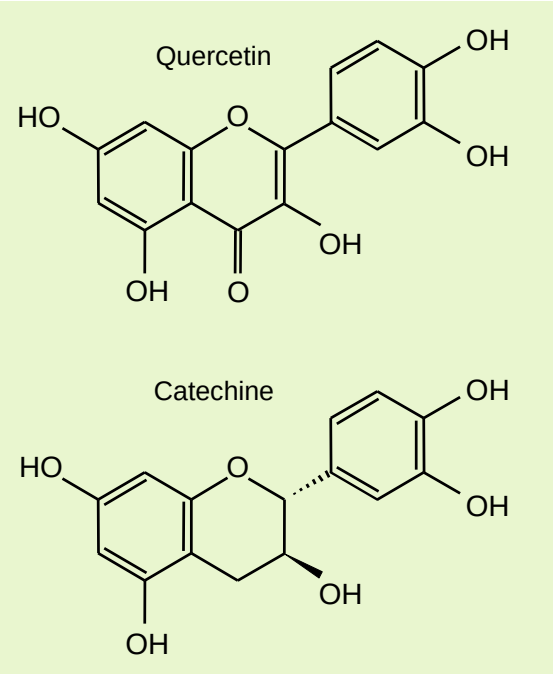
Polyphenol-Rich Hop Pellets

❖ Overview

- **Polyphenol-Rich Hop Pellets** are a kettle-added hop product rich in a range of hop polyphenols, providing some hop aroma but minimal bitterness.
- **Polyphenol-Rich Hop Pellets** can be used to provide additional polyphenols where high levels of pure starch or sugar adjuncts are used, such that insufficient protein coagulation and precipitation occur during the brewing process.
- Added late in the kettle boil **Polyphenol-Rich Hop Pellets** can release glycosidically-bound hop oils providing a pleasant hop character.



❖ Specification

- **Description:** Cylindrical pellets made from de-bittered, compressed hop powder
- **Consistency:** A solid which normally breaks up into a powder
- **Color:** Typically pale yellow-green
- **Alpha acid:** Typically < 0.5 % α-acids
- **Beta acid:** Typically < 0.2 % β-acids
- **Hop oils:** Typically < 0.1 %
- **Moisture:** Typically 7 – 9 %

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❖ Properties

❑ Appearance

Pale yellow-green, pellets approximately 6 mm x 15 – 20 mm in size (diameter x length); pellets should be smooth surfaced.

❑ Flavor

Polyphenol-Rich Hop Pellets produce minimal bitter flavor however it has been shown that the hard resins and polyphenols, contained within the pellets, contribute to improved mouth-feel and overall beer flavor. Key flavor components (e.g. linalool) released from hop glycosides can also produce a pleasant hoppy character.

❑ Quality

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

❖ Packaging

Polyphenol-Rich Hop Pellets are normally packed in laminated polythene / metalized polyester foils within cartons either as 'hard' packs under vacuum or as 'soft' packs under inert gas (N_2 or CO_2) at atmospheric pressure.

Pack sizes range from 2 kg (4.5 lbs) to 150 kg (330 lbs). Normal pack size in the US is 20 kgs (44 lbs).

❖ Product Use

Polyphenol-Rich Hop Pellets are used to supplement the polyphenols derived from malt and hops to ensure sufficient precipitation of undesirable proteins, thereby helping to ensure good physical stability.

❑ Dosage

The quantity of pellets to be added must be arrived at empirically by trial and error and will vary depending on mash tun raw materials and other hop products being used. To establish the impact on beer aroma, trial brews are recommended as the quality and quantity of aromatic flavoring components released from the hop glycosides will vary between varieties.

❑ Addition

Polyphenol-Rich Hop Pellets can be manually weighed and added directly into the kettle. Alternatively, owing to their free-flowing nature, the addition of **Polyphenol-Rich Hop Pellets** can be automated with the attendant labor saving benefits.

❑ Storage

Polyphenol-Rich Hop Pellets are best cool stored at < 5°C (41°F). Opened foils / cartons should be used within 24 hours to avoid deterioration.

❑ Best Before Date

Polyphenol-Rich Hop Pellets are stable 2 years from date of production under the recommended storage conditions.

❑ Safety

There are no known serious, health hazards in normal use. If dust is generated, it is advisable to wear a dust mask. Hop pellets are a combustible material.

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

❖ Analytical Methods

❑ Concentration of α- and β-acids

Residual α- and β-acids can be measured by any of the following:

- ASBC Spectrophotometric method (Hops-6) - (α- and β-acids)
- IOB method 6.4 - (α-acid)
- EBC method 7.5 - (α-acid)
- By HPLC, using the current ICE standard, according to the EBC 7.7 method, IOB method 6.5 or the ASBC method (Hops-14) - (α- and β-acids)

❑ Concentration of Hop oils

Residual hop oil concentration can be measured by the following methods:

- IOB 6.3 method
- ASBC hops-13

❑ Concentration Hop polyphenols:

Polyphenols can be measured by:

- Total polyphenols by the method EBC (Harris and Ricketts).
- Low molecular polyphenols by HPLC using the relevant pure substances as external calibration standards

❖ 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

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