

# PHA® Topnotes

## PHA® Topnotes in propylene glycol (PG)

### General:

PHA® Topnotes are prepared from cone hops by specific extraction and distillation methods. They consist of original hop oil compounds in a propylene glycol (PG) solution. PG is a permitted carrier for flavours as per regulation 2006/52/EC. PHA® products are exclusively supplied worldwide by the Barth-Haas Group.

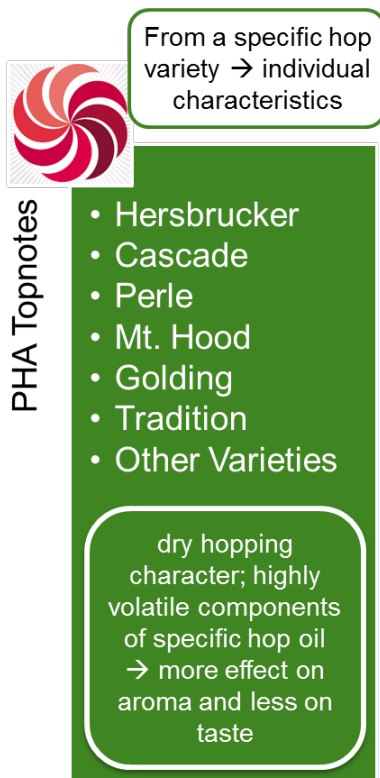


Figure 1: PHA® Topnotes

**Characteristics:**

PHA® Topnotes are soluble in beer (or other beverages). In general, PHA® products offer an alternative means of adding hop aroma independent of any other product or process. Specifically, PHA® Topnotes give a very intense ‘dry hop’ aroma to beer that is characteristic of the specific variety from which it is prepared. They enhance pleasant existing flavors in the beer/soft drink and can mask some off-flavors. The following PHA® Topnotes are immediately available:

**PHA• Topnotes:**

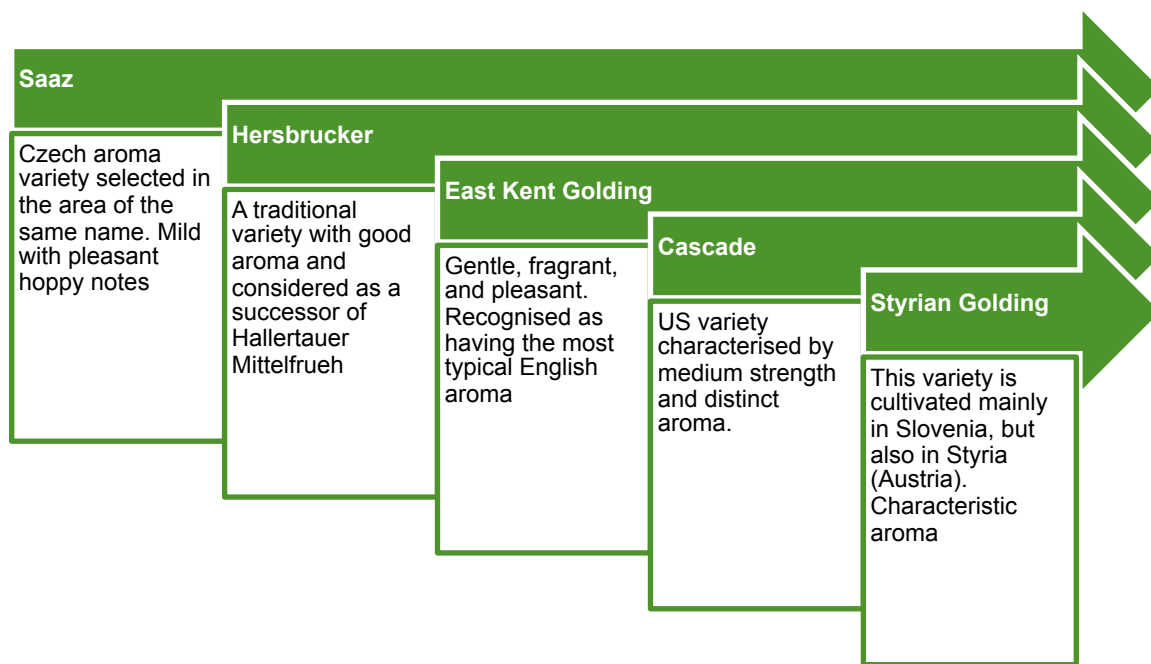


Figure 2: Examples from the PHA® Topnote range

**Custom made Products:**

Custom-made PHA® Topnotes from other varieties are available on request.

**Product specifications:**

|                          |                                   |
|--------------------------|-----------------------------------|
| Description:             | water white solution, can be hazy |
| Specific Gravity (20oC): | 1.034 - 1.037                     |
| Flash point:             | > 90 °C (194 °F)                  |

**Product Use:**

PHA® products are completely soluble in beer and are intended for addition to fined or filtered beers. The required amount of PHA® may be metered directly into the beer stream during transfer to bright beer tank or other appropriate vessel. A usage rate of PHA® per hectoliter normally is about 10 ml but might vary between 5 – 40 ml according to the desired intensity of aroma. We recommend laboratory scale trials to determine which concentration gives the desired effect. This evaluation can be carried out on bottles of 250 to 500 ml capacity.

On a large scale, PHA® Topnote products are used as a post fermentation addition to finished beer, where 100% utilization is feasible. PHA® Topnote products are lightstable and therefore can be used to introduce hop aroma into a beer brewed using exclusively downstream products such as Tetrahop Gold® and Redihop®. These products may be added without prior dilution to beer either before or after the final filtration preferably by metered injection into a turbulent beer stream during transfer. They can also be added to bright beer without any increase in haze or deterioration in foam stability. If possible the pump should be adjusted to deliver the PHA® over approx. 95% of the total transfer time.

**Trial Guide:**

We recommend benchtop trials to determine which concentration gives the desired effect. To get a better initial understanding for the effect of individual PHA® products and the required dose rate, we recommend dosing directly into a glass of beer. For more accurate results, we suggest following this up with dosing into bottles as explained below. The rate for initial tasting trials should be approximately 10 mL/hL of the PHA® as supplied. PHA® products can be dosed directly using a micropipette or syringe. For example, a 330 mL bottle, a 33µL amount of PHA® gives a dose rate equivalent to 10mL/hL. Chill the beer to normal drinking temperature. Open and introduce the required volume of PHA® in the headspace of the beer bottle and reclose the bottle. Invert the bottle several times to ensure mixing and chill again for at least two hours before opening and tasting.

**Special properties of PHA®:**

The PHA® products have the following properties:

- Natural: 100% derived from hops by physical processes.
- Fully soluble: utilisation is 100% because of full solubility in beverages.
- No negative impact on beer quality: Do not increase beer haze or reduce beer foam stability.
- Easy handling: Provided as standardised solution for direct dosing.
- Light stability: free of hop  $\alpha$ -acids; can be used with any packaging type.
- Ideal for brand diversification: differentiate existing products or create new ones.

**Packaging:**

The standard package size of PHA® is 1 and 5 l aluminium flask. Larger package units are available on request.

**Storage and shelf life:**

PHA® products are stable in unopened containers for at least 24 months. Store at 0-20 °C (32-68 °F) in high-grade stainless steel, glass, aluminum or lacquered steel drums.

**Safety:**

Please refer to our SDS which can be downloaded on our website.

**Technical Support:**

We will be pleased to offer help and advice on the use of PHA® in brewing/soft drink production.