



Rockwall Brewers Association

All Grain Brewing Fundamentals

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Purpose of this class-

Introduction to All Grain Brewing from a high level

All Grain Brewing Fundamentals

Malted Grain: what is it? Why do we care?
How do we use it?



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Malted Grain is grain that was hydrated until it is about to sprout, then kilned to various degrees to lock in the starches/sugars and stop the sprouting process.

- depending on what type of product they are making, it will be kilned at various temperatures and length of time (ex. Pilsner, Roasted Barley, crystal 60°, etc)

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Malted grain has enzymes inside that help the plant to convert the starch into sugar as food for the plant.

We use these enzymes to convert the starch inside the malt to Maltose and other sugars brewers yeast will eat during fermentation during a process called mashing.

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There are several different types of enzymes that are active at different temperatures. These different enzymes will create different types of sugar.

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The two main enzymes we care about are alpha amylase and beta amylase.

- Beta amylase active at 131° to 150°
- Alpha amylase active at 154° to 162°

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In General –

Beta will produce a more fermentable sugar (maltose) that is easy for Sach to eat.

Alpha will produce some higher chained sugars normal Sach can't eat.

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Simple Brewing Math:

Points per Gallon method=

Total ppg(-efficiency correction)/water gallons = gravity

Base malt = 36 ppg

Crystal/Carmel = 24 ppg

Example: 10lb pilsner + .5lb crystal 20° = 360+12 = 372 points

Efficiency is 75% on this system so 372*.75 = 279 points (we expect to get)

279 ppg / 6 gallons finishing volume = 46.5

SG calculated should be 1.046

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Types of Mashing

- Single infusion mash : one temp for entire mash
- Step mash : different rest temp throughout like a stair step
- Decoction mash : most often combined with step mash, part of grain is scooped out and boiled for a time then put back in for sparge.

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Helpful rest temperatures:

111° to 113° Ferulic acid rest (helps get more clove flavor in wheat beers) think German Style Hef.

113° to 131° Protein rest (keep these short, Gordon Strong recommends 130 to 131 for about 10 min.)

140° to 162° saccharification rest (main mash step)

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With Modern Malt conversion happens quickly, normally about 20 min, however, I always use the historical time of 1 hr to make sure I've obtained full conversion.

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Sparging –

Rinsing the grains after you have mashed to collect all your wort in boil kettle

Types – Batch and Fly

With batch you run off, dump your water in there let stand for 5 to 10 min, then run off. (tip, you can split this into 2 batches to help efficiency)

With fly you run off and pour your sparge water in at the same rate, keeping a steady level of water on top of the grain bed.

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Tips:

Go slow, this should be at least 30 min.

Your water should be between 165° and 170°

If you have a large volume of water beneath your false bottom, do not count this in the water to grist ratio, but it will count in the final volume of pre-boiled wort.

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Water -

Water becomes very important when you brew all-grain. This is related to PH of the mash and mineral content of the water.

At a minimum, you need to use filtered water, do not use untreated or filtered tap water. The chlorine, and chloramines in the water can cause off-flavors.

If you use R/O water, you need to use an acid in the sparge water to avoid astringency issues and brewing salts to correct the PH of the mash. (I use Gordon Strong's book to determine amounts.)

Don't use 100% spring water, it might work for certain styles but will cause issues in other styles your trying to make.

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Water to Grist Ratio-

This is the ratio between the grain and the strike water you have in the mash (or mash thickness). Normally you want to stay between 1.25 and 2 quarts/lb of grain. (ex. 11 lb grain and 4 ga water would be $16/11 = 1.45$)

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Basic equipment – what do I need for all grain?

1. Mash Tun – large enough to hold your grain + water
2. False bottom or manifold for sparging/runoff

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Mash Ton - Decide what size batches and gravity you want to make most often or the largest batch/gravity you want the ability to make and build your mash ton around this.

Note: a ball valve at the bottom of your mash ton will make life a lot easier

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Options: Cooler, stainless kettle, converted keg



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False bottom – after you decide on your mash tun, choose your false bottom.



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Options: stainless braid manifold, copper manifold with slits cut in it, pre-fab stainless perforated, brew in a bag

Note: If you go with the braid or copper manifold batch sparge can sometimes be best for efficiency due to channeling issues.

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Types of systems:

1. The victory cooler
2. HERMS
3. RIMS

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The Victory Cooler

Pros – cheap, about \$50, light for easy storage, pre-fab accessories

Cons – much harder to step mash, they do wear out over time, hard to re-circulate and maintain mash temp

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The HERMs – heat exchange re-circulation mash system

- Wort is pumped through a coil submerged in hot water

Pros – very gentle heating, no chance of scorching grains or wort, easier to step mash, great clarity and efficiency

Cons – Expensive/difficult to fabricate, pumps required

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The RIMs – re-circulation infusion mash system

- Wort is re-circulated with a pump and heated directly to maintain mash temp

Pros – easier to step mash, great clarity and efficiency, cheaper sometimes than HERMs, can be done in fewer number of vessels

Cons – care must be taken to not scorch or burn grains/wort, pumps required