

Partial Mash Brewing

Basic Procedure

- Pale Malt is steeped in warm water ('mashed') to convert the starchy portion of the barleycorn to fermentable sugars.
- When the conversion is complete, the mashing water ('wort') is drained off the grains and recirculated through the bed of mashed grains to make it *relatively* clear. Warm water is added to the top of the grain bed as the clearer wort is drawn off the bottom ('sparging').
- The wort is collected and water is added to it to equal the amount required for a 'full-wort' boil – approximately six gallons for a five gallon batch of beer. This is heated and as it approaches boiling the malt extract is added.
- During the boil hops are added at specific intervals and in specific quantities. Hops added at the beginning of the boil influence bitterness in the finished beer. Hops added at the end of the boil will influence hop flavor and aroma.
- During the boil protein masses coagulate and form globs and sheets ('hot break'), which will help clarify the finished beer.
- At the end of the boil, the wort is cooled as rapidly as possible. This rapid cooling causes another precipitation of protein globs ('cold break'). *The cooled wort is highly susceptible to bacterial infections, and so sanitary methods must be employed in earnest from this point on.*
- Stirring the cooled wort ('whirlpooling') causes accumulated debris – hops, cold break and hot break, to mound up in the center of the boiler (or whirlpool vessel, if you use a counter-flow chiller). This allows the homebrewer to drain off the *relatively* clear wort to the fermenter.
- During the transfer to the fermenter, the cool wort is aerated. The yeast is introduced to the wort and the fermenter is sealed with an airlock. Fermentation begins.
- *Brewers make wort – yeast makes beer.*

Step-by-step Partial Mashing

1. Make your yeast starter, if you need to increase your amount of yeast. You only need to do this step if you are working from a 50-ml 'smackpack' or a culture obtained from a bottle.
2. Prepare your brewing water, if your water is chlorinated, has a lot of dissolved iron, or has some other known problem. If you are on well water, and you like the way your water tastes, you will be able to make good beer with it, *but you may not be able to make every beer without treating it.*
3. Crush your brewing grains.
4. Mash your grains. Use 1.25 quarts of water per pound of grain. The temperature of the water should be 170°F. This will bring your mash to a rest temperature of 150°F to 152°F. Maintain the mash temperature until you have a satisfactory result from an iodine test (see box), about one or two hours.
5. Sparge with an amount of water equal to your mash water. Sparge water should be 160°F to 170°F. *Sparge until you have six gallons in the boiler (for a five gallon batch).*
6. Start heating your collected wort and add your malt extract. Stir the heated pot to prevent scorching (and darkening).
7. When your wort starts boiling, add your hops according to the *hop schedule*. This will be specified in the recipe.
8. At the end of the boil cool the wort as rapidly as possible (see box). Keep it covered to protect it from dirt, dust, dog hair etc.
9. Whirlpool your wort with a **sanitized** spoon and transfer it to a **sanitized** fermenter. Cap the fermenter with a **sanitized** airlock and a **sanitized** rubber bung.
10. Pitch your yeast directly into the cooled wort.
11. If you didn't get enough air in your wort during the transfer, gently rock the fermenter to splash the cooled wort. A couple of minutes every hour for the first three hours works very well.
12. Within twenty-four hours the wort will start foaming. It is generally best to transfer to a *secondary fermenter* after one week, leaving behind any accumulated sediment. Let the beer *fall clear* in the secondary.

The Iodine Test –

The Iodine Test is based on a curious feature of iodine that causes it to turn purple in the presence of starch. A brewer takes a small sample of wort and places it on a white plate – usually a saucer. Adding a drop of iodine, the sample is examined for a telltale purple color at the edge of the iodine drop and the wort sample. Depending on the amount of starch present in the wort sample, there may be no color change, a faint purple tint, a reddish tint or a dark purple color. The color change can be difficult to detect in dark worts. **Warning: Iodine is poisonous. Discard your test sample – do not return it to the mash kettle. Take care not to spill iodine in your mash. Rinse any implements that come in contact with iodine thoroughly**

According to Greg Noonan in New Brewing Lager Beer, 1996, Brewers Publications:

Iodine test results indicate the following:

Blue-black: Native starches (Amylose).

Deep mahogany/red-brown: amylose fragments and large limit a-dextrin.

Faint mahogany/violet-reddish: simple a-limit dextrin. This is desirable in some beers – dextrins add mouth-feel and body.

“... neither, however, should rich beers be saccharified to the point that a negative iodine reaction occurs. A faint mahogany-to-reddish reaction indicates an acceptable extract composition for these beers.”; pg. 143, New Brewing Lager Beer.

Brown Ale – Partial Mash

Grains: 3.00 lbs. Pale Malt
.50 lbs. Crystal or Caramel Malt
.25 lbs. Chocolate Malt

Extract: 3.3 lbs. Dry Malt Extract, Pale

Hops: 2 oz. Fuggles Alpha Acid 4.9%
1 oz. @ 60 min. from end of boil
1 oz. @ 45 min. from end of boil

Original Gravity: 1.048 - 1.051

Terminal: 1.007 - 1.010

Yeast: Dry *Danstar Nottingham (Neutral)*
Danstar Windsor (Estery)

Liquid *Wyeast 1187 Ringwood (Estery)*
Wyeast 1056 American (Neutral)
White Labs WLP005 British (Est.)

Wort Cooling –

Rapid cooling of the boiled wort has several benefits. Boiling hot wort is very susceptible to oxidation. Wort at 210°F combines with oxygen rapidly with some highly disagreeable tasting results. Rapid cooling also creates a precipitation of haze forming proteins, so you will have a cleaner looking and cleaner tasting beer. Rapid cooling also shortens the time before you can pitch your yeast at their optimum temperature, so there is less time for spoiling bacteria to infect your new wort.

Wort Chilling Methods –

Immersion Wort Chiller. Water runs through a copper coil immersed in your boiling hot wort.

The chiller is connected to a sink or hose tap. Usually costs about \$35-\$50 and takes about 30-45 minutes to chill 5 gallons to about 75°F.

Counter Flow Chiller –

There are various designs, but the most common works like this: hot wort drains out of the boiler into a whirlpool bucket (or tank) through a copper coil. The coil itself is running through a garden hose, through which cold water is flowing in the opposite direction. Usually costs about \$50-\$100 and cools 5 gallons to 70°F in ten minutes. You must have a boiler with a tap in the bottom.

Big Ice Water Bath –

A definite element of risk is involved in this. Only works with up to 5.5 gallons of wort. The entire boiler is immersed into a tub filled with a mixture of cold water, snow and ice. Moving a brew pot full of scalding hot wort can leave you with permanent scars or worse. This is very low cost and cools 5 gallons of wort to 75°F in 30-60 minutes.

American Brown: Use a neutral yeast and ferment on the low end of the yeast's preferred fermentation temperature range. Add 1 oz. of Willamette hops to the primary fermenter.

English Brown: Use an estery yeast and ferment on the high temperature end of the yeast's preferred temperature range.

Old English Style: Use 2-1/2 lbs. Pale malt and add ½ lb. brown sugar to the boil. Use Danstar Manchester or an estery yeast. Ferment on the warmer side of the preferred range.

Partial Mash Recipes

British Style Bitter

This simple recipe will produce a beer with a golden amber color and the aroma and taste of Kent Goldings. It is a traditional formulation of the British Bitter and will have a light maltiness balanced by a slight bitterness. It will be subtle, and depending on the yeast selected, can display a very complex flavor profile.

Grains: 3.00 lbs. Pale Malt
.50 lbs. Crystal Malt

Extract: 3.3 lbs. Dry Malt Extract, Pale

Hops: 3 oz. Kent Goldings Alpha Acid 4.9%
1 oz. @ 60 min. from end of boil
1 oz. @ 45 min. from end of boil
1/2 oz. @ 30 min. from end of boil
1/2 oz. @ 5 min. from end of boil

Original Gravity: 1.046 - 1.050
Terminal: 1.008 - 1.010

Yeast: Dry *Danstar Nottingham (Neutral)*
Danstar Windsor (Estery)
Liquid *Wyeast 1187 Ringwood (Estery)*
Wyeast 1335 British (Estery)
White Labs WLP002 British (Est.)
White Labs WLP023 Burton (Est.)

American Pale Ale

If you compare the recipe above with this one you will notice they are remarkably similar. This is intentional. Although American Pale Ales are a distinct style from British Bitters, they will generally have a similar grain bill, unless you want to use imported malts. The differences will be in the hopping rates and the yeast chosen. American Pale Ales can be quite aggressively hopped, hoppier than some British IPA's. American Pale Ales will generally display a far less estery flavor profile than a British ale, and so selection of a neutral tasting yeast is appropriate.

Grains: 3.00 lbs. Pale Malt
.50 lbs. Crystal Malt

American Pale Ale (Cont.)

Extract: 3.3 lbs. Dry Malt Extract, Pale

Hops: 1 oz. Centennial Alpha Acid 8.1%
@ 60 min. from end of boil
2 oz. Cascades Alpha Acid 3.2%
1/2 oz. @ 40 min. from end of boil
1/2 oz. @ 20 min. from end of boil
1/2 oz. @ 5 min. from end of boil
1/2 oz. in the secondary fermenter

Original Gravity: 1.046 - 1.050
Terminal: 1.008 - 1.010

Yeast: Dry *Danstar Nottingham (Neutral)*
Liquid *Wyeast 1056 American (Neut.)*

American Brown Porter

Brown Porters are a Porter sub-style. They are generally not terribly bitter or dry. They display a heavier richness from malt and (in this case) flaked barley. This recipe uses two specialty malts – Special 'B' and Aromatic – which will yield a nutty, toasted grain flavor. This is presented as an American style ale, so the hops and yeast selections are for that style. Expect this to be a rich, dark ale.

Grains: 1.25 lbs 2-Row Pale Malt
0.75 lbs Flaked Barley
0.75 lbs Crystal 60 Lovibond
0.50 lbs Belgian Special 'B'
0.50 lbs Victory or Aromatic
0.50 lbs Chocolate Malt
0.25 lbs Black Malt

Extract: 3.50 lbs Light Dry Malt Extract

Hops: 2 oz. Willamette Alpha Acid 7%
@ 30 min. from end of boil
1 oz. Cascades Alpha Acid 3.2%
@ 10 min. from end of boil

Original Gravity: 1.048 - 1.052
Terminal: 1.010 - 1.012

Yeast: Dry *Danstar Nottingham (Neutral)*
Liquid *Wyeast 1056 American*
White Labs WLP001 Calif Ale
White Labs WLP051 Calif Ale V

Partial Mash Recipes (Cont.)

Oatmeal Stout

Although this is called oatmeal stout, you won't find any oatmeal in this recipe. Use flaked oats from your homebrew supplier instead. The oats add to the mouth feel and head of this black stout.

Grains: 2.00 lbs. Pale 2-Row Malt
.50 lbs. Roasted Barley
1.00 lbs Caramel Malt 130 Lovibond
.75 lbs Flaked Oats
.75 lbs Chocolate Malt
.75 lbs Black Malt

Extract: 5.0 lbs. Dry Malt Extract, Dark

Hops: 1/2 oz. Cascades Alpha Acid 5.5%
And 1/2 oz. Willamette Alpha Acid 6.0%
@ 60 min. from end of boil
1/2 oz. Cascades Alpha Acid 5.5%
@ 30 min. from end of boil
1/2 oz. Willamette Alpha Acid 6.0%
@ 15 min. from end of boil

Original Gravity: 1.060 - 1.065

Terminal: 1.010 - 1.016

Yeast: Dry *Danstar Nottingham (Neutral)*
Liquid *Wyeast 1056 American (Neut.)*

California Common

If you're not familiar with this style, it is a lager fermented at a 'warm' 50° to 55° F. If you are going to try this style and you cannot maintain that temperature then try the Wyeast 1056 and keep your fermenter about 68°F.

This recipe should look familiar if your read the Bitter and Pale Ale recipes above. It is a very simple and produces a red beer, with a foamy head, a light bitterness and the flavor and aroma of Northern Brewer hops.

Grains: 3.00 lbs. Pale 2-Row Malt
.50 lbs. Victory Malt
1.00 lbs Crystal Malt 120 Lovibond

Extract: 3.0 lbs. Dry Malt Extract, Light

California Common (Cont.)

Hops: 1 oz. Northern Brewer Alpha Acid 9.7%
@ 45 min. from end of boil
1 oz. Northern Brewer Alpha Acid 9.7%
@ 2 min. from end of boil

Original Gravity: 1.050 - 1.055

Terminal: 1.009 - 1.015

Yeast: Dry *Danstar Nottingham (Neutral)*
Liquid *Wyeast 2112 California Lager*
Wyeast 1056 American (Neut.)

Spiced Stout

Spiced beers are normally reserved for the holidays, but when you have a good one, why wait until then? This recipe is for a black and bitter stout with the flavor of nutmeg and cinnamon, and a contribution from 1-1/2 pounds of Maple Syrup. It is a higher gravity beer and you must stir it during the boil to prevent scorching.

Grains: 4.00 lbs. Pale 2-Row Malt
1.00 lbs Crystal Malt 80 Lovibond
1.00 lbs Dextrine Malt
.50 lbs Roasted Barley
.50 lbs Black Malt

Extract: 3.3 lbs. Liquid Malt Extract, Dark
2.0 lbs. Dry Malt Extract, Dark
1.5 lbs. Maple Syrup

Hops: 2 oz. Centennial Alpha Acid 9.7%
@ 60 min. from end of boil

Spices: 2 sticks of Cinnamon
@ 10 min. from end of boil
1 tablespoon nutmeg
@ 10 min from end of boil

Original Gravity: 1.068 - 1.072

Terminal: 1.015 - 1.018

Yeast: Dry *Danstar Nottingham (Neutral)*
Liquid *White Labs WLP005 British (Est.)*