

## Isohop®

Iso- $\alpha$ -acids are the native bittering acids found in traditionally hopped beer. Isohop® is a standardised solution of iso- $\alpha$ -acids (30% w/w) produced from CO<sub>2</sub> hop extract using an all-aqueous process. Isohop® is used to replace kettle bittering hops to improve hop utilisation or to adjust bitterness in beers that may have been under-hopped in the kettle. For precise control of beer bitterness, Isohop® should be added post-fermentation to adjust the bitterness of the beer to the target bitterness units (BU). It may also provide an economic alternative to kettle hopping when performing high-gravity brewing. When hopping does not go according to plan, Isohop® will help to get back on target. Isohop® will contribute to foam stand and cling similar to that of traditional bitter hopping (whole hops, pellets, or CO<sub>2</sub> extract). Isohop® will also act as a natural antimicrobial agent when added to beer. Isohop® provides a very good utilisation along with comparatively low costs. Isohop® is classified by the U.S. FDA as a modified hop extract that may be safely used in beer in accordance with US FDA regulation 21 CFR 172.560 (b) (2-5).

### Product Specifications:

Description:	A pale yellow to amber aqueous solution of the potassium salts of iso- $\alpha$ -acids
Concentration:	Standard concentration is 30.0% $\pm$ 0.5 of iso- $\alpha$ -acids by HPLC
pH:	8.0 - 10.0
Density:	1.075 g/mL (approximately) at 20 °C (68 °F)
Viscosity:	10 - 20 mPas at 20°C (68°F)
Solubility:	Soluble in pH-adjusted de-mineralised water, and in alcohol
$\alpha$ -acids:	< 0.7%
$\beta$ -acids:	< 0.3%

### Quality and Food Safety:

BarthHaas maintains quality management systems registered to the ISO 9001 standard, as well as food safety management programs based on internationally recognised (HACCP) principles. Please refer to our web site ([www.barthhaas.com](http://www.barthhaas.com)) for more information on our systems and programs.

## Product Use:

Isohop® is normally used after fermentation and before final filtration. Utilisation of Isohop® in final beer is typically between 60 - 90% depending on the time and efficiency of dosing. If Isohop® is used in the brewhouse, utilisation may be expected at 50 - 60%. The preferred point of post-fermentation addition is close to a region of turbulent beer flow, e.g. on the suction side of a centrifugal pump. The dosing pump should be adjusted to deliver the Isohop® over approx. 70% of the total transfer time. It is advisable to make the addition prior to the final filtration step. Local high concentrations of iso- $\alpha$ -acids should be avoided in the beer stream and the addition point should be well separated from that of any other additions. Isohop® may be added at ambient temperature without prior dilution directly to beer. Dilution is not advised, but if necessary, the use of de-mineralised water and a pH adjustment to 9 - 10 with KOH is recommended. Do not use sodium bases to adjust the pH of dilution water; caustic soda or sodium hydroxide form poorly soluble salts with most hop acids.

The amount of Isohop® needed for dosing is calculated based on the product concentration and the assumed utilisation. Conducting trials at the brewery will determine the correct dosage of Isohop® in regard to sensory bitterness. Isohop® will give similar bitterness as that of traditional iso- $\alpha$ -acids. Following dosing, we recommend cleaning lines and dosing pumps with warm slightly alkaline de-mineralised water or ethanol immediately after each use.

## Usage Calculations for Bitterness Adjustment:

The following calculations are based on an assumed utilisation of 80%. (IAA = iso- $\alpha$ -acids).

Desired Sensory Bitterness Units = BU

$$\text{Dosage IAA in mg/L (80\% utilisation)} = \text{BU} \times \frac{100}{80}$$

$$\text{Dosage in grams IAA per hL of beer} = \text{BU} \times \frac{100}{80} \times \frac{100}{1000}$$

Dosage amount of Isohop® (30% IAA) in g/hL :

$$\text{BU} \times \frac{100}{80} \times \frac{100}{1000} \times \frac{100}{30} \text{ g/hL} = \text{BU} \times 0.42 \text{ g/hL}$$

Amount of Isohop® (30% IAA) in mL/hL :

$$\text{BU} \times \frac{100}{80} \times \frac{100}{1000} \times \frac{100}{30} \times \frac{1}{1.075} \text{ mL/hL} = \text{BU} \times 0.39 \text{ mL/hL}$$

*(e. g. for 5 desired sensory bitterness units  $5 \times 100/80 \times 100/1000 \times 100/30 = 2.1$  g/hL 30% Isohop® is necessary if utilisation is 80%)*

## Packaging:

Isohop® is normally supplied in high-density polyethylene containers of 20 kg. Larger package units are available on request.

### **Storage and Best-by Recommendations:**

Store Isohop® in full, closed containers at 2 – 8 °C (36 – 46 °F). Prolonged storage at high temperature can cause deterioration. Isohop® performs best if used within 24 months from the time of production if stored as recommended. Opened containers should be used within a few days.

### **Safety:**

Any material coming into contact with the skin should be washed off with soap and water. For more information, refer to the relevant Safety Data Sheet (SDS).

### **Analytical Methods:**

The determination of iso- $\alpha$ -acids comprises three types of methods, the specific measurement of iso- $\alpha$ -acids by means of HPLC, spectrophotometric or conductometric methods. In regard to the spectrophotometric method, please note that the optical density multiplication factor in the formula needs to be adjusted from 50 to 70.

- EBC 7.8 for Iso- $\alpha$ -acids,  $\alpha$ -acids,  $\beta$ -acids by HPLC
- EBC 7.9 for Iso- $\alpha$ -acids
- ASBC Hops-16 (Iso- $\alpha$ -,  $\alpha$ -, and  $\beta$ -acids in Hop Extracts and Isomerised Hop Extracts by HPLC)

### **Technical Support:**

We will be pleased to offer help and advice on the use of Isohop® in brewing.