-hop oil Economic benefits are well documented

- Reduced filtration losses
- Increased yield/batch
- Reduce carbon footprint
- Reduced shipping costs
- Reduce/eliminate processed hop bill
- Reduced storage costs
- Reduce labor (cleaning/filtration)
- Increased shelf life (5 years+)
- Increased throughput

Question:

Is it possible to get these Economic Benefits with a fresh-hop essential oil that MATCHES existing variety profiles?

YES.

**Through
Fractionalizing
& Re-blending**

**Matched
'traditional'
Oil Profiles**



Who is this for?

- Brewers who want the economic benefits of distilled essential oils
- While matching the aroma/flavor profile of an *existing* production beer
- Custom blend oil profiles are possible

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Thank You

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