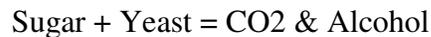


Introduction

Hello, and welcome to the Butler Winery home brewing primer! The purpose of this article is to provide basic instruction for beginning brewers who want to enter the world of home brewing, but are unsure how to proceed. This is not a scientific article, and should not be treated as an infallible reference for all techniques of brewing science. Rather it is a guideline to help beginners understand the hobby, and to make quality beer every time. The basic principles discussed should provide the necessary foundation for good brewing habits, and will be useful to a brewer no matter what level of brewing proficiency they achieve. By the end of this article, the new brewer should be more confident about his or her decisions when buying equipment, gathering ingredients, and making their first brew. So grab a beer and let's get started!

Basics

Home brewing is not very different from cooking. Grains are prepared at varying temperatures in order to turn starch into sugar. For now we won't worry about how grains are prepared to release sugar, known as *malting*. We will just focus on the sugar and its role in another reaction in beer known as *fermentation*. Fermentation is actually very easy to understand. First, *yeast* is introduced to a sugar solution, such as extracted malted grains. Yeast is a living organism, consisting of a single cell. The role of yeast in brewing is to consume the sugars extracted from grains. When this happens, two byproducts are produced. One is CO₂, which provides carbonation, and the other is alcohol. Put simply:



This simple process takes care of itself, provided you, the home brewer, help ensure that conditions are just right for fermentation to occur. Now that we have covered the most basic and important process in brewing, we can start shopping for the necessary equipment and ingredients. We will start by familiarizing ourselves with the most common methods of home brewing.

The Four Brewing Methods

Thanks to advances in malting and brewing science we can choose how much preparation time we want to spend before starting fermentation. The different methods of brewing are based on how much work the brewer has to do his or herself. The type of brewing you choose to do will determine what equipment and ingredients you will need. The three common methods are listed below, plus a non-conventional type of popular brewing.

- Beer Machines and Appliances: Various companies sell fermenting vessels that advertise easy brewing in a specialized container. While these contraptions look like a good idea at first, there are a number of problems that brewers encounter down the line.
 1. Lack of ingredients: The “specialized” ingredients for these systems can only be purchased from the company that made the system. They do not release them for sale at homebrew stores. The ingredients are often inferior as well, using refined sugar instead of sugar taken from malt.
 2. Expense of ingredients: As you might expect, a company that has a monopoly on its ingredients charges more. The price per batch can be so high that owners of these systems often come running to homebrew stores for help. Fortunately, ingredients can be purchased (often for a much lower price) that will keep your system running.
 3. Lack of control: While some brewers like to keep it simple, many others embrace the wide variety of options available in the world of home

brewing. Brewing systems are inherently limited because of their fixed size and restricted ingredients. In short, spend your money on a more traditional brewing set-up. It can expand as your interest in brewing expands, and provide you with years of home brewing pleasure.

- **Brewing with “Kits”:** Many companies manufacture pre-prepared malt extract with hops and specialty grains already added to the malt. The syrup in these kits is called *malt extract*. Malt extract is a concentrated syrup or powder that is made from the sugars and other compounds found in grain. The end product is useable at any time by the brewer. Beer made from kits has both advantages and disadvantages, as seen below.
 1. **Ease of Preparation:** Beer kits require very little work. Most kits can be prepared without even boiling water. The directions are simple and only a little corn sugar or malt extract is needed to complete the kit. Just add some hot water, and add yeast when the prepared beer (known as *wort*) has cooled to room temperature. Then sit back and wait for fermentation to start.
 2. **Flexibility:** Although kits may seem limited at first, they are actually capable of making a wide variety of beers. Many books and other media present recipes using the same kits available in homebrew stores, plus some extra ingredients to change or enhance the style that the kit was designed to make. Many brewers continue to make kit beers throughout their time brewing.
 3. **Lack of Standardization:** One difficulty with kits is that they tend to vary greatly in the amount of beer they make. Kits that make stronger beer must be more concentrated, and therefore take up less volume. Others are in U.K. pints, and make a larger batch than the U.S. standard. Fortunately brewing buckets hold a large volume of liquid, and smaller vessels can be purchased for small batches.
 4. **Less Control:** Since hops and specialty grains are already included in the extract for the kit, there is less opportunity to fine-tune your beer for optimum hop flavor, color, and body. Kit recipes overcome some of this problem, but you can’t take something out of the ingredients once it goes in. For the brewer who wants more control, hopped kits may be slightly frustrating.
- **Malt Extract Brewing:** This method is by far the most common way to brew. Brewing malt extract batches allows significant improvement in control and style. The quality is usually quite good, and there is plenty of room to “customize” your beer. Malt extract recipes use base malt in syrup or dried form. This extract provides most of the fermentable sugar and much of the color in the brew. Specialty grains are also crushed for steeping, and hops are added to taste or style. We will talk later about the process of extract brewing. For now we will concentrate on the advantages and disadvantages of this method.
 1. **More Control:** Malt extract recipes are capable of making virtually any style of beer. Color, body, and flavor can all be modified in malt extract recipes. Other ingredients such as fruit or extra hops can be added in these styles as well.
 2. **Abundance of Recipes:** Weather you look on the internet or in books, you will find a vast selection of recipes. These range from “clone” brews that produce beers similar to a commercial style, to favorite recipes of authors

and veteran home brewers. There is also the possibility of designing your own recipes with malt extract.

3. Superior Quality: Extract recipes only use grain and grain extracts. These ingredients are far superior to beers made with refined sugars or large quantities of adjuncts. The hops are usually fresher than the hopped kits as well. Extract recipes are capable of making beers similar in quality to micro brews or craft beers.
 4. Higher Expense: Malt extract recipes are by far the most expensive to make. The processed malt extract is quite costly. In addition, more equipment is usually needed to ensure the highest quality possible.
 5. Time Intensive: Malt extract beers require more time to brew due to the necessity of boiling the ingredients. The time needed is about 2-3 hours including sanitizing and cleanup. These beers also usually undergo a secondary fermentation stage which adds about 2 weeks to the brewing schedule.
- All Grain Brewing: This final form of brewing is the most time intensive style, and requires additional equipment compared to the other methods. The payback is the ability to maximize the control the home brewer has over their beer in terms of style, color, and fermentation ability. All grain brewing most resembles the way commercial beers are made. The quality of all grain beers is perhaps slightly higher than malt extract beers, but the expense is considerably lower. We won't worry about this style in this primer, but the home brewer should know that this style is available once he or she becomes comfortable with brewing basics.

Buying Equipment

New brewers are often daunted by the plethora of equipment available in homebrew stores and websites. While there are several gadgets that can make home brewing easier, the basic equipment necessary for brewing remains the same. To simplify selection of equipment, we will look at what is needed for the four stages of brewing: preparation and boiling, cleaning, fermentation, and bottling.

- Preparation and Boiling: First, you should take a look at your kitchen. A dirty kitchen could cause bacteria or wild yeast to infect your beer. This usually produces off flavors or even undrinkable beer. Thoroughly clean all surfaces in your kitchen before brewing. Materials you will need are as follows:
 1. Boiling Pot: Water needs to be heated or boiled for most recipes. Make sure your pot is capable of holding more than 2 & ½ gallons of water. Stainless steel pots with a copper bottom are best.
 2. Thermometer: It is essential to all forms of brewing to be able to measure the temperature of the water or wort. A good thermometer is essential for home brewing.
 3. Steel or Wooden Spoon: Stirring is important for preventing the wort from sticking to your brew pot, and is useful to aerate your wort before fermentation.
 4. Brew Journal: Keeping accurate records of your brews has several advantages. First, you can keep track of favorite recipes so that you can repeat your previous successes. Second, writing down all the steps of the boil and fermentation can help you keep track of time. This helps to keep your brewing on schedule. Third, ingredients can vary seasonally, especially hops. Having a record of the strength of your hops will help you match the bitterness from one batch to another.

- Cleaning and Sanitation: Thorough cleaning and sanitation is essential for a successful fermentation. It cannot be emphasized enough how important it is to sanitize all surfaces that come in contact with the wort. Sanitation should be performed within an hour before use to insure that new organisms cannot collect on your equipment. After brewing, be sure to clean everything you have used to ensure no residue hardens on your equipment.
 1. Cleanser: There are many quality cleansers especially for the home brewer. The most popular are usually oxygen based cleansers. These cleansers are usually environmentally safe and safe to handle. Two of the most popular cleansers are B-Brite and One Step. These cleansers also work as sanitizers, and are ideal for brewing equipment.
 2. Sanitizer: If you are using a cleanser that doesn't sanitize as well, you should get a dedicated sanitizer. The most common ways to sanitize are boiling or a mild bleach solution. Boiling kills germs and wild yeast, but may melt certain plastic items for brewing. Bleach is a very hazardous chemical, and care should be exercised when using it. Half of a cap full of bleach is enough for about 5 gallons of water. Brewing supply stores often have other sanitizers which are less dangerous to use, and are usually the best solution.
 3. Brushes: Brushes designed to clean bottles and fermenters are quite useful. Be sure to scrub everything thoroughly after use.
- Fermentation: The equipment needed for fermentation is relatively simple. We need something to ferment in, a way to keep air out of the fermenter, and a way to transfer the beer from one container to another.
 1. Fermentation Vessel: This is what will hold your beer when fermenting. The most common vessels are plastic buckets and glass jugs known as carboys. Be sure that plastic buckets are made from food grade plastic and have a tight fitting lid. The lid should have a hole with a grommet in it. Glass containers will never impart flavor and are basically immune to scratches. They usually don't have enough space for the rather volatile fermentation process, so an extra step should be used to prevent a beer explosion, as explained below.
 2. Airlocks: An airlock is a device that prevents outside air from entering the fermenter, while allowing CO₂ from the fermentation to escape. Basically, the airlock uses a layer of water to accomplish this. An airlock can also be created by running a hose from the fermenter and then submerging the other end in a container of water. If you blow on the hose then bubbles come out, while if you suck on the hose water comes through, and no outside air comes through the hose. This technique should be used when fermenting in a glass carboy.
 3. Racking Equipment: The best way to move beer to one container from another is to siphon the liquid. In brewing this process is known as *racking*. Kit beers will usually go straight into bottles, while extract batches must go from the primary fermenter to a secondary fermenter. All that is really needed is a length of siphon hose, but a straight tube with a 90° bend at the top, called a racking cane, is useful to hold the siphon hose in place.
 4. Hydrometer: While some home brewers find this piece of equipment optional, the brewer should become accustomed to using it properly.

A hydrometer measures the *specific gravity* of your beer, which is the density of the liquid. The more sugar from grain, the higher the number. As alcohol is produced, the number decreases. Many recipes list a starting and final specific gravity. These numbers help you to determine if the batch you are making is on target with the recipe. Knowing your specific gravity can help your home brew store to solve any problems you are having with your batch.

- Bottling: By the time you are ready to bottle, your wort will have turned into beer. Bottling takes some time, but is a fairly simple process.
 1. Bottles: Obviously, your beer needs a home after fermentation is over. Any Bottles will work, provided they are clean and sanitized. You can buy new bottles, or just scrub out some bottles from your previous purchases.
 2. Bottle Caps: Bottle caps can be purchased from home brew stores for about 2.75 per gross. Avoid bottle caps from craft stores, as these caps may not have been designed for brewing. You will need 54 caps for a 5 gallon batch.
 3. Bottle Capper: A capper holds your bottle cap in place with a magnet while you use a lever arm to crimp the cap around the bottle mouth. For ease of use, be sure the capper you buy has a magnet.

The Process

Now that you have equipment and a basic knowledge of brewing techniques, it's time to gather some ingredients and make a batch of beer! For this example, we will use the malt extract method. Kit beers are mostly self explanatory, and usually come with instructions that are easy to follow. Because there are more steps involved with malt extract recipes, we can learn more about the process of brewing, and then the brewer can move back to kits, which share several steps with malt extract methods. So let's get started on your first batch!

1. Choosing a Recipe: Your first recipe should be something simple. We will make an ale style beer because these beers are easier to make. Choose a beer style or clone that you are familiar with. That way you can taste and see if your beer has the same quality as one of your favorites. If the taste is drastically off, then you know something has gone wrong somewhere. Recipes can be found in books, on line, or in magazines dedicated to home brewing. Make a thorough list of what you need before you go shopping. Write the recipe in your brew journal.
2. Gather Ingredients: Whether you shop at a store or online, your ingredients should be picked carefully. This is the heart and soul of your beer, so be sure to match your recipe as closely as possible. Sometimes you will have difficulty finding certain ingredients. This is a time when it is advantageous to go to a local brewing supply shop in order to get advice quickly. Often the staff will know of a good substitute for your missing ingredient. If several ingredients are unavailable, you should choose a different recipe for your first batch. Write down any variations to the recipe in your brew journal, along with hop strength (measured in alpha acid percentage), and brands of products used.
3. Cleaning and Preparation: Clean and sanitize everything you will use to make your beer. Once again, it cannot be stressed enough that sanitation is essential to making good brew. Any item being used in the boil will be sanitized from

the heat, but you should still take care of such items as if they were not being boiled. Gather all your materials and arrange them in a convenient fashion as to insure everything is ready when the recipe calls for the next ingredient. If you have liquid malt extract, you should heat it in water before opening the can. This makes the extract pour more easily. Double check your ingredients and recipe. Write that you have sanitized and checked ingredients in your brew journal.

4. Steeping Grains: The specialty grains from your recipe will need to be steeped at 150°. This will extract color, sweetness, and a small amount of fermentable sugar. Usually you can purchase grain bags that will remove the need to strain the spent grains. Place all your grains in a grain bag and submerge the bag in 2 quarts of water. When the grain is added the water temperature will drop, so use your thermometer to adjust the heat levels. This steeping process usually lasts for twenty minutes to a half hour. When the steeping is over, pour water over the grain bag to wash the rest of the grain tea into the brew pot. Write down ingredients added, time of steeping, and any temperature fluctuations in your brew journal.
5. The Boil: For this recipe, we will perform a concentrated boil of 2 ½ gallons. Add water to your steeped grains until the volume is 2 ½ gallons, and then raise the temperature of the water to a rolling boil. At this point, add your malt extract. The temperature will drop again, so use your thermometer to make adjustments. Be sure to stir the ingredients with your spoon to dissolve the malt extract. Continue to stir to prevent the pot from boiling over. Once the malt extract is added, it's time to add the bittering hops. These hops will give the beer its sharpness or "bite". Be aware that the schedule for when to add hops measures the number of minutes *remaining* in the boil, so count backwards. Our boil will last 1 hour, with hops being added intermittently towards the end of the boil. Use your thermometer to maintain a constant temperature of 220°. Aroma hops are usually added at the last 10 minutes of the boil. Write down every step performed, along with when each was performed in your brew journal.
6. Preparing for Fermentation: When the boil is finished, it is time to cool your freshly made wort. There are many methods you can use to chill the wort, with some being better than others. One common method is to place the boiling pot in a sink and run cold water around the pot. Stir the wort to distribute heat evenly. This method requires a lot of water. You can also add cold water to bring the wort down to fermentation temperatures when you bring your batch up to 5 gallons. This works pretty well, but usually doesn't drop the wort to the desired temperature. If you are planning to do your fermentation in a carboy, add cold water first to prevent heat shock which could crack the carboy. The best method to cool wort is with a device known as a wort chiller. This simple gadget runs water from the faucet into a coil of copper tubing, and then back out to the sink. While a wort chiller is a good investment, you probably won't be using one for your first batch. A final and effective method is to freeze bottles of water and place them in the wort to cool the liquid. Extreme care must be taken to keep the bottles sanitary, as the outside of the bottle can carry bacteria and other harmful organisms. When the temperature drops below 90° you are ready to pitch your yeast. Write down all the details of the boil in your brew journal.

7. Fermentation: When your wort is the right temperature, it is time to add yeast, which is known as *pitching*. It is very important to make your wort the right temperature, as drastic temperature change can shock or kill the yeast. Place your airlock with water in the hole in the fermentation bucket, or attach it to a bung for your carboy. Within 24 hours you should see the first signs of fermentation. This is known as primary fermentation. After 3-5 days the primary fermentation will settle down. It is then time to move the beer into the secondary fermenter, which should be a carboy in order to minimize the space for oxygen. Oxygen is necessary to start fermentation, but after that you should work to keep your beer from contact with oxygen. Racking to the secondary fermenter also leaves behind sediment and dead yeast, both of which can harm your beer. After about two weeks you are ready to bottle your beer. Write down the dates you racked your beer in your brew journal.
8. Bottling: The final step is to package your beer for your later enjoyment. First, dissolve 5 oz of corn sugar in your beer. The remaining yeast will ferment the sugar into CO₂, thus carbonating your beer. Use your racking cane to siphon the beer into bottles, cap them, and then store them in a cool, dark place. After two weeks, your beer will be carbonated and ready to drink!

Final Advice

Hopefully you now feel more prepared to enter the world of brewing. Remember, there are many ways to make beer, but following the guidelines in this primer will insure that you can get help from your local shop. The closer you stay to the home brewing standard, the easier it is to make good beer and get sound advice. Remember to relax. Brewing is not meant to be harrowing, but should be enjoyable instead. You cannot kill yourself with bad beer, and the worst thing that usually happens to brewers is a carboy that turns into a geyser during primary fermentation. If you have questions before you start brewing, contact someone who knows how to answer your question accurately and in a way you can understand. Butler Winery often answers questions for brewers, and we can be contacted by e-mail at vineyard@butlerwinery.com. We usually respond to e-mails within 24 hours. So good luck, and may your first batch be a smashing success!

Cheers!
Jeremiah