THE ULTIMATE JUMPSTART GUIDE TO HOMEBREWING
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**INTRODUCTION**

**WHAT IS HOMEBREWING?**

Homebrewing is one of the most rewarding hobbies in the world today. It crosses boundaries between diverse interests including cooking, history, art, crafts, science, culture – and of course the enjoyment of high quality craft beer! It’s a hobby that grabs hold of you and takes you places you’d never imagine, allowing you to experiment and explore to no end. Here’s your chance to join the more than 1 million homebrewers in the United States, and even more all around the world!

Excited? Intrigued? Not convinced?

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**THE PURPOSE OF THIS BOOK**

This book is intended to serve as a guide for those just entering the exciting world of homebrewing. It will give basic instructions for the beginning brewer and point the reader towards resources where they can learn more about a given subject.

One of the reasons that so many people enjoy brewing is the endless opportunity to learn – but don’t let the abundance of technical information out there scare you away! Homebrewing can be as simple or as complex as you want it to be, but at its most basic level, the process of making beer is very straightforward.
WHAT IS BREWING?

Brewing is the art and science of making beer! It can be broken down into a simple, four-step process:

1. **Mixing (or “mashing”)** crushed, malted grains in water to extract fermentable sugar. The grains are strained out and the resulting sugary mixture is called wort (pronounced “wert”).

2. **Boiling the wort** with hops to extract bitterness, flavor, and aroma. Boiling also sterilizes the wort.

3. **Cooling the wort** and pitching yeast. Yeast converts the sugars in the wort into alcohol and carbon dioxide. This process lasts for several days and is called fermentation.

4. **Packaging the beer** into bottles, kegs, or casks, and allowing the beer to mature and carbonate.

So you’re ready to brew – that’s great! I promise, it’s a decision you won’t regret.

Let’s start by reviewing the tools and equipment you will need to make your own beer *(Chapter 1)*, followed by the ingredients used in brewing *(Chapter 2)*.

From there, we will cover how to make beer at home *(Chapter 3)* and conclude with a number of recipes *(Chapter 4)* and resources *(Chapter 5)* for you as you continue your journey as a brewer.
CHAPTER 1: EQUIPMENT

Part of the fun of brewing is gradually adding to and upgrading parts of your home brewery, constantly improving your system to make better beer and more of it. There’s no one right way to set up your home brewery, just like there’s no one right way to brew beer.

The equipment you need for making your own beer depends on your method of homebrewing. When it comes to the basic gear required, your equipment needs depend on whether you brew with malt extract, partial mash, or all-grain.
ESSENTIAL HOMEBREWING EQUIPMENT – EXTRACT BREWING

Because it requires less equipment and is easier to learn, most homebrewers get started with what we call “extract brewing.” In this method, the first step in the brewing process (in which fermentable sugars are extracted from grain) has already been done. By purchasing malt extract from your homebrew supply shop, you get to skip the mashing process and focus on several other important brewing techniques (don’t worry – we’ll learn all about mashing later on!).

AT A MINIMUM, YOU WILL NEED:

- A large kettle for boiling wort (5 gallons or larger)
- A stainless steel or plastic spoon for stirring the wort
- A glass carboy or plastic fermenting bucket
- An airlock
- Tubing for siphoning
- A bottling bucket
- A bottle filler
- Bottles and caps
- A bottle capper

NOT ESSENTIAL, BUT RECOMMENDED:

- A hydrometer (required if you want to measure alcohol content)
- A thermometer
- An auto-siphon

WE’LL REVIEW WHAT EACH ITEM IS FOR WHEN WE COVER HOW TO BREW IN Chapter 3: Brewing Your First Batch.

FURTHER READING:

5 TIPS FOR ORGANIZING THE HOME BREWERY

5 HOMEBREWING GADGETS THAT WON’T BREAK THE BANK
EQUIPMENT FOR PARTIAL MASH BREWING

When brewing partial mash, brewers obtain fermentable sugars from both malt extract and malted grain. The homebrewer will do a “mini-mash” with a small portion of malted grains, strain out the grain, then mix the malt extract into the wort and bring it all to a boil.

A mini-mash is an easy transition into all-grain brewing. It introduces the mashing process without requiring a big investment in additional equipment. To do the mini-mash, the brewer simply soaks the crushed grains in warm (~150°F.) water for 30-60 minutes, monitoring pH and temperature in order to extract fermentable sugars from the grain.

At a minimum, the partial mash brewer will need:

- large kettle for boiling wort (5 gallons or larger)
- A smaller stockpot for the mini-mash (you may already have one in the kitchen)
- A strainer
- A thermometer
- pH testing strips or a digital pH meter
- Calcium carbonate and gypsum
- A stainless steel or plastic spoon for stirring the wort
- A hydrometer
- A glass carboy or plastic fermenting bucket
- An airlock
- Tubing for siphoning
- A bottling bucket
- A bottle filler
- Bottles and caps
- A bottle capper

TO SKIP AHEAD TO PARTIAL MASH BREWING INSTRUCTIONS, VISIT Chapter 3: Instructions for Partial Mash Brewing.
EQUIPMENT FOR ALL-GRAIN BREWING

After mastering the mini-mash, you may choose to advance to all-grain brewing. This is the closest thing to the way professionals brew beer, where they extract most, if not all, the fermentable sugars from malted grain.

To do this at home, the homebrewer will need a few extra toys, particularly a mash tun – basically a large pot for mashing the grains in water. The mash tun has a false bottom of some sort and a spigot that allows the wort to be drawn out of the tun and into the brew kettle, leaving behind all the grains.

Mash tun construction can vary. Many brewers use coolers of all shapes and sizes to construct a do-it-yourself mash tun. E. C. Kraus carries mash tuns made from water coolers; the design is tried and true.

Stainless steel mash tuns with perforated false bottoms are the next step up in terms of quality and ease of use. These tend to be a little easier to clean.

Both mash tun systems can be used to make good beer. Either way, a barbed fitting on the outlet and temperature rated tubing will make transferring wort from the mash tun to the brew kettle much cleaner and splash free.
THE MASH TUN ALTERNATIVE: BREW IN A BAG

A popular alternative to the mash tun option is something called Brew in a Bag (BIAB). It’s one way to jump into all-grain brewing without buying a mash tun. This saves some money in the short term, but it’s not necessarily easier than using a mash tun and may limit the amount of beer you can make. Still, it’s a viable alternative that may make sense for some people.

With BIAB, you essentially fill a brew pot with water and suspend a large mesh bag in the pot. Then you fill the bag with the grains, do the mash, and remove the bag afterwards, grain and all. There are a couple challenges to be considered:

1. You want to avoid burning or melting the bag. This can be tricky when adding heat to the mash. It’s recommended to fix the bag to the kettle with a bungee cord or some such device to keep the bag from touching the bottom of the kettle.

2. When removing the bag full of water-logged grains from the pot, the bag may rip. Remove it slowly and carefully to avoid ripping the bag.

These concerns aside, many brewers who use the Brew in a Bag technique report good results. To brew in a bag, you will need all of the equipment required for partial mash brewing, plus:

- large mash bag

READY TO TRY BIAB? SKIP AHEAD TO Chapter 3: Instructions for All-Grain Brew in a Bag FOR DETAILED INSTRUCTIONS.
CHAPTER 2: INGREDIENTS

Over the centuries, just about every ingredient under the sun has been used to make beer. Today, beer as we know it is made from these four essentials: malted grains (most often barley), water, hops, and yeast. Sometimes, brewers will use malt extract as a substitute for malted grains. In addition to the four main ingredients, brewers will sometimes use various adjuncts and additives to improve quality or flavor.
MALT

Malt is one of the basic building blocks of beer, responsible for contributing fermentable sugar (which gets converted into alcohol), color, body, and flavor. Malt is most often made from barley, but it’s not uncommon to see malted wheat or rye.

To make grain suitable for brewing, a professional maltster encourages the grain to sprout, then kilns it to stop the growing process. This locks in valuable enzymes within the grains that were activated by germination, and in turn, are used by the brewer to convert starches into fermentable sugar.

We’ll learn more about the science behind malting and mashing, but for now, let’s introduce some of the most common kinds of malt. Just like beers range in color from light to dark, malt can be very pale or nearly pitch black. A beer recipe will typically start with a majority of very lightly colored “base” malt, and then darker malts will be added for additional layers of color and flavor.
THESE ARE SOME OF THE MOST COMMONLY USED MALTS (FROM LIGHT TO DARK):

PILSNER MALT: This very lightly kilned barley malt is ideal for lightly colored lagers, but can also be used as base grain for a number of different styles. It features a mild, husky grain flavor.

TWO-ROW BASE MALT: All barley malt is made from either two-row or six-row barley. Two-row malt is a very common base malt for ales. Two-row malt typically contributes more fermentable sugar and less protein than six-row malt.

SIX-ROW BASE MALT: Six-row is often used in lagers for its grainy flavor, protein content, and DIASTATIC POWER. 6-Row barley is primarily grown in the U.S.

PALE MALT: A base malt with a little more kilning than the malts above.

VIENNA MALT: Vienna malt is kilned slightly more than Pilsner, 2-Row, and Pale malts, but it still works well as base malt. It is recommended for use in Pilsners and Vienna-style lagers.

MUNICH MALT: Munich malt lends a sweeter, maltier flavor than the lighter malts. It is ideal for brewing amber ales, Märzen lagers, and a number of darker beer styles.

CRYSTAL/CARAMEL MALT: A wide range of malts kilned at higher temperatures are called crystal, or caramel malts. They range in color from 10 to 120 degrees Lovibond, contributing color and flavors that range from sweet caramel to raisins and dates.

CHOCOLATE MALT: Chocolate malt is often used (in moderation) for brown ales, porters, and stouts. As you might expect, it contributes a chocolaty flavor and aroma to beer.

BLACK MALT: Black malt has been kilned nearly to the point of being burnt. It provides roasty bitterness and very dark color to stouts and other dark beers.

In addition to the above, beer can be made from wheat, oats, rye, and other adjuncts and additives.

FURTHER READING:
WHAT IS MALT?
BREWING WITH WHEAT
BREWING WITH OATS
A SIMPLE GUIDE TO ADJUNCT GRAINS
MALT EXTRACT

Most homebrewers begin their brewing careers by using malt extract. Extract brewing allows the homebrewer to save significant time and ease their way into the process of brewing beer. Simply mix the malt extract with hot water, bring it to a boil, and you’re ready to add some hops.

WHAT IS MALT EXTRACT?

Malt extract is concentrated brewers wort, available as either a heavy liquid syrup (liquid malt extract or “LME”) or a dried powder (dried malt extract or “DME”). Companies that produce malt extract have already done the work of mixing the malted grains with water and extracting the fermentable sugars. Additionally, they’ve condensed the wort into an easy to use form. All the homebrewer has to do is mix the malt extract into hot water.
MALT EXTRACT COMES IN SEVERAL FLAVORS AND VARIETIES:

LIGHT: a good base for just about any style. On its own, produces a light colored beer.

AMBER: a good base for amber ales, brown ales, and darker styles of beer. Yields a rich, malty, caramel flavor.

MUNICH: made from Munich malt, is somewhat darker than the extracts above.

DARK: a good base for porters and stouts. A rich, malty extract contributing some chocolate and caramel flavor.

WHEAT: an extract for brewing wheat beers, such as hefeweizens. Made from a combination of barley and wheat malt.

Any of the malt extracts above can be combined with each other or with malted grains to achieve a full spectrum of colors, flavors, and beer styles. Malt extract is also available with or without hops already added. The hops are in the malt syrup as a bittering oil. If brewing with hopped malt extract, adding more hops isn’t necessary, but it may be desired for additional hop flavor and aroma.
WATER

By volume, water comprises more than 90% of beer. It’s important not to forget about it, considering that it’s the beer’s main ingredient. Many of the world’s famous brewing cities are known for their water supply. In some cases, a high mineral content may accentuate hops, in others; a low mineral profile might contribute to smooth, clean flavor.

THERE ARE A NUMBER OF MINERALS THAT ARE IMPORTANT TO CONSIDER WHEN BREWING. SOME OF THESE INCLUDE:

CHLORINE/CHLORAMINE: Chlorine & chloramine are often used by municipal water facilities to sterilize the water supply. You can remove these chemicals from your water by boiling it for 30 minutes, letting it sit overnight, or by adding CAMPDEN TABLETS to your brewing water.

CALCIUM: Lowers pH and helps with mash conversion.

MAGNESIUM: Lowers pH and aids yeast growth (up to 20 parts per million)

SODIUM: Low levels of sodium can help give beer a full flavor; too much might make a beer taste salty.

CARBONATE/BICARBONATE: Can impede the mashing process and extract harsh hops flavors.

SULFATE: When combined with sodium, may introduce harsh, dry flavors.

CHLORIDE: Can make beer taste sweet.

Beginning brewers shouldn’t get hung up on water chemistry too much. Just be aware that if you can smell chlorine, sulfur, or anything else in your water, you may want to brew with filtered or bottled water instead of tap. Make sure the water has not been distilled.

Partial mash and all grain brewers will need some minerals on hand to amend water and control mash pH. We’ll cover what you need and how to use it in the Partial Mash Brewing Instructions.

FURTHER READING:
HOW TO PREP YOUR WATER FOR BREWING BEER
Hops come from the *Humulus lupulus* plant, a perennial shrub that sends climbing vines (aka bines) 20 feet or higher up wires or lampposts or anything it can grab hold of. One of the most highly valued ingredients in beer, hops, contribute the bitterness that balances out beer’s malty sweetness. They also offer a wide range of flavors and aromas, from pine and citrus to earth and spice. Other descriptors include herbal, floral, grassy, or woody.

The part of the plant that’s used for brewing is the flower from the female hop plant. The hop flower looks like a green pine cone. Within the cone are yellow lupulin glands, which contain valuable resins and oils. The resins contain alpha-acids that contribute bitterness. The oils are responsible for flavor and aroma.
While some hop varieties are prized for their bitterness potential, others may have desirable flavors and aromas. As such, hop varieties are sometimes referred to as either bittering hops or flavor and aroma hops.

Hops are added to boiling wort to release their resins and oils. Hops added early during the boil contribute more bitterness than those added towards the end of the boil. Hops that are prized for their flavor and aroma characteristics are added late in the boil, which infuses their aromatic hop oils into the wort.

Homebrewers work with hops in a few different forms. They may use the hop cone in its natural, whole leaf form. Often, hops are processed into pellets, which remove some of the extraneous vegetative material from the hop cone. Both forms should be packaged and stored to maintain their potency.

The more you brew, the more familiar you will become with the different hop varieties and their characteristics.

FURTHER READING:
- Varieties: A Quick Guide to American Hops
- Anatomy of the Hop
- What Are Noble Hops?

TECHNIQUES:
- Dry Hopping
- First Wort Hopping
- Proper Hop Storage: Fridge or Freezer?
YEAST

Yeast is the single-celled organism that converts sugar into both alcohol and carbon dioxide. We homebrewers like to say that we make beer, but in fact, yeast does all the work.

It wasn’t until 1857 that yeast was recognized as responsible for fermentation, but it has been used for centuries to make beer. When added to wort, yeast will first start by primarily consuming all available oxygen to reproduce in number. Then they go after the sugars and digest them into alcohol and carbon dioxide. When the fermentation is complete, the yeast settles out of suspension.
ALE VS. LAGER YEAST

There are two broad categories of brewing yeast: ale yeast and lager yeast. Ale yeast generally ferments at warmer temperatures (~60°-75°F) than lager yeast, and forms frothy foam at the top of the wort. Ale yeast is sometimes referred to as “top-cropping” or “top-fermenting” yeast.

Lager yeast prefers lower fermentation temperatures than ale yeast (~40°-60°F.). As such, lagers ferment more slowly. Lager yeast is sometimes referred to as “bottom-cropping” or “bottom-fermenting” yeast.

It takes billions of yeast cells to ferment a batch of beer. In addition to creating alcohol, yeast also produces flavor and aroma compounds such as esters and phenols. Different yeast strains will produce different characteristics. Consult the yeast packaging for specific recommended temperature ranges.
ADJUNCTS & ADDITIVES

In addition to malt, hops, yeast, and water, a wide range of ingredients can be used to alter a beer’s appearance, flavor, or alcohol content. Adjuncts generally add fermentable ingredients to the brew. Some adjuncts may be used to improve head retention or add body or flavor. Additives may be minerals or other ingredients that improve clarity, adjust pH (acidity), or contribute flavor.

For hundreds of years in Germany, adjuncts and additives were prohibited for use in brewing by Reinheitsgebot, the German Purity Law. Many commercial and hobbyist brewers use adjuncts and additives. You can decide for yourself what you feel comfortable using in your homemade beer.

COMMON BREWING ADJUNCTS

These brewing adjuncts are commonly added to the grain bill, or grist, ranging in proportion from 5% or less up to 50% or more, depending on style.

ADJUNCT GRAINS

WHEAT: Wheat is an essential ingredient when brewing American and German wheat beers. Typically, the wheat will be combined with barley. Wheat is sometimes used in other beer styles, such as pale ales and stouts, to add body and improve head retention. Wheat can be used malted or flaked (pressed through hot rollers).
BARLEY: In addition to being malted, barley can be flaked or roasted. Flaked barley will contribute fermentable sugar, while roasted barley (used sparingly) will contribute rich roasted or burnt flavors.

OATS: Oats are sometimes found in stouts, saisons, and a number of other beer hearty styles. They add a smooth, silky mouthfeel and add body. Oats are usually used flaked or raw, typically no more than 10-20% of the total grain bill.

RYE: Rye is a spicy cereal grain, common in rye pale ales (10-20% of grist) and German Roggenbier (rye beer, 50% or more of grist). Rye can be found malted or flaked.

CORN/MAIZE: Large commercial breweries frequently use corn (a.k.a. maize) in light American lagers. It adds fermentable sugars without contributing much body or color. It’s also inexpensive compared to other brewing grains. Craft brewers sometimes use corn when brewing cream ales and other styles. Corn is usually used as flakes, grits, or syrup.

RICE: Like corn, rice is an inexpensive source of fermentable sugar used to lighten body. It’s usually found in flaked or syrup form.
ADJUNCT SUGARS

An effective way to increase a beer’s gravity and alcohol content is to use sugar. Pound for pound, sugar adds more gravity than malted grains. Different types of sugar contribute different flavors and characteristics. Both Belgian and English brewers have brewed with sugars for hundreds of years. Below are just a few of the types of sugar that can be used in brewing:

**CORN SUGAR:** Corn sugar, or dextrose, is most often used as priming sugar (sugar added prior to bottling to produce carbonation). Corn sugar can be added to any beer to increase gravity, though in excess it can produce a “cidery” flavor.

**CANE SUGAR:** Cane sugar is derived from the sugar cane plant. There are a few different types, including turbinado, panela, and demerara. Because these are less processed than white sugar, they retain some molasses flavor.

**CANDI SUGAR:** Belgian Candi Sugar is an invert sugar, usually found in either crystal or syrup form. It’s commonly used to boost the gravity of Belgian ales, such as dubbels and tripels, without making them too malty or sweet. Dark Candi Sugar will affect the color of your beer, while Light Candi Sugar will not.

**CARAMEL:** Caramel can be added to beers to increase gravity and add caramel flavor. Caramel will contribute some color.

**MOLASSES:** Molasses is a byproduct of the sugar refining process. Its dark color and syrupy flavor makes it an interesting addition for stouts and porters.

**HONEY:** Honey is a highly nutritious source of sugar. It’s also highly aromatic; adding it at the end of the boil will help to preserve those flavor and aroma qualities. A beer or wine made entirely from honey is called mead.

**MAPLE SYRUP:** Maple syrup’s distinctive flavor makes it an interesting addition to dark beers.

### TABLE: ADJUNCT SUGARS COLOR AND GRAVITY

<table>
<thead>
<tr>
<th>Type of Sugar</th>
<th>Color (degrees Lovibond)</th>
<th>Gravity (1 lb./Gal.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Candi Sugar (light)</td>
<td>0.5</td>
<td>1.036</td>
</tr>
<tr>
<td>Candi Sugar (dark)</td>
<td>275</td>
<td>1.036</td>
</tr>
<tr>
<td>Corn Sugar</td>
<td>1</td>
<td>1.037</td>
</tr>
<tr>
<td>Demerara Sugar</td>
<td>1</td>
<td>1.041</td>
</tr>
<tr>
<td>Honey</td>
<td>Varies</td>
<td>1.032</td>
</tr>
<tr>
<td>Maple Syrup</td>
<td>35</td>
<td>1.030</td>
</tr>
<tr>
<td>Molasses</td>
<td>80</td>
<td>1.036</td>
</tr>
</tbody>
</table>
ADDITIVES

Brewing additives serve a variety of purposes, including reducing haze, adjusting pH, and adding flavor. You may wish to get your first brew under your belt before exploring the world of brewing additives.

WATER AMENDMENTS

Changes to brewing water can affect the flavor of the beer and for the purposes of mashing, the amount of sugar extracted from malted grains.

GYPSUM: Calcium sulfate, more commonly known as gypsum, lowers pH.
CALCIUM CARBONATE: Also known as chalk, calcium carbonate raises pH.

FININGS & CLARIFIERS

Finings and clarifiers help to improve beer clarity. Some are added to the kettle during the boil, others are added during fermentation.

IRISH MOSS: Irish moss is a type of seaweed. When added during the last 10-15 minutes of the boil, it helps protein to clump together and fall to the bottom of the kettle. This makes it easier to leave the protein behind when moving the wort to the fermenter.

GELATIN: Gelatin is derived from animal collagen. It’s usually mixed with a small amount of boiled water and stirred into the fermenter. As a positively charged finings, it attaches to negatively charged particles in beer and helps them settle out of suspension.
Surely you’ve heard of, maybe even tried an apricot wheat ale or a bourbon barrel stout. Any flavoring aside from malt and hops is considered an additive. Additives can be fruit, herbs, wood chips, spices – anything that might add a “special something” to your brew.

**FRUIT:** Fruit is often added whole-crushed to the fermenter, to the boil, or in extract form. Orange peel is often added to boil for some Belgian style beers. A simple fruit extract can be made by steeping fruit in vodka for several weeks, straining out the fruit, then adding it in measured amounts to the fermenter.

**HERBS:** Similarly, herbs can be added at any point in the brewing process. In fact, prior to the use of hops, herbs were used to make beers bitter. Anything from basil, oregano, rosemary, to sage, mint, and bog myrtle can be used to add bitterness, flavor, or aroma to beer. Rule of thumb – less is more.

**SPICES:** Spices such as coriander, cinnamon, vanilla, and anise can be added at any point in the brewing process.

**WOOD CHIPS:** To simulate the effect of barrel aging, homebrewers can add wood chips to the fermenter. Some brewers like to soak the wood chips first in whiskey or bourbon before adding them to the fermenter, simulating the practice of aging in previously occupied liquor barrels.

**OTHER FLAVORINGS:** The world is your oyster! Chocolate, peanut butter, pumpkin, bacon, granola...yes, even oysters! Brewing is an excellent opportunity to experiment and try something crazy!
CHAPTER 3: HOW TO BREW

Now that we’ve covered all the ingredients that can be used to make beer, let’s learn how to make it! Keep in mind that homebrewing is one of those hobbies that’s a lifelong learning process. While on one hand there is an endless amount of information that you can learn about brewing, it doesn’t mean you should try to learn everything there is to know before you brew your first batch. When you’re just getting started, keep it simple.
IN THIS CHAPTER, WE’LL COVER:

CLEANING AND SANITATION

INSTRUCTIONS FOR BREWING YOUR FIRST BATCH

INSTRUCTIONS FOR PARTIAL MASH BREWING (INTERMEDIATE LEVEL)

SIMPLE IMPROVEMENTS TO MAKE BETTER BEER

INSTRUCTIONS FOR BREW IN A BAG

INSTRUCTIONS FOR ALL GRAIN BREWING (ADVANCED)

FERMENTATION TECHNIQUE
Since cleaning and sanitation are such an important part of brewing, that’s where we’ll start.

Cleaning and Sanitation

It’s simple – wild microorganisms love beer about as much as we do. If given the chance, they’ll infiltrate your sugary wort and eat all they can. Though there is no danger of deadly pathogens infecting your beer, wild yeast and bacteria can cause some pretty nasty off flavors. The last thing you want to do is dump a batch of homebrew because of lack of sanitation. Luckily, keeping your beer free from contamination is pretty straightforward.

Always remember that cleaning and sanitation is a two-step process. First, your equipment should be clean of visible debris. Use a brewery-grade cleaner to soak your equipment in the cleaning solution. Just follow the instructions on the cleaner for the proper dilution rate. Use a soft cloth to wipe down your equipment and scrub any tough spots. Keep an eye out for nooks and crannies where sediment might build up. (The spigot in the bottling bucket is a notorious hiding place.)

After your equipment is clean, it’s time to sanitize. The wort will be sanitized through the boil, but anything that comes in contact with the wort afterwards needs to be sanitized. This includes fermenters, lids, airlocks, your stirring spoon, bottles, and caps.
The homebrewer has a few choices when it comes to sanitizing agents. A few of the most common include:

**STAR SAN SANITIZER:** StarSan is an acid sanitizer that’s very easy to use. Mix one ounce per five gallons of warm water to prepare a sanitizing bath. It only requires 1-2 minutes of contact time. Air dry.

**IODOPHOR SANITIZER:** Iodophor is a halogen-based sanitizer. It’s made from the same iodine that’s often used in medical applications. It’s also very easy to use. Prepare a soak with one tablespoon per five gallons of water and allow a contact time of two minutes. Air dry.

**ONE-STEP NO-RINSE CLEANSER:** This is an oxidative sanitizer that only requires the equipment either be dipped in its solution, or be rinsed with the solution. The actual sanitizing occurs as the solution evaporates or dries from the surface. For this reason it is important to let the equipment air-dry as opposed to being dried off with a towel.

**BLEACH:** Unscented, non-concentrated household bleach makes an effective, inexpensive sanitizer. The drawbacks are that it takes longer to work and it has the potential to leave behind residual chlorine flavor. Mix one tablespoon of bleach per gallon of cold water. Allow 20 minutes of contact time. Rinse well with very hot water to evaporate any remaining bleach.

**THE DISHWASHER:** Your dishwasher, without detergent and set to the “heat dry” or “sanitize” cycle, is actually a very useful tool in the home brewery. I wouldn’t use it for plastics, but the dishwasher makes sanitizing your pre-cleaned bottles pretty painless.

One thing to keep in mind – cleaning and sanitation will be much easier if you do a good job cleaning up after brew day. The same goes for bottles. After drinking a bottle of beer, give it a good rinse. Come bottling day, putting bottles in the dishwasher on the sanitize cycle will make your job much easier.
CHAPTER 3:
HOW TO BREW

BREWING YOUR FIRST BATCH

Finally! Let’s make some beer!

If you’re like most homebrewers, you’ve just purchased a homebrewing equipment kit. Congratulations! Now we’re going to go over how to brew that first batch step by step.

If you need one, here is a recipe for the first-time brewer. (The instructions that follow will work for most any boxed recipe kit.)

BREWMASTER’S BROWN ALE
(EXTRACT WITH SPECIALTY GRAINS, FIVE-GALLON RECIPE)

STYLE:
American Brown Ale

TARGET OG: 1.052
TARGET FG: 1.013
TARGET ABV: 5.1%
TARGET IBU: 26
TARGET SRM: 23

INGREDIENTS
6.6 LBS. Steam Freak Liquid Malt Extract: Amber
1 LB. Dried Malt Extract: Dark
0.5 LB. Chocolate Malt (crushed)
0.5 LB. Caramel 60L Malt (crushed)
1 OZ. Northern Brewer hops for bittering (60-minute boil time)
1 OZ. Willamette hops for flavoring (15-minute boil time)
1 PACKET Safale US-05 Ale Yeast

EXTRA SUPPLIES: 1 small muslin grain bag (for steeping crushed grains)

FOLLOW THE STEP-BY-STEP INSTRUCTIONS ON THE NEXT TWO PAGES TO BREW YOUR FIRST BATCH OF BEER!

REMEMBER: homebrewing is not difficult. If you find yourself wondering if you’re doing it right, just trust the process. As long as you follow the directions, everything will turn out just fine.
1. Read through the whole list of directions. Make sure you have everything you need. Review the Essential Homebrewing Equipment – Extract Brewing section if needed.

2. Clean your gear using a brewing grade cleaner, such as One Step. Since your equipment has never been used before, this should be easy. Wait to clean and sanitize your bottles until bottling day.

3. Sanitize your gear, especially the fermenter and anything that will touch the wort after the boil. Follow the instructions that came with your sanitizer. If you don’t have sanitizer on hand, dilute one tablespoon of unscented household bleach per gallon of cold water and soak your fermenter and equipment for 20 minutes. Rinse very thoroughly with hot water to remove any residual chlorine. (See the beginning of Chapter 3 for more information on cleaning and sanitation.)

4. Start heating your brewing water. If you have a five-gallon kettle, start with about three gallons of water.

5. If your recipe kit uses specialty grains, put them in a small grain bag and steep the grain as the water heats. (Specialty grains should always be crushed before steeping.) Ideally, they’ll steep for about 30 minutes when the water is 140°-160°F. Do not boil your specialty grains, and take care to keep the grain bag from touching the bottom of the kettle.

6. Remove the bag of specialty grains and discard. (Consider composting your “spent” grains or using them to make bread!) Remove the kettle from the heat source and stir in your malt extract. If using liquid malt extract (LME), it helps to soak the canister in hot water beforehand – the LME comes out much easier! Be sure to stir as you pour in the malt syrup so as not to scorch it on the bottom of the kettle.
7. Return the kettle to the heat and bring to a boil. Keep an eye on the kettle — at this stage the wort is prone to boiling over. If this starts to happen, turn off the heat and/or add cold water to the kettle.

8. When the wort begins to boil, it’s time to add the first round of hops (often called the 60-minute addition — i.e., the boil has 60 minutes to go). Add the remaining hops at time intervals as indicated in your recipe.

9. At the end of the boil (usually 60 minutes), give the wort a good stir, remove the kettle from the heat source, and chill the wort. This can be accomplished with an ice bath or an immersion wort chiller.

10. When the wort has reached 80°F., or lower, transfer it to your fermenter. Do your best to leave the hop matter and other “trub” at the bottom of the kettle. You may wish to siphon the wort into the fermenter or pour it through a sanitized strainer.

11. If you have one, use your hydrometer to take a gravity reading by carefully floating the hydrometer in the wort.

12. Using your sanitized spoon, give the wort a vigorous stir and pitch your yeast. (The aeration will help the yeast grow and multiply!)

13. Seal the fermenter with a lid and airlock and allow to ferment for two weeks.

That’s it! You now have beer!

YOU’RE NOT QUITE DONE THOUGH. JUMP AHEAD TO THE SECTION ON Bottling and Kegging TO LEARN HOW TO BOTTLE YOUR HOMEBREW!

The instructions above will guide you through your first several batches of homebrew. If you find yourself ready to advance, consider the following section: Instructions for Partial Mash Brewing.

NEED ANOTHER RECIPE TO BREW? CONSIDER THESE:

5 RECIPE KITS FOR BEGINNING BREWERS
INSTRUCTIONS FOR PARTIAL MASH BREWING

If you’re happy with extract brewing and want to keep making beer that way, that’s perfectly fine. If you’re short on time, extract brewing may be your best bet. But once they’ve caught the bug, many homebrewers want to improve their brewing skills and learn more techniques to add to their beer making toolbox. The next logical step after extract brewing is partial mash.

As we discussed in the introduction, professional brewers mix water with crushed malt to create wort. This process is called mashing. With partial mash brewing, we’re going to do this too, but using only a small amount of malted grains. Most of the fermentable sugars will still come from malt extract.

There are two main benefits to partial mash brewing:

1. You can learn to mash without a significant investment in additional equipment.
2. You don’t have to risk messing up a whole batch of beer if your mash doesn’t go quite right.

Here’s an example of a partial mash recipe:

AMARILLO PALE ALE
(PARTIAL MASH, FIVE-GALLON RECIPE)

STYLE:
American Pale Ale

TARGET OG: 1.051
TARGET FG: 1.013
TARGET ABV: 5.0%
TARGET IBUS: 34
TARGET SRM: 10

INGREDIENTS
3.3 LBS. Steam Freak Liquid Malt Extract: Amber
3.3 LBS. Steam Freak Liquid Malt Extract: Light
1 LB. Six-Row Pale Malt (crushed)
1 LB. Caramel 40L Malt (crushed)
1 OZ. Amarillo hops for bittering (60-minute boil time)
1 OZ. Amarillo hops for flavoring (15-minute boil time)
1 OZ. Amarillo hops for aroma (5-minute boil time)
1 PACKET Safale US-05 Ale Yeast
At first glance, the recipe above isn’t very different from an extract recipe with steeped specialty grains. The key difference is that at least some of the grains are lightly kilned base malt. Without getting too technical, these base grains are critical for extracting fermentable sugar.

Recall from the Equipment section that you’ll need a few additional items to do a partial mash, some of which you may already have in your kitchen:

- smaller stockpot for the mini-mash
- A strainer
- A thermometer
- pH testing strips or a digital pH meter
- Calcium carbonate and gypsum

These tools will help you control two important factors that affect the efficiency of your mash: temperature and pH. To get the most fermentable sugars from your malted grains, you’ll need to make sure the temperature of the mash stays between 148°-156°F. and the pH is between 5.0 and 5.5.

Ready to give it a try? Let’s brew!

1. Read through these directions. Make sure you have everything you need.
2. Clean your gear using a brewing grade cleaner, such as One Step. Wait to clean and sanitize your bottles until bottling day.
3. Sanitize your gear, especially the fermenter, and anything that will touch the wort after the boil. (SEE CHAPTER 3, SECTION 1 TO REVIEW CLEANING AND SANITATION.)
4. Fill your small stockpot with 1.5 quarts of water per pound of malted grain in your recipe. If using the recipe above, this comes out to 3 quarts. Heat the water to 165°F.
5. Pour the crushed malt into the water and stir. You’ve just “mashed in”!
6. Check the temperature. Hold the mash temperature between 148°-156°F. for best results.
7. Check the pH, following the directions for your pH meter or testing strips. If it’s above 5.5, add 1/4 tsp. of gypsum and stir. If it’s below 5.0, add 1/4 tsp. calcium carbonate and stir. Adjust until your mash is between 5.0 and 5.5.

8. After 60 minutes, pour your mash through the strainer into your brew kettle. If flakes of malt show up still in the wort, recirculate the wort through the strainer full of grains again and into the original stock pot. Repeat until the wort is relatively clear of debris. At this point, you can discard the grains.

9. Mix in all the malt extract and bring your wort to a boil. Be sure to stir as you pour in the malt syrup so as not to scorch it on the bottom of the kettle.

10. When the wort begins to boil, add the first round of hops. Add the remaining hops at intervals according to your recipe.

11. At the end of the boil (usually 60 minutes), give the wort a good stir, remove the kettle from the heat source, and chill the wort. This can be done with an ice bath or an immersion wort chiller.

12. When the wort has reached 80°F., or lower, transfer the wort to your fermenter. Do your best to leave the hop matter and other “trub” at the bottom of the kettle. You may wish to siphon the wort into the fermenter.

13. Use your hydrometer to take a gravity reading by carefully floating the hydrometer in the wort.

14. Using your sanitized spoon, give the wort a vigorous stir and pitch your yeast. (The aeration will help the yeast grow and multiply!)

15. Seal the fermenter with a lid and airlock and allow it to ferment at 66°-70°F. for two weeks.

16. Bottle or keg and condition for another 2 weeks.
SIMPLE IMPROVEMENTS TO MAKE BETTER BEER

Before we dive into all grain brewing, I thought it might be wise to suggest some tips for brewing better beer. After all, producing and boiling wort are just the first steps in the process.

THESE FOUR TIPS OFFER SOME EASY WAYS TO IMPROVE THE QUALITY OF YOUR BEER:

1. **TAKE GOOD NOTES.**
   Good record keeping makes it easier to remember what happened on a given brew day. Whether you want to recreate a beer that turned out really well or try to figure out what went wrong, taking good notes is very important.

2. **USE YEAST STARTERS.**
   Beginning brewers may not realize that liquid yeast cultures rarely contain enough cells to adequately ferment a batch of beer. This can result in a high final gravity, an overly sweet tasting beer, and worse, a stuck fermentation. A yeast starter is one of the best ways to brew better beer.

3. **RAPIDLY CHILL YOUR WORT.**
   Cooling your wort quickly may be the difference between an average homebrew and an award-winning beer.

4. **HIT YOUR TARGET GRAVITY.**
   Accurately predict the alcohol content of your beer by Hitting Your Target Original Gravity. This can be achieved by measuring mash efficiency, watching your evaporation rate, and making additions later in the brewing process.

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E.C.Kraus
Home Wine & Beer Making Supplies
INSTRUCTIONS FOR ALL-GRAIN BREWING

Before you begin brewing all-grain, I highly recommend trying at least a few partial mash brews to get the mash procedure down. You’re in it for the long haul – take your time with the first few batches before investing in all the additional equipment necessary to do all-grain brewing!

Don’t let anyone intimidate you! All-grain brewing is really no more difficult than other forms of brewing, especially if you’ve already done partial mash. The key difference that inhibits most brewers from going all-grain is the extra equipment and expense.

To obtain enough fermentable sugar for a full five-gallon batch of beer, you’ll need to mash about 10-12 pounds of grain in about 3.5 gallons of water. To do this, you’ll need some extra gear. Here are your options:

- Brew in a Bag (BIAB)
- Cooler mash tun with false bottom
- Stainless steel mash tun with false bottom

Because many homebrewers transition into all-grain brewing with Brew in a Bag, that’s where we’ll begin.
INSTRUCTIONS FOR ALL-GRAIN BREWING
(BREW IN A BAG - BIAB)

To brew in a bag, you will need a large grain bag that’s big enough to fit 10-12 lbs. of grain, plus your mash water. I also recommend a bungee cord to hold the bag in place and a large colander of strainer that will fit across the top of your brew kettle and support the bag of wet grain as the wort drains back into the pot. (At this point, I recommend a kettle at least 7.5 gallons in size to brew a five-gallon batch. Otherwise you’ll need to brew smaller batches or top off with water after the boil.)

What we’re going to do is mash the grains in the brew kettle, remove the bag from the pot, then bring to wort to a boil and proceed just like any other brew day. Ready? Let’s brew!

1. Read through the instructions and make sure you have everything you need.

2. Clean your gear using a brewing grade cleaner, such as One Step. You can wait to clean and sanitize your bottles until bottling day.

3. Sanitize your equipment, especially the fermenter and anything that will touch the wort after the boil. (SEE Chapter 3, Section 1 TO REVIEW CLEANING AND SANITATION.)
4. Fill your brew kettle with water. (If possible, we want to do a full-volume boil. For a five-gallon batch, fill it to 6.5 gallons. If your kettle only holds five gallons, fill it to about four gallons and plan to top off the batch in the fermenter.)

5. Bring the water to 165°F. Turn off the heat and place the grain bag in the brew kettle.

6. Pour the crushed malt into the bag and stir. You’ve just mashed in!

7. Check the temperature. Hold the mash temperature between 148°-156°F.

8. Check the pH, following the directions for your pH meter or test strips. If it’s above 5.5, add 1/4 tsp. of gypsum and stir. If it’s below 5.0, add 1/4 tsp. calcium carbonate and stir. Adjust until your mash is between 5.0 and 5.5.

9. After 60 minutes, remove the bag of grain from the brew pot, allowing the wort to drain from the bag. Discard the grains.

10. Bring your wort to a boil.

11. Add the hops at intervals according to your recipe.

12. Chill the wort and transfer to a sanitized fermenter.

13. Use your hydrometer to take a gravity reading by carefully suspending the hydrometer in the wort. If needed, top off with enough clean, sanitized water to hit your target OG (original gravity).

14. Using your sanitized spoon, give the wort a vigorous stir and pitch your yeast.

15. Seal the fermenter with a lid and airlock and allow it to ferment as required for the recipe.

16. Bottle or keg as usual.
INSTRUCTIONS FOR ALL GRAIN BREWING
(MASH/LAUTER TUN)

Brewing all grain in a mash tun is essentially the same process as brew in a bag, except for the fact that instead of the bag, we’re mashing the grains in a separate vessel with a false bottom. At the end of the mash, the wort is drawn out from the mash tun and into the brew kettle, with the grains held back by the false bottom. A sparge step rinses the grains with hot water and these final runnings are collected in the kettle as well to reach the full boil volume. Because we’re dealing with a significant amount of water, many brewers use a separate kettle just for heating and holding hot water. This is called a hot liquor tank.

There are many variables when it comes to all-grain brewing, most of which you will learn as you continue your homebrewing journey. For starters, there are technically three all-grain mash processes:

SINGLE INFUSION MASHING: Grains are mashed in water held at a constant temperature (148°-156°F.).

MULTIPLE INFUSION (OR STEP) MASHING: Grains are mashed through a series of increasing temperatures, usually starting with a protein rest (~122°-138°F.) followed by the saccharification rest (148°-156°F.). Additional steps may be desired to control a number of factors.

DECOCTION MASHING: Grains are mashed through a series of increasing temperatures, achieved by removing a portion of the grist from the mash, boiling it, and returning it to the mash.

In most cases, a single infusion mash will serve you just fine. Decoction mashing was developed as a technique before the invention of modern thermometers, allowing brewers to mash in steps with some accuracy. It takes a long time and is really not necessary for the average homebrewer.

That said, here are step-by-step instructions all-grain brewing with a stainless steel mash/lauter tun and a single infusion mash:

1. Read through these instructions and make sure you have everything you need.
2. Clean your gear using a brewing grade cleaner, such as One Step. Wait to clean and sanitize your bottles until bottling day.
3. Sanitize your equipment, especially the fermenter and anything that will touch the wort after the boil.
4. Fill your mash/lauter tun with 1.5 qts. of clean water per pound
of grain and heat to 165°F. Meanwhile, start heating 2 qts. of clean water per pound of grain in a separate vessel (this will be your sparge water).

5. Pour the crushed malt into the mash tun and stir. You’ve just mashed in!

6. Check the temperature. Hold the mash temperature between 148°-156°F. by either applying heat to the mash tun or by adding hot (200°F.) or cold water.

7. Check the pH, following the directions for your pH meter or test strips. If it’s above 5.5, add 1/4 tsp. of gypsum and stir. If it’s below 5.0, add 1/4 tsp. calcium carbonate and stir. Adjust until your mash is between 5.0 and 5.5.

8. Stir occasionally over 60 minutes, then slowly start to draw off wort from the mash tun into the boil kettle. The very first runoff may have some grain particulate. Pour that part back through the grain bed in the mash tun and repeat until the wort is clear.

9. Once the wort in the mash tun begins to reveal the grain bed, start adding the sparge water (at ~170°F.) to the mash tun. Pour the sparge water gently or through a colander so as not to disturb the grain bed.

10. Collect 6.5-7.5 gallons of wort (more or less depending on your system’s evaporation rate, amount of hops in recipe, etc.) and bring to a boil.

11. Add the hops at intervals according to your recipe.

12. Chill the wort and transfer to a sanitized fermenter.

13. Use your hydrometer to take a gravity reading.

14. Using your sanitized spoon, give the wort a vigorous stir and pitch your yeast.

15. Seal the fermenter with a lid and airlock and allow it to ferment as required for the recipe.

16. Bottle or keg as usual.
FERMENTATION TECHNIQUE

Many beginning homebrew books gloss over the importance of fermentation technique. Because of its potential impact on your beer, I feel obliged to share some advice.

While it may be tempting to assume that once brew day is done our work as brewers is complete, however this is not the case. Recipe formulation and brew day technique are both important, but the fermentation of our homebrew can have a profound impact on the quality of the final brew. In fact, fermentation has the ability to make or break our beer.

Let’s review some basics of fermentation science:

Fermentation is the process by which yeast converts sugars in the wort into alcohol. Yeast is a living organism – keep your yeast happy, and they’ll help you make very good beer. Neglect their needs and their comfort, and your beer could suffer.

There are four steps in the fermentation of beer:

1. PITCHING: This is when yeast is added to the wort.
2. GROWTH OR LAG PHASE: The yeast starts to consume oxygen in order to multiply. This is why it’s important to aerate or oxygenate your wort prior to pitching.
3. FERMENTATION PHASE: The yeast starts consuming the sugars in the wort and converts them into alcohol and carbon dioxide.
4. SETTLING: When all the food is gone, the yeast settles out of suspension.

As a brewer, it’s our job to make sure that the yeast can do their job. By creating optimal conditions for the yeast, they will produce beer that tastes good. If the conditions are less than ideal, we could end up with an incomplete fermentation or a beer that just doesn’t taste as good as it could.
**FACTORS AFFECTING THE QUALITY OF FERMENTATION INCLUDE YEAST NUTRITION, PITCH TEMPERATURE, PITCH RATE, AND FERMENTATION TEMPERATURE.**

**YEAST NUTRITION**

Luckily, malt contains many of the vitamins and minerals needed for yeast to thrive. In some cases, as when brewing high gravity beers, yeast nutrient may be added. Otherwise, our main area of concern is adequate oxygenation. For the beginning homebrewer, a vigorous stir with your sanitized brewing spoon prior to pitching yeast will be fine. Wort may also pick up some oxygen when transferring from the brew kettle to the fermenter.

**PITCH TEMPERATURE**

When we finish boiling wort, we can’t just throw in the yeast – the high temps would kill it. This is one of the main reasons why it’s important to chill wort after boiling. The optimum thing is to chill the wort all the way down to your ideal fermentation temperature, which will vary depending on the yeast strain you’re using. Each type of yeast should have that temperature range clearly printed on the packaging. Otherwise, that information is easily found online.

Many homebrewers start out by chilling their wort in an ice water bath, kettle and all. After a few batches this way, I think most will agree that an immersion wort chiller is a worthwhile investment. An immersion wort chiller is simply a coil of copper or steel with a hose attachment on one end. The wort chiller is submerged in the wort, then cold water is pushed through it. The cold water removes heat from the wort as it passes through the coil and out the other end.
CHAPTER 3: HOW TO BREW

PITCH RATE

The pitch rate is simply the number of yeast cells pitched into a volume of wort. Usually the concern is under pitching, which can result in a slow fermentation and strained yeast. Strained yeast may create some unpleasant off flavors.

Pitching rates can get a little complicated. My advice to the beginning brewer is to start with dry yeast packets. The 11.5 gram packets contain enough yeast cells for a healthy fermentation and do not require a starter. When brewing with liquid yeast cultures, it becomes more important to make a starter to pitch the right amount.

DAVID’S PITCHING RATE RULE OF THUMB:

If brewing an ale with a liquid yeast culture, either use two, 100-billion cell yeast packs (such as the Wyeast Smack Pack), or in advance.

If brewing a lager, prepare a 4L yeast starter from two yeast packs and double the DME.

GET INFO: MORE INFORMATION ON PITCHING RATES CAN BE FOUND AT MRMALTY.COM.

TOOLTIME: A YEAST PITCHING RATE CALCULATOR CAN HELP YOU FIGURE OUT EXACTLY HOW MUCH YEAST YOU SHOULD PITCH.
FERMENTATION TEMPERATURE

As for maintaining fermentation temperature, this is one of the most important factors for brewers to control. Fermentation temperatures in excess of the recommended temperature range can produce undesirable off-flavors. While it is possible to brew beer without much regard to temperature, taking a little extra care can make a big difference.

Controlling fermentation temperature does present some challenges for beginning homebrewers. For one, when yeast is added to wort it starts to grow and reproduce. This activity generates heat, which can increase the fermentation temperature by as much as 5°F.

Also, most of us don’t have a spare refrigerator for keeping our fermenters in the perfect temperature range. We’ll usually just stick the fermenter in a closet somewhere. Most ale yeast prefer temperatures below about 70°F., so this might be difficult to maintain, especially in the summer. Lager yeasts prefer temperatures in the ballpark of 40°-50°F., which may also be difficult to control.
Here are a few of the things you can do to produce good results in respect to fermentation temperature:

1. **CHOOSE YOUR BEER YEAST WISELY.** Pay attention to the recommended temperature range for the strain. It may not be feasible for beginning brewers to brew lagers due to the cold temperatures required. On the other hand, some yeast strains (namely Belgian yeasts) tend to do well at higher temperatures (even into the 80’s).

2. **BREW SEASONALLY.** With your yeast’s temperature range in mind, you may find it easier to brew some styles in the winter and others in the summer, when the ambient temperature may be better suited for brewing that particular beer style.

3. **DEDICATE A ROOM OF YOUR HOUSE WHERE YOU CAN KEEP THE TEMPERATURE WITHIN THE RECOMMENDED RANGE OF THE YEAST YOU’RE USING.** Ale yeasts generally perform best in temperatures 60°-70°F.; lager yeasts 40°-50°F.

4. **TRY SUBMERGING YOUR FERMENTER IN A BUCKET FILLED WITH WATER AND WRAP THE FERMENTER IN A TOWEL.** This will reduce the likelihood of big temperature swings, and the towel will help cool the fermenter by “wicking away” and evaporating moisture. In the summer, you may also want to periodically add frozen water bottles to the bucket for some extra cooling.

5. **CONSIDER PURCHASING A DEDICATED CHEST FREEZER OR REFRIGERATOR WITH A TEMPERATURE CONTROLLER FOR YOUR BREWING NEEDS.** While it can be expensive for some, it is probably the best way for homebrewers to control fermentation temperature.

**FURTHER READING:**

- CONTROLLING HOMEBREW FERMENTATION TEMPERATURES
- WHAT IS A STUCK FERMENTATION, AND HOW TO AVOID IT!
CHAPTER 3: 
HOW TO BREW

PRIMARY VS. SECONDARY FERMENTATION

If you spend much time reading about homebrewing, you will no doubt come across some discussion about primary and secondary fermentation. What’s this all about?

Primary fermentation is simply the first time wort and yeast interacts in the fermenter. This is when most of the fermentable sugars in your wort will be converted to alcohol and CO2. Some homebrewers chose to also do a secondary fermentation. All this means is that they transfer the fermenting beer from the first fermenter to a secondary fermenter about midway through the fermentation process, giving the beer a little extra time to improve.

THIS ACHIEVES TWO THINGS:

1. It gets the fermenting beer off of the inactive yeast and other unwanted particulate.

2. It gives the brewer an opportunity to add finings (to clear the beer) or flavorings (such as hops, fruit, or wood chips).

Secondary fermentation is entirely optional, but many brewers feel it is easier to get a clearer beer this way. Give it a try and decide for yourself whether it’s worth doing a secondary fermentation.
CHAPTER 4: BOTTLING

After fermentation, your wort is now beer, but it’s not quite ready to drink. By bottling or kegging your homebrew, you give the beer a chance to carbonate (get fizzy) and condition (improve in flavor). Homebrewers have the option to either bottle or keg their homemade beer.
Most homebrewers start out with bottling because it’s less expensive than kegging, and the bottling procedure is fairly straightforward. 

**TO BOTTLE, YOU WILL NEED:**
- Your batch of fermented beer
- A siphoning hose
- A bottling bucket
- Priming sugar (~5 oz. of corn sugar for a five-gallon batch)
- Cleaner
- Sanitizer
- A bottle brush
- A bottle filler (bottling wand)
- Bottles (~11, twelve-ounce bottles per gallon of beer)
- Caps (never reuse old bottle caps)
- A bottle capper
HOW TO BOTTLE YOUR HOMEBREW

Now that we’ve covered some basic requirements, here are step-by-step instructions for bottling your homebrew:

1. Confirm that your beer has finished fermenting by taking at least two hydrometer readings two days apart. The final gravity should not change between the two readings. If your second reading is lower, this means your beer is still fermenting. You need to wait.

2. Boil two cups of water for 20 minutes to sterilize it. Mix in priming sugar (usually 5 ozs. corn sugar/5 gallon batch).

3. Allow the sugar mixture to cool.

4. Clean and sanitize all of your bottling equipment, including the bottling bucket, siphoning hose, bottle filler, bottles, and bottle caps. A bottle brush may be necessary for removing stubborn deposits from inside the bottles.

5. Pour the cooled sugar mixture into your bottling bucket, then siphon your beer on top of it. Make sure the spigot is closed! Gently stir to make sure the priming sugar is evenly dispersed.

6. Place the bottling bucket on the counter and connect the siphoning hose to the spigot, and the bottle filler to the hose.

7. Open the spigot and fill each bottle with beer by pressing the bottling wand to the bottom of the beer bottle. Fill to about 1 inch of the top of the bottle.

8. Cap each bottle with a sanitized cap.

9. Store the bottles upright in a closet that stays around 70°F., wait two weeks and enjoy!

As your bottles are hanging out in the closet, the small amount of yeast in each one will start to eat the priming sugar and produce CO2. Since the gas can’t escape from the bottle, it will go into solution and carbonate your beer.

While it’s tempting to open bottles before the two weeks are up, it’s always worth being patient. If for some reason the bottles won’t carbonate, additional time may be needed. Extra conditioning time will almost always improve the flavor of your beer.
ON BOTTLES...

Although you can buy plain, empty bottles by the case and save yourself a lot of work, many brewers choose to recycle old bottles for their homebrewed beer. When recycling bottles, remember the following:

Bottles should be the pop-off style. Twist-offs are not ideal for homebrewing.

Brown glass is the best, as it protects your homebrew from damaging light. Green bottles are acceptable, but clear bottles should be avoided.

The larger 22 or 25-ounce bottles take some of the effort out of bottling. Hoard them if you can!

If reusing bottles from commercial beers or homebrew, rinse them out when you’re done with them. This will save a lot of time and effort on bottling day.

You don’t have to remove labels from the bottles, but it really helps with presentation. The easiest way to remove labels is to soak them in warm water mixed with brewing cleaner. You’ll soon learn that some breweries’ labels come off more easily than others. Keep this in mind when stocking up on bottles.
ON PRIMING SUGAR...

By adding a small amount of sugar to the beer before bottling, we give yeast just a little more food in order to produce the carbon dioxide that carbonates the beer. Any fermentable sugar will work, but the most common priming sugars are corn sugar, cane sugar, and dried malt extract.

Corn sugar is the standard priming sugar for many homebrewers. It’s nearly 100% fermentable, so you’ll need very little, and it’s colorless when dissolved, so it won’t affect the color of the beer.

Cane sugar is another good option. It has a little more molasses flavor than corn sugar, but we use so little of it that it’s not likely to be noticeable. Cane sugar is a touch less fermentable than corn sugar, so we need slightly more cane sugar than corn sugar to achieve the same level of carbonation.

Dried malt extract is the least fermentable of the three, so it takes more DME than corn or cane sugar. On the other hand, DME is derived from brewers wort, so if you have apprehensions about using simple sugar in your beer, it’s the best option. Use the lightest DME you can find so you don’t alter the color of your beer.

How much priming sugar should I use?

As a general rule of thumb, 3/4 cups of corn or cane sugar or 1-1/4 cups of DME will adequately carbonate your brew, however, not all beer styles are carbonated at the same level, and not all beers carbonate as readily as others.

Carbonation level is measured in units called volumes CO2. Depending on the style of beer, anywhere from 1.5 to 5.1 vols. CO2 may be appropriate. About 2.3–2.5 is a good middle range, but you may wish to consult the following table to determine how much carbonation you want in your beer:

<table>
<thead>
<tr>
<th>Style</th>
<th>Volume of CO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>American ales</td>
<td>2.2–3.0</td>
</tr>
<tr>
<td>British ales</td>
<td>1.5–2.2</td>
</tr>
<tr>
<td>German weizens</td>
<td>2.8–5.1</td>
</tr>
<tr>
<td>Belgian ales</td>
<td>2.0–4.5</td>
</tr>
<tr>
<td>European lagers</td>
<td>2.4–2.6</td>
</tr>
<tr>
<td>American lagers</td>
<td>2.5–2.8</td>
</tr>
</tbody>
</table>

Source: BYO.COM
To avoid bottles that gush out when you open them, I would hesitate to carbonate above 3.0 vols. CO2.

The other thing to consider with priming is that beer holds CO2 more easily at lower temperatures, so the temperature you plan on serving the beer matters as well. The warmer the serving temperature, the more priming sugar you will need.

If you want to be truly accurate with your carbonation level, figure out how much carbonation you want, then use a PRIMING SUGAR CALCULATOR to see how much sugar or DME to use.
CHAPTER 5: KEGGING

Many homebrewers find that kegging is easier and less time consuming than bottling. Besides, it’s pretty cool to have your own homemade beer on tap! On the other hand, kegging requires an investment in specialized equipment that not all homebrewers are willing to make.
LET'S FIRST GO OVER THE EQUIPMENT YOU NEED IN ORDER TO KEG YOUR HOMEMADE BEER.

TO KEG YOUR HOMEBREW, YOU WILL NEED:

- A keg: a five-gallon stainless steel keg is the norm
- A CO2 tank for carbonating and dispensing your beer
- A CO2 regulator for measuring CO2 pressure
- A gas inlet hose
- A beer outlet hose with a faucet
- Quick-disconnects for connecting the hoses to the keg
- Cleaner and sanitizer

THE ANATOMY OF A HOMEBREW KEG

A typical homebrew keg is in the style of a five-gallon soda keg. In fact, almost all homebrewers use repurposed soda kegs for their beer. You should be familiar with the following components:

- The keg itself (the shell, made from stainless steel)
- The lid
- Most kegs have handles of rubber or steel
- Gas in connect
- Beer out connect
- 5 O-rings form tight seals around the lid, connects, and dip tubes
- Poppets: spring-loaded mechanisms in each of the connects
- Gas in dip tube: 1-2 inches long
- Beer out dip tube: reaches to the bottom of the keg
BALL-LOCK VS. PIN-LOCK KEGS

Brewers are faced with the choice of buying either a ball-lock or a pin-lock style kegs. What does this mean? What’s the difference?

Ball-lock and pin-lock simply refer to the type of connection between the keg and the gas and beer lines. Neither is necessarily better than the other, just be aware that once you buy-in to one type or the other, you’ll want to stick with that style of connection for all your kegs. It has been my experience that pin-lock is the most readily available. For this reason alone, you may want to go with this type of soda keg.

PREPARING YOUR KEG FOR HOMEBREW

Before you fill your keg with beer, you need to clean and sanitize the keg:

TO CLEAN YOUR KEG:

1. Take apart the keg, removing the lid, O-rings, connects, and dip tubes. Take care not to damage the various components.
2. Use a brewing grade cleaner to clean all of the components. Use a non-abrasive scrubber to wipe down the whole keg, inside and out. A 1/4-inch line brush may come in handy for cleaning out the dip tube.
3. Check all components for damage and replace if needed.
4. Rinse well.
5. Put the keg back together.

TO SANITIZE YOUR KEG:

1. Fill the keg with water and sanitizer mixed at the manufacturer’s recommended dilution rate.
2. Leave in contact per the manufacturer’s recommended time frame. (~2 minutes for Iodophor and Star San)
4. Replace the lid and turn keg upside down to make sure sanitizer reaches all points of the keg.
5. Drain the keg, by either dumping or siphoning the sanitizer, or by pushing it out with CO2 pressure.

Your keg is now ready to fill with homebrew.
FILLING YOUR KEG
This is the easy part! Once you have cleaned and sanitized your keg, you can simply siphon your beer from the fermenter into the keg and then attach the lid.

CARBONATING YOUR KEGGED HOMEBREW
Now that your beer is in the keg, it’s time to add carbonation. When kegging, this is referred to as force carbonation. You will first need to assemble your keg system.

1. Connect your CO2 regulator to the CO2 tank.
2. Connect one end of the gas line to the CO2 regulator, and the other end (the one with the quick disconnect) to the gas inlet connection on the keg.
3. Ensure that both the CO2 tank and regulator are all the way closed.

When you are ready to carbonate your beer:

1. Determine the amount of carbonation you want in your beer.
2. Determine the amount of pressure needed to carbonate your homebrew. Remember that the lower the temperature of the beer, the easier it will be to carbonate. (See chart)
3. Turn on the gas from the tank.
4. Turn on the gas via the regulator and set to your desired PSI.
5. Allow the beer to sit at a constant temperature under constant pressure for a minimum of 5 days. (If you have some headspace in the keg, this process can be accelerated by shaking the keg, which
6. Take a sample of beer. If the beer needs more carbonation, give it an extra couple days. If the beer is over carbonated, you can “bleed off” pressure by pulling up on the pressure relief valve.

7. When the beer is properly carbonated, you may disconnect the CO2 system until you’re ready to serve your beer.

SERVING YOUR HOMEREWDED BEER FROM A KEG

Now for the best part! When it’s time to serve your homebrew, you have to maintain the carbonation level in the beer but also apply enough CO2 pressure to force the beer out of the keg.

TO SERVE YOUR HOMEBREW:

1. Connect the CO2 system to your keg.
2. Connect the beer out line and tap to your keg.
3. Open the gas tank and regulator and set to about 10 PSI. You may have to use more or less pressure depending on temperature, volume, etc.
4. Fully depress the tap to pour your beer without excessive foam.
5. Enjoy!

TIP: AS YOU CONTINUE TO SERVE YOUR BEER, YOU MAY NEED TO INCREASE THE LEVEL OF CO2 PRESSURE.
CHAPTER 6: RECIPES AND STYLE GUIDES

In this section, I’ve included four recipes that will serve as a good starting point for the beginning brewer. I’ve also included links to over a dozen additional recipes and style guides that you can try as soon as you feel comfortable. Good luck!
CHAPTER 6: RECIPES

AMERICAN AMBER ALE
**AMERICAN AMBER ALE**

**SPECIFICATIONS:**
- **TOTAL BATCH SIZE:** 5-Gallon Recipe
- **TYPE:** Extract with Specialty Grains
- **APPROX. ORIGINAL GRAVITY:** 1.049
- **APPROX. ABV:** 4.6%
- **TOTAL BOIL TIME:** 60 min.
- **ANTICIPATED IBUS:** 26-29

**FERMENTABLES:**
- **6.6 LBS.** Light Liquid Malt Extract
- **.75 LB.** Amber Dried Malt Extract

**SPECIALTY GRAINS:**
- **8 OZ.** Crystal 80L° Malt (crushed)
- **2 OZ.** Special B Malt (crushed)
- **2 OZ.** Black Roasted Barley (crushed)

**HOPS:**
- **1.5 OZ.** Pelletized Hallertauer hops (60-minute boil time)
- **1 OZ.** Pelletized Fuggles hops (30-minute boil time)
- **1 OZ.** Pelletized Fuggles hops (10-minute boil time)

**YEAST:**
- **FERMENTIS:** Safale US-05

**BOTTLING:**
- **5 OZ.** Priming Sugar (Corn Sugar)
- **52** Bottle Caps
**AMERICAN AMBER ALE**

**BREW DAY DIRECTIONS:** Place specialty grains in a muslin grain bag. Steep the grains in clean, 150°F. water for 30 minutes. Remove grains and discard. Stir malt extract into wort. Bring to a boil. Add Hallertauer hops and boil for 30 minutes. Add one ounce of Fuggles hops and boil for 20 minutes. Add final ounce of Fuggles hops and boil for 10 minutes. Stir vigorously for 15-20 seconds to create a whirlpool. Chill wort with either an ice bath or wort chiller. Pour wort into a clean, sanitized fermenter, leaving hop and protein trub in the kettle. If needed, add enough clean, sterile water to make 5 gallons. When the wort is 70°F. or lower, sprinkle yeast into wort. Attach airlock to fermenter and let ferment in a cool, dark room (60°-70°F.) for two weeks.

**BOTTLING DAY DIRECTIONS:** Clean and sanitize about 52 bottles. Dissolve corn sugar in two cups of boiled water. Cool and add to bottling bucket. Siphon beer from fermenter into the bottling bucket. Fill bottles and cap with sanitized crowns. Beer will be ready to drink in two weeks!
ENGLISH INDIA PALE ALE
ENGLISH INDIA PALE ALE

SPECIFICATIONS:
TOTAL BATCH SIZE: 5-Gallon Recipe
TYPE: Partial Mash
APPROX. ORIGINAL GRAVITY: 1.065
APPROX. ABV: 6.4%
TOTAL BOIL TIME: 60 min.
ANTICIPATED IBUS: 40-45

FERMENTABLES:
6.6 LBS. Light Liquid Malt Extract
1 LB. Amber Dried Malt Extract
1 LB. UK Mild Ale Malt (crushed)
1 LB. Caramel/Crystal 40L (crushed)
.25 LB. Victory Malt (crushed)

HOPS:
2 OZ. Pelletized Kent Goldings hops (60-minute boil time)
2 OZ. Pelletized Kent Goldings hops (20-minute boil time)
2 OZ. Pelletized Kent Goldings hops (5-minute boil time)

YEAST:
FERMENTIS: Safale US-04

BOTTLING:
5 OZ. Priming Sugar (Corn Sugar)
52 Bottle Caps
ENGLISH INDIA PALE ALE

BREW DAY DIRECTIONS: Mix the crushed grains in a pot with 3 qts. of clean water at 160°F. Hold mash at 150°F-152°F. for 60 minutes. Strain wort through a strainer and into the brew kettle. Rinse with 2 qts. of water at 170°F. Remove kettle from heat and stir malt extracts into the wort. Add enough water to bring volume to about 3.5 gallons. Bring wort to a boil. Add bittering hops and boil for 40 minutes. Add flavoring hops and boil for 15 minutes. Add aroma hops and boil for 5 minutes. Stir vigorously for 15-20 seconds to create a whirlpool. Chill wort with either an ice bath or wort chiller. Pour wort into a clean, sanitized fermenter, leaving hop and protein trub in the kettle. If needed, add enough clean, sterile water to make 5 gallons. When the wort reaches 70°F., or lower, sprinkle in the yeast. Attach airlock to fermenter and let ferment in a cool, dark room (60°F-70°F.) for two weeks.

BOTTLING DAY DIRECTIONS: Clean and sanitize about 52 bottles. Dissolve corn sugar in two cups of boiled water. Cool and add to bottling bucket. Siphon beer from fermenter into the bottling bucket. Fill bottles and cap with sanitized crowns. Beer will be ready to drink in two weeks!
BAVARIAN WHEAT BEER (HEFEWEIZEN)
BAVARIAN WHEAT BEER (HEFEWEIZEN)

SPECIFICATIONS:
TOTAL BATCH SIZE: 5 Gallons
RECIPE TYPE: Partial Mash
APPROX. ORIGINAL GRAVITY: 1.049
APPROX. ABV: 4.6%
TOTAL BOIL TIME: 60 min.
ANTICIPATED IBU: 9–11

FERMENTABLES:
6.6 LBS. Wheat LME
8 OZ. White Wheat Malt (crushed)
8 OZ. Carapils® Malt (crushed)

HOPS:
0.5 OZ. Pelletized Tettnanger hops (60-minute boil time)
0.5 OZ. Pelletized Tettnanger hops (15-minute boil time)

YEAST:
FERMENTIS: Safbrew WB-06

BOTTLING:
5 OZ. Priming Sugar (Corn Sugar)
52 Bottle Caps
BAVARIAN WHEAT BEER (HEFEWEIZEN)

BREW DAY DIRECTIONS: Mix the crushed grains in a pot with 1.5 qts. of clean water at 160°F. Hold mash at 150°-152°F. for 60 minutes. Strain wort through a strainer and into the brew kettle. Rinse with 1 qt. of water at 170°F. Add enough water to bring volume to about 3 gallons. Remove kettle from heat and stir malt extracts into the wort. Bring wort to a boil. Add bittering hops and boil for 45 minutes. Add flavoring hops and boil for 15 minutes. Stir vigorously for 15-20 seconds to create a whirlpool. Chill wort with either an ice bath or wort chiller. Pour wort into a clean, sanitized fermenter, leaving hop and protein trub in the kettle. If needed, add enough clean, sterile water to make 5 gallons. When the wort is 65°F., or lower, sprinkle in the yeast. Attach airlock to fermenter and let ferment in a cool, dark room (60°-65°F.) for two weeks.

BOTTLING DAY DIRECTIONS: Clean and sanitize about 52 bottles. Dissolve corn sugar in two cups of boiled water. Cool and add to bottling bucket. Siphon beer from fermenter into the bottling bucket. Fill bottles and cap with sanitized crowns. Beer will be ready to drink in two weeks!
CHAPTER 6: RECIPES

AMERICAN STOUT
**AMERICAN STOUT**

**SPECIFICATIONS:**
- **TOTAL BATCH SIZE:** 5 Gallons
- **TYPE:** Extract with Specialty Grains
- **APPROX. ORIGINAL GRAVITY:** 1.067
- **APPROX. ABV:** 6.6%
- **TOTAL BOIL TIME:** 60 min.
- **ANTICIPATED IBUS:** 40-45

**FERMENTABLES:**
- **6.6 LBS.** Dark Liquid Malt Extract
- **2.0 LBS.** Dark Dried Malt Extract

**SPECIALTY GRAINS:**
- **8 OZ.** Chocolate Malt
- **4 OZ.** Caramel (Crystal) Malt 20°L
- **4 OZ.** Black Roasted Barley: Unmalted
- **4 OZ.** Flaked Barley

**HOPS:**
- **1 OZ.** Pelletized Nugget (60-minute boil time)
- **1 OZ.** Pelletized Willamette (30-minute boil time)
- **1 OZ.** Pelletized Willamette (10-minute boil time)

**YEAST:**
- **FERMENTIS:** Safale US-05

**BOTTLING:**
- **5 OZ.** Priming Sugar (Corn Sugar)
- **52** Bottle Caps
**AMERICAN STOUT**

**BREW DAY DIRECTIONS:** Place specialty grains in a muslin grain bag. Steep the grains in clean, 150°F. water for thirty minutes. Remove grains and discard. Stir malt extract into wort. Bring to a boil. Add Nugget hops and boil for 30 minutes. Add Willamette hops and boil for another 20 minutes. Add final ounce of Willamette hops and boil for another 10 minutes. Stir vigorously for 30 seconds to create a whirlpool. Chill wort with either an ice bath or wort chiller. Pour wort into a clean, sanitized fermenter, leaving hop and protein trub in the kettle. If needed, add enough clean, sterile water to make 5 gallons. When wort is 70°F., or lower, sprinkle in the yeast. Attach airlock to fermenter and let ferment in a cool, dark room (60°-70°F.) for two weeks.

**BOTTLING DAY DIRECTIONS:** Clean and sanitize about 52 bottles. Dissolve corn sugar in two cups of boiled water. Cool and add to bottling bucket. Siphon beer from fermenter into the bottling bucket. Fill bottles and cap with sanitized crown. Beer will be ready to drink in two weeks!
Additional Recipes & Styles Guides:

- American IPA
- Brown Ale
- Barley Wine
- Chipotle Smoked Porter
- English Pale Ales: Bitter, Special Bitter, ESB
- German Bock
Additional Recipes & Styles Guides:

- Ginger Ale
- Kölsch
- Malt Liquor
- Oktoberfestbier
- Rye Pale Ale
- Pumpkin Ale
Additional Recipes & Styles Guides:

SAISON

SCOTCH ALE

SUMMER ALE

WINTER SPICED ALE

WITBIER
CHAPTER 7: FAQs

The following Frequently Asked Questions address some of the most common questions that arise for a beginning homebrewer.
WHAT’S BETTER: ALL-GRAIN OR EXTRACT BREWING?

It depends on many factors: time, budget, experience level. For the beginning brewer, it’s recommended to start with extract brewing before progressing to all-grain. This way, you can learn the basic steps involved in making your own beer and gradually use more techniques as you go along. Both methods of brewing can be used to make excellent beer.

CAN I USE MY TAP WATER FOR BREWING?

Yes! If your tap water tastes fine, it will work for brewing. However, if you can taste chlorine, sulphur or other chemicals, you may find that these flavors can come through in your final beer. Chlorine will boil off, but otherwise you should consider using bottled water.

The main exception is if you are trying to recreate the water profile for a famous brewing city. In this case you should start out with distilled or reverse osmosis water and add in the mineral compounds that you need. A final note: if mixing tap water into your wort or beer, it should be sterilized by boiling it for 20 minutes and then chilled (if necessary).

CAN I USE BOTTLED WATER FOR BREWING?

Yes! The main consideration is when brewing all-grain. Because some bottled water is processed to remove minerals, you may need to add minerals back to the water to have a successful mash.

CAN I ADD XYZ INGREDIENT TO MY BEER?

Yes! But that doesn’t mean it will turn out well. My advice: 1) Research, 2) Use half as much as you think you need, 3) If it doesn’t taste good at first, let the beer age for two months and try it again.
WHICH SANITIZER SHOULD I USE?
It’s up to you. There are many good sanitizers that you can use. Some brewers prefer Star San. I like Iodophor. They’re both fast-acting and effective at the appropriate dosage. Try them both and choose which one you prefer. In a pinch, you can use unscented household bleach, just be sure to rinse very well with hot (preferably pre-boiled) water to rinse away and evaporate any residual bleach.

WHAT’S BETTER: GLASS OR PLASTIC FERMENTERS?
It’s up to you. There are pros and cons to each. Glass is heavier and generally more expensive. It’s also more prone to breaking. On the other hand, they’re clear, so you can see what’s happening inside. Plastic fermenters are lighter. Some are virtually indestructible. But plastic fermenters can be scratched, giving wild yeast and other spoilers a place to hide. If you stick with homebrewing for any amount of time, you will likely accumulate both kinds. Choose whichever you prefer.

MY BEER DIDN’T FERMENT DOWN TO MY PREDICTED FINAL GRAVITY – WHAT SHOULD I DO?
Make sure that the beer has stopped fermenting by taking gravity readings a few days apart with your hydrometer. If you’re close (within about five to ten points), you’re probably in good shape. If your final gravity is off by twenty points or more, you may have encountered a stuck fermentation. Read What Is a Stuck Fermentation, and How to Avoid It for some advice on how to fix it.

DID I RUIN MY BEER?
Probably not. Remember that people have been brewing for thousands of years, without all the technical gadgets that we have today. Don’t fret if you added the hops a minute too late or forgot to use Irish moss. There are thousands of variations that go into making beer and chances are you didn’t ruin the batch. If you did make a mistake, just write down what went wrong and learn for your next batch.
HOW MUCH PRIMING SUGAR SHOULD I USE?

Though most homebrew recipe kits come with 5 oz. of priming sugar, this is about the amount that you should use in a five-gallon batch. To avoid having bottles that gush out when you open them, use a priming calculator to figure out exactly how much sugar to use.

CAN I BOTTLE MY BEER IN GROWLERS?

I wouldn’t recommend it. Your standard glass growler isn’t made to withstand the pressure that builds up during bottle conditioning. I lost two growlers before I learned that it’s not worth the broken glass and the lost beer.

MY BEER IS FLAT – WHAT SHOULD I DO?

Your beer probably just needs more time. Make sure the bottles are stored in a room at a constant temperature of 70°F.

MY BEER HAS TOO MUCH CARBONATION – WHAT SHOULD I DO?

If your beer is in a keg, you may be able to bleed off some pressure from the pressure relief valve and give the beer a day or so to balance out. If the beer is in bottles, there’s not much you can do. Open your bottles over a sink in case they over flow, and pour into a glass or pitcher to allow some of the carbonation to come out of suspension. Look back over your notes to see how much priming sugar you used and keep this in mind for the next time you bottle.
**ABV:** alcohol by volume \([\text{OG} - \text{FG}] \times 131.25 = \text{ABV}\)

**ADDITIVES:** ingredients which contribute flavor or other qualities to a beer; may be used to improve clarity or amend water

**ADJUNCTS:** ingredients other than malted barley which contribute fermentable sugars to a wort, such as malted wheat and rye, oats, corn, and various sugars

**AERATION:** the process of incorporation oxygen into wort; improves yeast performance during fermentation

**ALE:** beer that is fermented at higher temperatures (~60-75°F.) by top-fermenting ale yeast

**ATTENUATION:** the percentage of sugars consumed by yeast during fermentation

**COLD BREAK:** chilling beer after the boil; also, the proteins and other material that precipitate out during this process

**CROWNS:** bottle caps

**DME:** dried malt extract

**DRY HOPPING:** the process of adding hops directly to beer in the secondary fermenter for increased hop aroma; usually for about four days

**ESTERS:** aromatics created by yeast during fermentation, usually described as fruity

**FERMENTATION:** the process by which yeast converts sugar into alcohol

**FINAL GRAVITY (FG):** a measurement of the sugars remaining in beer after fermentation

**FININGS:** additives used to improve beer clarity

**FLOCCULATION:** the ability of yeast to clump together and settle out of solution

**FORCE CARBONATION:** using CO2 pressure to force carbonation in beer

**HOPS:** the flowers of humulus lupulus, which are used to add bitterness, flavor, and aroma to beer

**HOT BREAK:** the precipitation of proteins during the boil; also, the material that coagulates during this process

**IBUS:** International Bittering Units, a measurement of a beer’s bitterness

**INFUSION MASH:** the simplest type of mash, in which crushed, malted grains are soaked in hot (148-158°F.) water to convert starches into fermentable sugars

**LAGER:** beer that is fermented at lower temperatures (~40-60°F.)

**LME:** liquid malt extract

**MALT:** grain which has been modified by a maltster, making starches and enzymes available for brewers to extract fermentable sugars from the grain

**MALT EXTRACT:** condensed wort, either in dried or liquid form
**ORIGINAL GRAVITY (OG):** a measurement of sugars in wort prior to fermentation

**PITCHING:** adding yeast to the wort; try to pitch when the wort is at fermenting temperature so as not to shock the yeast

**PRIMING SUGAR:** a small amount of sugar added to beer prior to bottling, which gives yeast additional food and allows them to produce enough CO2 to carbonate beer

**RACKING:** the process of transferring beer from one fermenter to

**SECONDARY FERMENTATION:** an optional fermentation step, moving beer from one fermenter to another, leaving behind yeast sediment in the first fermenter

**SPARGE:** rinsing grains after the mash with hot water

**STRIKE TEMPERATURE:** the temperature of the water before mashing in, usually 10-15°F above mash temperature

**TRUB:** hop and protein material left behind in the kettle or fermenter

**WORT:** unfermented beer

**YEAST:** the single-celled microorganism responsible for fermentation
RECOMMENDED RESOURCES

Below are some recommended resources for learning more about homebrewing:

**BOOKS**

THE COMPLETE JOY OF HOMEBREWING, CHARLIE PAPAZIAN: The original homebrewing guidebook, written by the godfather of homebrewing.

HOMEBREWING FOR DUMMIES, MARTY NACHEL: An excellent all-around homebrewing resource.

DESIGNING GREAT BEERS, RAY DANIELS: An encyclopedia of classic beer styles and the ingredients used to make them.

RADICAL BREWING, RANDY MOSHER: This book includes a number of recipes and techniques for getting creative with your homebrewing.

THE HOMEBREWER’S GARDEN, JOE & DENNIS FISHER: An excellent guide for growing your own hops, grains, and herbs for brewing.

**MAGAZINES**

BREW YOUR OWN MAGAZINE  ZYMURGY MAGAZINE

**WEBSITES**

E. C. KRAUS HOMEBREWING BLOG  E. C. KRAUS BEER RECIPES  BREWER’S FRIEND (RECIPE BUILDERS AND CALCULATORS)