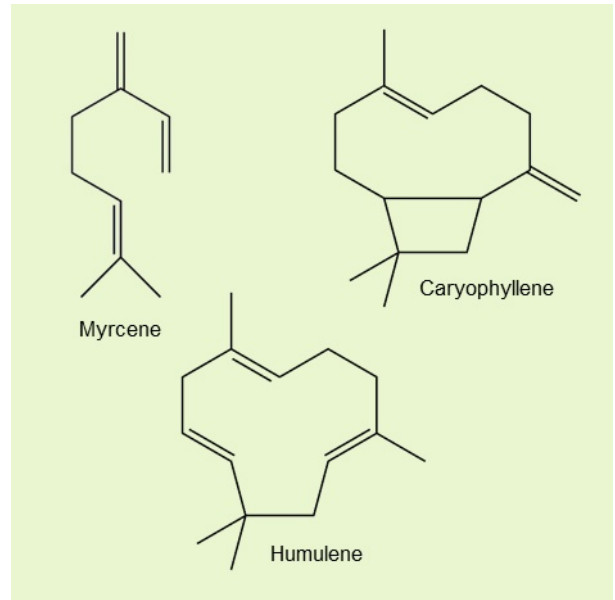


Hop Oil

❖ Overview

- **Hop Oil** is produced from leaf hops and contains the complete range of essential oils.
- **Hop Oil** can be dosed at various steps during the brewing process (typically added in the cold section of production) resulting in improved aroma yields compared to traditional hopping techniques.
- **Hop Oil** produces pleasant hop aroma that can be varied depending on the time of dosage.



❖ Specification

- | | |
|-------------------------|---------------------------------------------------------------------------------------------------------|
| • Description: | Pure hop oils diluted in a blend of propylene glycol and ethanol, resulting in a 1:100 diluted product. |
| • Key Compounds*: | Myrcene, Humulene, Caryophyllene, Farnesene |
| • Bittering Components: | < 0,1 % |
| • Viscosity: | 46 mPas at 25°C (77°F) |
| • Density: | approx. 1,0 g / ml at 20°C (68°F) |

* Detailed information is given in the corresponding certificate of analysis.

❖ Properties

• Appearance

An almost colorless, clear liquid, containing the complete range of hop essential oils.

• Utilization

Depending on the time and method of addition, hop oil recoveries can range up to 95%. Actual utilization will vary from brewery to brewery depending on plant and process conditions.

• Flavor

Hop Oil can be used to provide a strong or, alternatively, a more subtle hop aroma depending on the quantity added, method and point of addition.

Depending on the dosed amount, the bitter intensity might be increased.

• Quality

All Hopsteiner® products are produced in plants accredited to internationally accepted quality standards.

❖ Packaging

Hop Oil is usually packaged in various sizes of aluminum bottles or pails containing up to 20kg.

Hop Oil is usually delivered diluted 1:100 in a blend of 95% propylene glycol and 5 % ethanol (recommended).

On request, other dilutions but also pure hop oils might be supplied.

❖ Product Use

• Dosage

The quantity of a 1:100 diluted **Hop Oil** (see section packaging) to be dosed depends on the method of addition:

Pre-fermentation: up to 500 g per hl

Maturation tank: 50 – 300 g per hl

Prior to filtration: 1 – 20 g per hl

The above figures are indications only; actual additions will depend on the intensity of aroma required. Dosing experiments, using a microliter syringe to inject oil into beer, will give useful indications of the target quantity required.

• Addition

Hop Oil can be added at different stages during beer production. For the addition of **Hop Oil** a dosing equipment to pump the product into the beer stream is preferred. Alternatively the hop oil can be added into the tank prior to filling.

• Pre-fermentation: the reaction of volatile compounds during fermentation, combined with the biochemical modification of aroma compounds by yeast, can produce a more decent and less herbal (typical or comparable) aroma.

• Maturation tank: addition to maturation will result in slight changes of aroma, due to certain yeast activity.

• Prior to filtration: direct addition results in an almost unchanged flavor. However, there's a certain loss of non-polar components.

- **Storage**

Hop Oil should be stored <10°C (50°F) in screw top aluminum bottles.

- **Best Before Date**

Hop Oil is stable 1 year from date of production under the recommended storage conditions.

- **Safety**

If material comes into contact with the skin, wash off with soap and water. If material gets into the eyes, irrigate with excess water and seek medical attention.

For full safety information please see the relevant Hopsteiner® safety data sheet.

❖ Analytical Methods

- **Aroma Components**

For the analysis of single hop oil components, gas chromatography technique is used according to the following methods:

- Analytica-EBC 7.12
- ASBC Hops-17

❖ Technical Support

We will be pleased to offer help and advice on the full range of Hopsteiner® products:

- Copies of all relevant analytical procedures
- Safety Data Sheets (SDS)
- Assistance with pilot or full brewery trials
- Specialist analytical services

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