Basic Brewing Instructions

BEGINNING THE BOIL:
Bring 2 1/2 gallons water to a boil in a large pot. Meanwhile, re-hydrate the dry yeast. When the water is boiling, remove from the heat. Add all the malt syrup to the hot water and stir until dissolved. Make sure there is no syrup stuck to the bottom of the pot by scraping the bottom of the pot with the spoon while stirring. It is very important not to burn any malt stuck to the bottom when the pot is returned to the heat. Burnt sugar tastes terrible.
The following stage is critical. The pot needs to be watched continuously. Return the pot to the heat and bring to a rolling boil, stirring frequently. Start timing the hour.
If you are adding bittering hops, do so now.
A foam may start to rise and form a smooth surface. This is good. If the foam suddenly billows over the side, this is a boil over (Bad). By the way, adding hop pellets at this stage tends to trigger a boilover if the pot is really full. Murphy's Law… The liquid is very unstable at this point and remains so until it goes through the Hot Break (when the wort stops foaming). This may take 5-20 minutes. The foaming can be controlled by lowering the heat and/or spraying some water on the surface from a spray bottle. The heat control using an electric range is poor. Try to maintain a rolling boil. Boiling 2.5 – 3 gallons can be maintained fairly easily on an electric stove. Boiling the full 5 gallons of water on electric ranges is almost impossible (not enough heat) and dangerous to lift when the boil is over.
Continue the rolling boil for the remainder of the hour. Stir occasionally to prevent scorching. There may be a change in color and aroma and there will be particles floating in the wort. This is not a concern, it's the hot break material. If you are adding the finishing hops, do so during the last fifteen minutes. Add during the last five minutes if more hop aroma is desired. This provides less time for the volatile oils to boil away.

COOLING THE WORT:
At the end of the boil, cooling the wort is very important. While it is above 130F, bacteria and wild yeasts are inhibited. It is very susceptible to oxygen damage as it cools though. There are also sulfur compounds that evolve while the wort is hot. If the wort is cooled slowly these di-methyl sulfides can dissolve back into the wort causing cabbage or cooked vegetable flavors

in the final beer. The objective is to rapidly cool the wort to below 80F before oxidation or contamination can occur. Here is one preferred method for cooling the wort.
Place the pot in a sink or tub filled with cold/ice water that can be circulated around the hot pot. While the cold water is flowing around the pot, gently stir the wort in a circular pattern so the maximum amount of wort is moving against the sides of the pot. If the water gets warm, replace with cold water. The wort will cool to 80F in about 20 minutes. When the pot is still warm to the touch, the temperature is close enough.
Pour the reserved 2.5 gallons of water into the sanitized fermenter. Pour the warm wort into it, allowing vigorous churning and splashing. Oxidation of the wort is minimal at these temperatures and this provides the dissolved oxygen that the yeast need to reproduce. Combining the warm wort with the cool water should bring the mixture to fermentation temperature. It is best for the yeast if the pitching temperature is the same as the fermentation temperature. For Ale yeasts, the fermentation temperature range is 65-75F. (The temperatures mentioned are not absolutely critical and a thermometer is not absolutely necessary, but is nice to have.)
Note: Do not add commercial ice to the wort to cool. Commercial Ice harbors lots of dormant bacteria that would love a chance to work on the new beer. Bottled Drinking Water is usually pasteurized or otherwise sanitized to inhibit contamination.

PITCHING THE YEAST:
If the Dry Yeast Starter is not foaming or churning, use the backup yeast. Repeat the re-hydration procedure and then pitch the Yeast Starter into the beer, making sure to add it all. Put the lid in place and seal it. Do not put the airlock in quite yet. Place a piece of clean Saran Wrap over the hole in the lid and cover it with your hand.
With the fermenter tightly sealed, pick it up, sit in a chair, put the fermenter on your knees and shake it several minutes to churn it up. This mixes the yeast into the wort and provides more dissolved oxygen that the yeast need to grow. Wipe off any wort around the hole with a paper towel that is wet with bleach water and place the sanitized airlock and rubber stopper in the lid. The airlock should be filled to the line with the bleach water solution.
Active fermentation should start within 12 hours. It can be longer for liquid yeasts because of lower cell counts, about 24 hours.

FERMENTATION:
Put the fermenter in a protected area like the bathtub. If foam escapes it will run down the drain and is easy to clean. The temperature here is usually about the most stable in the house. Animals and small children are fascinated by the smell and noises from the airlock, so keep them away.
The airlock should be bubbling in twelve hours. Maintain a consistent temperature if possible. Fluctuating temperature strains the yeast and could impair fermentation. On the other hand, if the temperature drops overnight and the bubbling stops, simply move it to a warmer room and it should pick up again. The yeast does not die, it merely goes dormant. It should not be heated too quickly as this can thermally shock the yeast. In summary, if the temperature deviates too

much or goes above 80F, the fermentation can be affected, which then affects the flavor. If it goes too low, the ale yeast will go into hibernation.
The fermentation process can be very vigorous or slow; either is fine. The secret is in providing enough active yeast. Fermentation time is a sum of several variables with the most significant probably being temperature. It is very common for an ale with an active ferment to be done in a short time. It could last a few days, a week, maybe longer. Any of the above is acceptable. Three days at 70F may be regarded as typical for the simple ale being described here.
If the fermentation is so vigorous that the foam pops the airlock out of the lid, just rinse it out with bleach water and wipe off the lid before replacing it. Contamination is not a big problem at this point. With so much coming out of the fermenter, not much gets in. Once the bubbling slows down however, do not open the lid to peek. The beer is still susceptible to infections, particularly anaerobic ones like Lacto Bacillus, found in your mouth. It will do just fine if left alone for a minimum of two weeks.
The fermentation of malt sugars into beer is a complicated biochemical process. It is more than just attenuation, which can be regarded as the primary activity. Total fermentation is better defined as two phases, the Primary or Attenuative phase and a Secondary or Conditioning phase. The yeast do not end Phase 1 before beginning Phase 2, the processes occur in parallel, but the conditioning processes occur more slowly. This is why beer (and wine) improves with age. Tasting the beer at bottling time will show rough edges that will disappear after a few weeks in the bottle. Because the conditioning process is a function of the yeast, it follows that the greater yeast mass in the fermenter is more effective at conditioning the beer than the smaller amount of suspended yeast in the bottle. Leaving the beer in the fermenter for a total of two or even three weeks will go a long way to improving the final beer. This will also allow time for more sediment to settle out before bottling, resulting in a clearer beer.

SECONDARY FERMENTATION:
Using a two stage fermentation requires a good understanding of the fermentation process. At any time, racking the beer can adversely affect it because of potential oxygen exposure and contamination risk. Racking the beer before the Primary fermentation phase has completed can result in a stuck or incomplete fermentation and too high a final gravity. Simple extract ales do not need to be racked to a secondary fermenter. It can improve clarity and aspects of the flavor, but wait until the second or third beer when you have more experience with the brewing processes.
The reason for racking to a Secondary Fermenter is to prevent a yeast breakdown called autolysis, and the resulting bad taste imparted to the beer. This will not be a problem for these relatively short fermentation-time ale beers. Other beer types, like Lagers and some high-gravity beer styles, need to be racked to a secondary because these sit on the yeast for a longer period of time.
The following is a general schedule for a simple ale beer using a secondary fermenter. Allow the Primary Fermentation stage to wind down. This will be 3-4 days after pitching when the bubbling rate drops off dramatically to about 1-5 per minute. Using a sanitized siphon (no sucking!), rack the beer off the trub into a another clean fermenter and affix an airlock. The beer should still be fairly cloudy with suspended yeast. Racking from the primary may be done at any time after

primary fermentation has more-or-less completed.(Although if it has been more than two weeks, you may as well bottle.) Most brewers will notice a brief increase in activity after racking, but then all activity may cease. This is very normal. Fermentation (Conditioning) is still taking place, so just leave it alone. A minimum useful time in the secondary fermenter is two weeks. Overly long times in the secondary (for ales- more than 6 weeks) may require the addition of fresh yeast at bottling time for good carbonation. This is usually not a concern.
For more information, see the Recommended Reading section.
A Word About Hydrometers, a hydrometer measures the relative specific gravity between pure water and water with sugar dissolved in it. The hydrometer is used to gauge fermentation by measuring one aspect of it, attenuation. Attenuation is the conversion of sugar to ethanol by the yeast. Water has a specific gravity of 1.000. Beers typically have a final gravity between 1.015 and 1.005. Champagnes and meads can have gravities less than 1.000, because of the large percentage of ethyl alcohol, which is less than 1. By the way, hydrometer readings are standardized to 59F, since liquid gravity (density) is dependent on temperature. Temperature correction tables are usually sold with a hydrometer or are available from Chemistry Handbooks (ex. CRCs).
Here is a short table of corrections:
50F => -.0006□55F => -.0003□59F => 0□65F => +.0006□70F => +.0012□75F => +.0018□80F => +.0026□85F => +.0033
A hydrometer is a useful tool in the hands of an experienced brewer who knows what he wants to measure. Various books or recipes may give Original and/or Final Gravities (OG and FG) of a beer to assist the brewer in the evaluation of his success. For an average beer yeast, a rule of thumb is that the FG should be about one-fourth of the OG. For example, a common beer OG of 1.040 should finish about 1.010 (or lower). A couple points either way is typical scatter.
It needs to be emphasized that the stated FG of a recipe is not the goal. The goal is to make a good tasting beer. The hydrometer should be regarded as only one tool available to the brewer as a means to gauge the fermentation progress. The brewer should only be concerned about a high hydrometer reading when primary fermentation has apparently ended and the reading is about one half of the OG, instead of the nominal one-fourth. Incidentally, if this situation occurs, two remedies are possible. The first is to agitate or swirl the fermenter to rouse the yeastbed from the bottom. The fermenter should remain closed with no aeration. The goal is to re-suspend the yeast so they can get back to work. The alternative is to pitch some fresh yeast. Hydrometers are necessary when making beer from scratch (all-grain brewing) or when designing recipes. But the first-time brewer using known quantities of extracts simply does not need one.

PRIMING AND BOTTLING:
This ale beer will be ready to bottle in two weeks when primary fermentation has completely stopped. There should be few, if any, bubbles in the airlock. The flavor won't improve by bottling any earlier. Some books recommend bottling after the bubbling stops or in about 1 week. It is not uncommon for fermentation to stop after 3-4 days and begin again a few days later. If the beer is bottled too soon, the beer will be over-carbonated and the pressure may exceed the bottle strength. Exploding bottles are a disaster.

After the bottles have been cleaned with a brush, rinse them with sanitization solution to sanitize and allow to drain upside down in the six-pack holders or on a rack. Do not rinse out with tap water unless it has been boiled. (Rinsing should not be necessary.) Also sanitize priming container, siphon unit, stirring spoon and bottle caps. But do not heat the bottle caps, as this may ruin the gaskets or tarnish them.
Boil 3/4 cup of corn sugar or 1 and 1/4 cup Dry Malt Extract in some water and let it cool. Here are two methods of **Priming:**
1. Pour the corn sugar mixture into the sanitized Bottling Bucket. Using your sanitized siphon unit, transfer the beer into the sanitized bottling bucket. Place the outlet beneath the surface of the priming solution. Do not allow the beer to splash as you don't want to add oxygen to your beer at this point. Keep the intake end of the racking tube an inch off the bottom of the fermenter to leave the yeast and sediment behind. See Note on Siphoning.
2. Opening the fermenter, gently pour the priming solution into the beer. Stir the beer gently with the sanitized paddle, trying to mix it in evenly while being careful not to stir up the sediment. Wait a half hour for the sediment to settle back down and to allow more diffusion of the priming solution to take place. Then siphon to your bottles.
Note on Siphoning: Do not suck on the hose to start the siphon. This will contaminate the hose with Lacto Bacillus bacteria from your mouth. Fill the hose with sanitizing solution prior to putting it into the beer. Keep the end pinched or otherwise closed to prevent the solution from draining out. Place the outlet into another container and release the flow; the draining solution will start the siphon. Once the siphon is started, transfer it to wherever.
Some books recommend 1 tsp. sugar per bottle for priming. This is not recommended because it is time consuming and not precise. Bottles may carbonate unevenly and explode.

BOTTLING:
Place the fill tube of the siphon unit or bottling bucket at the bottom of the bottle. Fill slowly at first to prevent gurgling and keep the fill tube below the waterline to prevent aeration. Fill to about 3/4 inch from the top of the bottles. Place a sanitized cap on the bottle and cap. Inspect every bottle to make sure the cap is secure. Age the capped bottles at room temperature for two weeks, out of direct sunlight. Aging up to two months will improve the flavor considerably, but one week will do the job of carbonation for the impatient.
It is not necessary to store the beer cool, room temperature is fine. It will keep for several months. When cooled prior to serving, some batches will exhibit chill haze. It is caused by proteins left over from the initial cold break. It is nothing to worry about.

REQUIRED EQUIPMENT:

Airlock□: Several styles are available. Fill to the water line with boiled water and cap it (if it has one).

Boiling Pot:□ aka (KETTLE) Must be able to comfortably hold a minimum of 3 gallons; bigger is better. Use only Stainless Steel, Ceramic- coated Steel, or Aluminum. Plain steel will give off-flavors.

Bottles: Two cases of recappable 12 oz bottles. Use Corona or heavier glass import bottles. Twist-offs do not work well. Used champagne bottles are ideal if you can find them.

Bottle Capper: Either Hand Capper or Bench Capper. Bench Cappers are more versatile and are needed for the champagne bottles, but are more expensive.

Bottle Caps: Either standard or oxygen absorbing are available.

Bottle Filler: Rigid plastic (or metal) tube with spring loaded valve at the tip for filling bottles.

Bottle Brush: Necessary for first, hard-core cleaning of used beer bottles.

Fermenter(s): The 6 gallon food-grade plastic pail is recommended for beginners. These are very easy to work with. Glass carboys are also available, in 5, 6, and 7.5 gallon sizes.

Racking Cane: Rigid plastic tube with sediment stand-off.

Siphon/Hose: Available in several configurations, consisting of clear plastic tubing with optional Racking Cane and Bottle Filler.

Stirring Paddle: Food grade plastic paddle (spoon) for stirring the wort during boiling.

Thermometer: Obtain a thermometer that can be safely immersed in the wort and has a range of at least 40F to 150F. The floating dairy thermometers are great.
*****Optional but Highly Recommended**

Bottling Bucket: A 6 gallon food-grade plastic pail with attached spigot and fill-tube. The finished beer is racked into this for priming prior to bottling. Racking into the bottling bucket allows clearer beer with less sediment in the bottle. The spigot set-up is used instead of the Bottle Filler above, allowing greater control of the fill level and no hassles with a siphon during bottling.