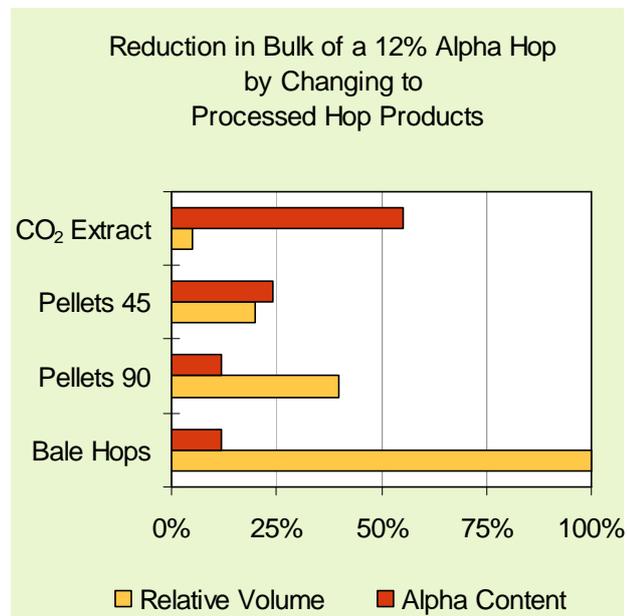


## CO<sub>2</sub> Extract

### ❖ Overview

- **CO<sub>2</sub> Extract** is an extract of hops produced by extraction of hop pellets using food grade carbon dioxide under liquid or supercritical conditions.
- **CO<sub>2</sub> Extract** contains alpha acids, beta acids and essential oils and is normally used as a partial or complete replacement for kettle hops or hop pellets.
- **CO<sub>2</sub> Extract** is an extremely stable, convenient and concentrated alternative to the use of hops or hop pellets.



### ❖ Specification

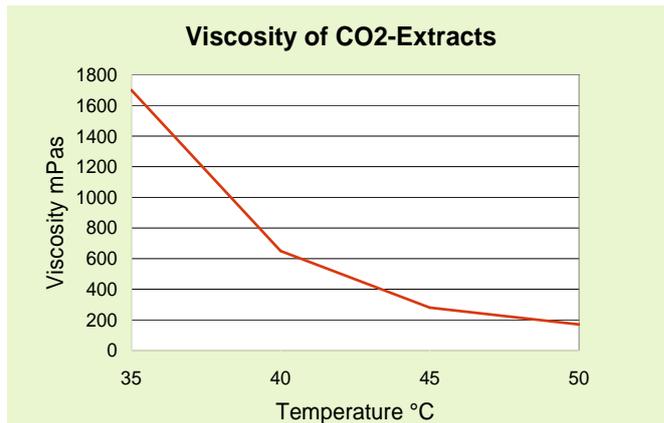
- **Description:** A golden/amber/green, semi-fluid syrup or paste at room temperature.
- **Alpha Acids:** Variety specific; typically 35 % for an aroma hop and > 50 % for a high alpha hop.
- **Beta Acids:** Variety specific; normally in range 15 – 40 %
- **Hop Oils:** Variety specific; typically 3 – 12 %
- **pH** 4 (± 0.5)
- **Viscosity:** See Properties
- **Density:** 0.9 – 1.0 g/ml

PDS 05/09 issued 06/2012

## ❖ Properties

### □ Appearance

A golden/amber/green (dependent on variety and extraction conditions), thick syrup which becomes more fluid on warming.



### □ Utilization

Early addition of **CO<sub>2</sub> Extract** to the wort boil normally results in a fractionally higher utilization of the alpha acids into the beer than that of corresponding Type 90 Pellets, typically in the range 32 – 38%. Late additions may have utilizations as little as one half of these values.

### □ Flavor

The flavor characteristics of the original hops are maintained. Early addition of **CO<sub>2</sub> Extract** to the kettle imparts mainly bitterness, while late addition allows carry over of a proportion of the volatile oils resulting in a beer with aromatic “late hop” character.

### □ Chemical Residues

Nitrates and heavy metals are almost completely eliminated in **CO<sub>2</sub> Extract**. Many pesticide and fungicide residues are also largely removed by CO<sub>2</sub> extraction.

### □ Quality

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

## ❖ Packaging

**CO<sub>2</sub> Extract** can be packaged in cans, pails and drums according to customer requirements:

Cans: 0.5 to 4 kgs USA;

0.5 to 10 kgs Germany

Pails: 3 to 20 kgs (6.5 – 44 lbs); USA only

Drums: 50 & 200 kgs (110 – 441 lbs)

For convenience of use, customers may have their extract packed in cans to any desired content of alpha acids per container (e.g. 450 g alpha per can).

Alternatively, the alpha acids content of **CO<sub>2</sub> Extract** can be standardized to any particular concentration using glucose syrup (non-GM glucose cannot be guaranteed) and the container filled to a standard weight (e.g. 30 % alpha in 1-kg cans).

## ❖ Product Use

**CO<sub>2</sub> Extract** typically added into the kettle as a complete or partial replacement for leaf hops or hop pellets.

### □ Dosage

Addition to the kettle is based on the alpha acids concentration in the **CO<sub>2</sub> Extract** and the assumption that the utilization is likely to be slightly better than that achieved with hops or hop pellets. Actual utilization will vary from brewery to brewery depending on plant and process conditions.

PDS 05/09 issued 06/2012

## □ Addition

For the best utilization **CO<sub>2</sub> Extract** should be added early in wort boiling. However, owing to likely losses caused by protein precipitation, the product is best added 10 minutes after the start of boiling. For imparting “late hop” character, extract should be added not less than 5 minutes before kettle cast. However, in this situation, better results can be achieved using the pre-isomerized kettle extracts – IKE and PIKE.

If **CO<sub>2</sub> Extract** is used in cans, it does not need to be warmed prior to use. Punctured containers suspended into the boiling wort will ensure that all of the extract is completely flushed out into the wort.

Should **CO<sub>2</sub> Extract** be used in automatic dosing units, it should be warmed to 40°C (104°F) and gently mixed to ensure perfect dosing.

## □ Storage

**CO<sub>2</sub> Extract** should be stored in sealed containers at < 10°C (50°F). Opened containers should be used within a few days.

## □ Best Before Date

**CO<sub>2</sub> Extract** is stable 6 years from date of production under the recommended storage conditions.

## □ Safety

**CO<sub>2</sub> Extract** is a natural substance and may be safely handled using routine precautions to avoid contact with skin and, particularly, eyes. Any material coming into contact with the skin should be washed off with soap and water or proprietary hand cleansers. If **CO<sub>2</sub> Extract** gets into the eyes, irrigate with excess water until clear and seek medical attention.

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

## ❖ Analytical Methods

### □ Concentrations of Alpha and Beta Acids

The concentrations of these hop resin acids are measured by:

- HPLC, using the current ICE standard, normally according to the EBC 7.7 or the ASBC Hops-14 methods.
- Conductometric methods – IOB 6.4, EBC 7.6 or ASBC Hops-8 and spectrophotometric method ASBC Hops-6 can also be used.

### □ Concentrations of Hop Oils

Hop oil concentration is measured by the IOB 6.3, EBC 7.10 or ASBC hops-13 method.

## ❖ Technical Support

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

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

PDS 05/09 issued 06/2012