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**Sunday 9:00am - 9:00pm**

**These instructions cover:**

- ***Mashing* vs. *Steeping***
- **Mashing Methods & Equipment**
- **Intermediate tips and tricks**

# All Grain Brew-in-a-Bag Instructions

Welcome to the world of all grain home-brewed beer! What follows are instructions for upgrading your brewing skills to include all grain recipes. These instructions assume that you are already familiar with boiling wort, sanitizing equipment, fermentation, and bottling procedure. If it's been awhile, or you're new to brewing, we suggest you also pick up our "Beginning Brewer's Instructions" which cover these topics. Like the "Beginning Instructions," the methods outlined below are drawn from decades of home-brewing experience, as well as published sources such as Charlie Papazian's *The Joy of Homebrewing* and John Palmer's *How to Brew.*

## Brewing in a Bag (BIAB)

**Going "All Grain":** Making the transition to all grain recipes can seem like a daunting task. But don't let all the mash-lauter tuns, hot liquor tanks, sparge arms, refractometers and efficiency percentages scare you off. You can make the transition slowly and without emptying your wallet on a bunch equipment that you've never used before. These instructions will go through the "Brew-in-a-Bag" method of all grain brewing which requires only 3 upgrades in equipment: a bigger pot, a bigger steeping bag and a wort chiller.

Assuming that you are a practiced home brewer already, you've probably dealt a fair deal with extract. When you buy extract, you're buying condensed wort. A malter has taken a batch of milled, malted barley, soaked it in water long enough for the enzymes to extract all the available sugars out of the grain, and then reduced it to a powder or syrup. We home brewers buy it, add it to water, boil it with hops, cool it down, ferment it, bottle it, and consume it. The difference when you brew with all grain is that you will be doing the sugar extraction (the "mash") yourself.

Examples:
-Crystal 10L – 120L
-Carapils
-Chocolate
-Roasted barley

**"Steeping" vs. "Mashing":** As a practiced home brewer, you may have a working knowledge of "*steeping grains*". Unlike using "amber" or "dark" malt extracts, whose actual ingredients are predetermined, steeping grains allow us to use a light, base extract and then choose specific grains to pinpoint our malt profile to our exact needs. Grains that are meant to be "steeped" are more heavily kilned or roasted than the grains meant for "mashing". This modifies the grains so that they have less fermentable sugars, and more sweet, biscuity, roasty, or other malty flavors. When you steep these specialty grains, it's just like it sounds: you are soaking them in hot water to absorb their flavor, like making a large batch of malt tea. Very little fermentable sugar (and thus, very little alcohol) will be created by adding steeping grains, which is why you use extract to provide your wort with fermentability. What steeping grains provide are color, density and malt flavor.

"*Base malts*" contain starch, which must go through a conversion process to become fermentable sugar; we call this process "mashing". During this process, enzymes in the grain will work to break the complex starches down into fermentable sugars, which will be transformed into alcohol by the yeast during fermentation. In order to work properly, the grains must be soaked in water for a longer period of time and at a narrower range of temperatures than you would if you were just "steeping" them. Once complete, you will have created the same fermentable, sweet wort that you get when you dissolve malt extract into water.

Examples:
-US 2-Row
-German Pilsner
-Maris Otter
-Belgian Pale

**Equipment:** If you have done any amount of research, you will have seen some amazing home brewing systems out there complete with multiple tiers, rotating sparge arms and pump-driven whirlpools. We're not going to worry about that. We can create the same product with one pot, a little ingenuity, and a little more lifting. The only difference between this "low-tech" solution and the "Continuous Sparge" setup shown below, is that it is less efficient. This means that the BIAB-no-sparge methods described below often need more grain to achieve the same gravity in a 5 gal batch.


## A Game of Volumes

- **"Efficiency":** this is the percent that measures how much of the available starch in a malt that you are able to convert into sugar and extract with your mash.
- **"Target Batch Volume":** this is the total volume you want to end up in your fermentor.
- **"Target Boil Volume":** this is the volume of your boil. When you're brewing with extract, typically you boil a concentrated wort of 3-4 gallons and then top it up to 5 gallons in your fermentor. With all grain brewing, you will be starting with more and boil *down* to your target volume. So, your boil volume is going to be between 2 and 2 ½ gallons more than your Target Batch Volume due to two sources of loss:
  - **Evaporation:** during the boil you will lose 8-10% of your volume to steam.
  - **Trub:** (pronounced */troob/*) after the boil is complete, there will be a certain amount of hop sediment and break material (proteins that separate from the wort during the boil and cool down) in the effort to leave this crud behind you will lose about a gallon.
- Most recipes assume that you are operating a brewhouse at around 80% efficiency and that you will be boiling about 7 gallons of wort to achieve a target batch volume of 5 gallons.
  - Since BIAB is generally about 65% efficient, you'll need to add 15-20% more base malt to hit your target original gravity

**The Process**

| General Principles of Mashing |
|---|
| 1qt mash water per lb grain |
| ½ qt 170F sparge water per lb of grain |
| Mash temp between 148F and 158F |

1) As usual all grains should first be milled so that the starches inside will be exposed to the mash water.
2) Measure out your water into your kettle.
    a. The amount of water will depend on the amount of grain in your recipe. You're looking for a ratio of about 1 quart water for every pound of grain (*example:* for 10 lbs of grain you would add 10 qts or 2.5 gal of water)
3) Bring the water in your kettle up to your strike temperature (the temp at which you will add your grains)
    a. Your strike temperature should be 10-12 degrees above your target mash temperature. So if you're target temperature is 155F you should have a strike temperature of 165-68F
    b. *TIP:* It's easier to bring the temperature down a couple degrees by adding a couple ice cubes, than it is to bring it up a few degrees by turning the heat back on. So, consider erring on the side of too hot when calculating the mash temperature. Just remember, mash temperatures higher than 160 could denature the enzymes and your mash will be cut short.
4) If your steeping bag is big enough, place it in your pot so the edges wrap around the lip of your kettle. You can secure it with binder clips or something similar.

5) Slowly add your grains into the mash water while constantly stirring, evenly mixing the grain and breaking apart clumpy, dough-balls. Wetting every ounce of malt is paramount to a good mash.
6) When all grain is added, check the temperature. Some recipes will give you a target temperature somewhere between 148F and 158F.
    a. Higher temperatures will make a less fermentable, maltier product while lower temperatures will make a more fermentable and drier beer.
    b. When in doubt, go for a middle ground of about 153F.
7) Once your mash is at the correct temperature, put your lid on the pot and let the enzymes go to work.
    a. Since your kettle isn't very insulated, it may not hold your mash temp for the full hour. Check the temperature every 20 min if you're in an enclosed area with a stable ambient temperature, every 10 min if you're outside and it's windy.
    b. If the temperature falls below 148F, turn on your heat and stir constantly to avoid overheating the grain until you reach your target mash temp again. Don't allow the nylon bag to have contact with the bottom of the pot.
8) After an hour, your mash should be complete, and you now need to remove the grain before starting the boil
    a. Pull the grain bag out of the wort and allow it to drain into the pot
        i. Try not to squeeze the bag as this can extract unwanted tannins and astringency
        ii. It can take some time for the bag to drain, so a kitchen strainer can be handy at this stage to hold the weight of the wet grain while it drains.
    b. By adding a sparge step at this point, you can increase your extraction efficiency
        i. Pour 168F water over your straining bag to rinse the sweet wort retained in your straining bag
9) Since we are aiming for a boil volume of about 7.5 gallons to compensate for the amount we'll lose due to evaporation and the trub, you'll have to top up your kettle to 7.5 gallons.
    a. For maximum efficiency, continue to rinse your grain until you reach your boil volume. If you don't have the kitchen strainer or you've already compensated for low efficiency with more base malt, you can top up your kettle to the desired volume with water.
10) You will now perform the boil as usual. For more instructions on the boil, please see our "Beginner's Instructions".

**Tips and Equipment for Intermediate Brewers:** As we grow as brewers we begin adding extra steps and equipment to our brew day. One of the upgrades you may be interested in concerns the trub.

During the boil, as well as during the rapid cool down of the wort before it's transferred to the fermentor, various proteins and hop particles are separated from the liquid wort. These are collectively known as the "trub". Retaining trub from your fermentor will aid not only in the clarity of the beer's final appearance but in the cleanliness of its final flavor

1. A **Hop Spider** is a tool used to contain your hop additions during the boil so that they are easily removed once the boil is complete. The hop spider is submerged in the boiling wort, and any hop additions are added into the container. This allows flavor to be extracted from the hops, but prevents the hop sediment from gumming up the works later.
    a. Stainless steel mesh tubes are available for purchase and are the easiest to use.
    b. A cheaper alternative would be to buy a steeping bag and suspend the bag in the boiling wort using a few lengths of metal or wood.


2. A **Wort Chiller** can accelerate the cool down process which will aid in the "settling out" of the cold break material. The simplest of these is a copper coil "immersion chiller" which is connected to a pair of garden hoses and submerged in the hot wort once the boil is finished. The heat of the liquid will sanitize the copper, and as the water flows through the tubing, the wort will be cooled by heat transfer. You will notice that the first 100F will pass quite rapidly. Especially if you stir the wort with a sanitized metal spoon. The home-stretch between 90F and 70F can take much longer depending on the temperature of your ground water. You can accelerate this part by adding a pre-chiller.
3. A **pre-chiller** is a second coil of copper spliced into the hose before your kettle and placed in a tub of water. Be sure that the length of hose from your pre-chiller to your wort chiller is as short as possible to ensure that the effect of the pre-chiller is not lost due to temperature change in the hose. Once you're down to 100F, you can add ice to the water in this pre-chiller tub which will cool the ground water before it reaches your kettle. This will greatly lessen the time spent waiting for those last few degrees, especially if you stir the pre-chiller around in the ice water.


4. **Whirlpooling** your wort is the process of vigorously stirring your wort in order to create a "whirlpool". This will suck the hot break into the center and bottom of your kettle, making it easier to leave it behind during the transfer to the fermentor.
    i. You'll want to remove your hop spider at this stage as it will get in the way of your whirlpool.
    ii. Once you've achieved the desired cyclonic effect, cover your pot and let it sit for 5-10 min to allow the trub to settle.
        a. Once chilled and whirlpooled, you can then transfer your beer into your sanitized fermentor:
            i. Position your sanitized carboy beneath your kettle and prepare to transfer.
            ii. To prevent the trub from getting into your fermentor, open your valve partway to start your transfer (opening the valve completely may pull unwanted sediment from the middle of your kettle). If you don't have a valve on your kettle, use a racking cane to siphon your beer from a corner of your pot.
            iii. Once your down to a gallon or so of wort heavily saturated with trub, close your valve or remove your racking cane. Using a strainer, you could harvest some of the remaining wort, but you won't get all of it without also getting some of the trub as well.
            iv. Now you should have 5 gallons of cool, clear wort in your fermentor: oxygenate and ferment.