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Hard Seltzer Overview

October 20th, 2020

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What is Hard Seltzer?

- Hard seltzers are generally made from sucrose or dextrose or a combination of brewers malted barley and one of the two.
- 100-110~ calories, 4.5-5% ABV, “sparkling water”
- Flavored Malt Beverage or Beer? – FMB’s must contain 25% malted barley and 7.5lbs of hops per 100/ BBLs.
- Currently the FDA or TTB does not recognize hard seltzer as a new category so any limitations for beer and beer raw materials are currently applicable for seltzer.
- Other types of “Hard Seltzers” – Wine or Spirit based

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Hard Seltzer Production Process

- The sugar base is blended into hot water to reach the desired gravity, then boiled for 10-15~ minutes.
- Nutrients are either added at the end of the boil, with 5~minutes to go, or right at the start of fermentation post chilling.
- The base is chilled and oxygenated/ aerated at the same rate you would for a beer based on the same gravity.
- The base is then inoculated with yeast
- Fermentation tank temperature is set to 70-75°F/ 20-22°C.
- The base is fermented as low as possible; often negative gravity is desired. Fermentation can range from 3-10 days depending in your fermentation kinetics.
- The fermented seltzer is then crash chilled for 24-48 hours.
- The chilled seltzer is then filtered/ centrifuged and often times treated or filtered with carbon to achieve a desired neutral flavor and color profile.
- If high gravity fermenting, the seltzer is blended with deaerated water to achieve desired ABV. When desired ABV has been adjusted for, flavors and colorings may be blended in as well as other agents for stabilization.
- Prior to packaging, C02 volumes may be adjusted to achieve desired volumes between 2.6 - 3.0.

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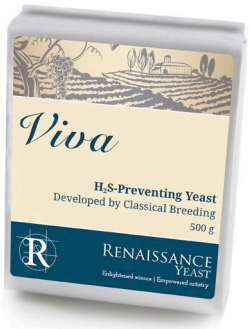
Yeast for Hard Seltzer

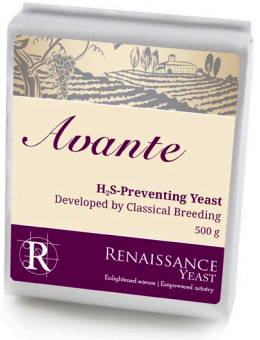
We recommend using Renaissance Yeast Viva, Avante or Chr. Hansen Merit dosed at 2lbs/1000gal or 28g per US Beer BBL.



Renaissance Yeast Viva
- *Saccharomyces cerevisiae bayanus*

Tolerant of high alcohols (up to 16% v/v)
- Rapid and clean fermenter

Able to ferment at low temperature
- No H2S production
- Killer Status – Active



Renaissance Yeast Avante
- *Saccharomyces cerevisiae*
- Tolerant of high alcohols (up to 17% v/v)
- No H2S production
- Killer Status – Neutral

Chr. Hansen Merit
- *Saccharomyces cerevisiae*
- Tolerant of high alcohols (up to 17% v/v)
- Strong all around fermenter
- Restarting stuck fermentations
- Low SO2 and H2S production
- Killer Status – Active

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Yeast Rehydration & Reactivation

- Take special care in preparing active dry yeast cells for alcoholic fermentation
- Two important steps:
  1. Rehydration to allow the dry cells to get hydrated
  2. Reactivation to allow the cells to start growth
- If not done correctly, sluggish or stuck fermentation can occur

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Yeast Rehydration & Reactivation

- Use a clean/ sanitized bucket
- Add yeast at a rate of 2lb/ 1000 gallons to unchlorinated tap water in a 1:10 mixture for 10 minutes prior to dosing into fermenter.
- Water temp should be kept between 75-85F. Gentle mixing should be utilized to prevent clumping and speed up rehydration process.
- Watch this video for more info: https://youtu.be/wefPAyKbflE

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Nutrient Recommendations

Sucrose, dextrose and maltose are extremely nutrient deprived and thus require a complex blend of nutrients for a successful fermentation and to achieve desirable fermentation profile. Nutrient dosing levels is dependent upon the starting gravity and the time desired to complete fermentation. Here are a number of options to consider:

Micro***Essentials*** Powder – A powdered form of yeast nutrient supplying a rich mixture of organic and inorganic nitrogen, vitamins and trace minerals.

Micro***Essentials*** Powder + DAP – DAP can be supplemented in conjunction with ME Powder.

Micro***Essentials*** Complete TR – Time-release nutrient supplying a rich mixture of organic and inorganic nitrogen, vitamins and trace minerals.

Micro***Essentials*** Prime – 100% organic nitrogen source and complex mixture of vitamins and minerals. DAP Free.

Micro***Essentials*** Trace – Pure vitamin and mineral blend for yeast.

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Nutrient Recommendations

Starting Gravity: 22-27°P

Nutrient Dosing: 60% at inoculation, 40% at 48 hrs.

Option #1 – 562g per US Beer BBL(40lbs/1000gal) of Micro***Essentials*** Powder

Option #2 – 562g per US Beer BBL(40lbs/1000gal) of Micro***Essentials*** Complete TR (Dose 100% at inoculation)

Option #3 – 470-587g per US Beer BBL of Micro***Essentials*** Prime (34-42lbs/1000gal)

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Regulatory Compliance

Currently the FDA or TTB does not recognize hard seltzer as a new category so any limitations for beer and beer raw materials are currently applicable for seltzer.

Contact your local regulatory agency for specific guidelines.

Filtration Recommendations

For hard seltzer, a neutral base is desired prior to flavor addition. A neutral base is typically:

- Clear
- Colorless
- Flavorless
- Odorless

How do you get a neutral base? Filtration!

Filtration Recommendations

To achieve a clear product:

- A coarse filtration step should be done to remove solids such as yeast prior to filtration with carbon media.
- Do you need a coarse filtration step prior to filtering with carbon media? YES!
  - Skipping the coarse filtration step can lead to surface blinding of expensive carbon media.
  - Active carbon will not be fully utilized and wasted!

Filtration Recommendations

Filter media to help achieve a clear product:

- A loose filter media grade such as the **CSF-XC** filter sheets is recommended for a plate and frame filter.
  - **Cellu-Stack®** lenticular filters in a coarse grade are also available for lenticular housings.
- If loose carbon is used, a polish filtration step is necessary to remove the loose carbon.
  - The **CSF-SP** media can be used for a plate and frame.
  - A polish grade **Cellu-Stack** for lenticular housings is suggested.

Filtration Recommendations

To achieve a colorless, flavorless and odorless product:

- Filter media that is impregnated with active carbon is used.
- Carbon media is not selective!
  - All forms of carbon will remove color, flavor, and odor to some degree.
- Performance will depend on parameters such as contact time (flow rate), active carbon surface area (sheet/stack size), and internal specifications for color, flavor and odor.

Filtration Recommendations

Carbac® media to help achieve a colorless, flavorless and odorless product:

- Carbac media is offered in several grades.
  - The **1640 HCX** grade is the best choice for all around color, odor, and flavor removal.*
  - Available in both filter sheet and lenticular formats.
  - For more targeted color removal, the **1640 CRM** or**1640 CRX** grade is recommended.*

**Based on internal studies*

Filtration Recommendations

Scenario #1:

Desired Outcome: Clear, odorless, neutral finished product

- Coarse Filtration: **CSF-XC** filter sheets or **1925SD** lenticular cartridge filter
- Carbon Filtration: **1640 HCX** Carbac media.

Scenario #2

Desired Outcome: Color removal, flavor and odor not as big of an issue

- Coarse Filtration: **CSF-XC** filter sheets or **1925SD** lenticular cartridge filter
- Carbon Filtration: For more targeted color removal using filter sheets, the **1640 CRX** Carbac media is recommended. For more targeted color removal using lenticular modules, **1640 CRM** Carbac media is recommended.

Enzymes

Enzymes can be used to promote faster processing and higher throughputs for hard seltzer.

- Diacetyl rest can be shortened or eliminated with the use of an alpha-acetolactate decarboxylase (ALDC).
- DuPont's **ALPHALASE® ADVANCE 4000** is dosed at 8ml/ US Beer BBL at inoculation. Dosage rates can vary depending on processing parameters such as pH and temperature.

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Enzymes

Pectinases are suggested for applications of natural fruit juice or puree flavoring to seltzers.

- **BioSelect®** granular pectinases are available in 250g packs for smaller to medium volume applications.
- DuPont **PEKTOZYME™** liquid pectinases are available in 20Kg pails for larger volume applications.
- Dose rate will depend on the type of fruit and processing conditions such as contact time, pH, and temperature.

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Denwel Water Dearation Cold Column

- The Deaeration unit is designed for efficient and reliable deaeration of water under atmospheric conditions.
- The column is filled with structured packing, enabling a large internal surface which strips out the oxygen to levels below 10 ppb.
- DAW is one of the most useful utilities in the brewery…once a brewery has a reliable source of DAW they will wonder how they ever got by without it!
- The DWDxxxC comes in a range of available sizes to handle any production scale, from 4-852 bbl/h production.
- Standard options include: O2 analyzer, ice water or glycol cooling, pre-carbonation and UV disinfection

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Denwel Inline Gas Injection

- Gas is injected into the beverage through the DENWEL Injector, which splits the gas into micro bubbles.
- The most efficient and instant dissolution of gas is achieved with only minimal pressure drop and no gas or flavor loss.
- No static mixer, sinter candle or tank with stone is required.
- Designed for CIP, no parts of the Injector have to be removed for sanitation. Available in manual, semi manual and fully auto units.
- Manual (cart mounted) unit sized from 9-85 bbl/h
- Semi-Auto (ratio controlled) unit sized from 18-852 bbl/h
- Full-Auto (analyzer contolled) unit sized from 18-852 bbl/h

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Denwel Carbo-Blender

- The Carboblender provides precise and reliable Extract/Alcohol concentration adjustment and carbonation of Beer or Hard Seltzer at one process step.
- Inline process analytics guarantees very high accuracy.
- A great piece of equipment to add along with a DAW system for the creation of seltzer from alcohol base, can also be used for dilution of beer to “sales gravity”
- Available in Semi or Full Automatic versions
- Sized from 18-852 bbl/hr
- Semi-Automatic (Ratio control) unit
- Full-Automatic (analyzer control) unit

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Denwel Inline Dosing

- The Compact Dosing Unit provides continuous dosing of one, or more additives into beverage, water or cleaning solution.
- A precise dosing rate is controlled by process analytics or volume / mass flow measurement.
- Additives are dosed from homogenizing vessels.
- Perfect for inline dosing of liquid or dry flavors or ingredients to beer or seltzer
- As number and type of ingredient(s) to be dosed can vary, each system is basically a customized piece of equipment
- For production volumes of 26-426bbl/h

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Denwel Flash Pasteurizer

- The Flash Pasteurization Automatic Unit is designed for safe, precise and reliable heating of beverages.
- While reducing pathogenic microorganisms, uniform and gentle treatment is applied to maintain the original taste and appearance of the beverage.
- Full automatic only, pasteurization is too important to be left to chance
- Available in a broad range of sizes to accommodate production from 4-213 bbl/h
- Buffer tanks are available as an option

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Denwel "Seltzer System"

"A business plan that arrives in a sea container…" –Tom Mondor

- This is a ***NEW*** combination equipment skid, which includes water deaeration, ingredient dosing, blending and carbonation functions and is capable of creating "ready to drink" beverages in semi- automatic mode.
- The Blending Skid Unit is proposed in the following configuration: Water Deaeration Column Cold with Pre-carbonation, Dosing Compact Unit and Carboblender Semi-automatic unit.
- Standardized design and sizes are in the works
- Can quote now if desired production/flow rates can be determined
- Each is essentially a custom piece of equipment, as number and type of flavors/ingredients to be dosed can vary

Questions?