ANNAPOLIS HOME BREW

Beer Brewing Instructions for All-Grain Recipes

Before Brewing:

Check Your Yeast – it may need preparation. Your recipe will include one of the following types of yeast:

(a) Wyeast Direct-Pitch Activator Liquid Yeast. Activator yeast can be used as soon as it warms to room temperature, but it's even better if activated before use. We recommend activating Wyeast when you start brewing; it'll be ready at pitching time.

1. Locate and move the inner packet (bulge) to a corner.
2. Place this area in palm of one hand and firmly smack it with your other hand to break the inner packet.
3. Confirm the inner packet is broken. Shake the package well to release the nutrients.
4. Incubate the pack for 3 hours or more at 70-75°F.
5. It's not necessary to see full swelling before use.
6. Shake, open, and pour into aerated wort at 65-75°F.
7. Maintain temperature until fermentation is evident by bubbling airlock or foaming on top of wort.

Wyeast Activator packs sometimes swell during shipping or later even while properly stored. This does not indicate deterioration; it's just the result of trace remaining nutrients causing culture activity and CO2 production.

(b) White Labs Liquid Yeast. White Labs tubes can be used as soon as they warm to room temperature. Remove White Labs yeast from refrigeration 2 hours before use to allow time for gradual warming.

When it's time to pitch yeast simply remove the protective shrink wrap, shake the vial to re-suspend the yeast, open the cap, and pour into your aerated wort at 70-75°F.

(c) Fermentis Dry Yeast. Manufactured with one of the most technologically advanced processes in the industry, these are certainly the best dry yeast cultures available.

Re-hydration is not necessary. When it's time to pitch yeast simply tear open the packet and sprinkle evenly on the surface of your 60-75°F wort without stirring. The Fermentis dry yeast particles are pH buffered and designed to absorb water, sink down, and then disperse all on their own.

Grain Brewing Equipment:

These instructions are designed for simple all-grain equipment. A good brew pot with false bottom and drain is a great choice.

There's a lot of grain brewing gear on the market. If you have specialized equipment you'll want to modify these instructions to suit or to follow the manufacturer's instructions.

Mash Temperature Control:

You need an accurate and precise thermometer. Meat or candy thermometers aren't suitable. The best cheap thermometer we recommend is our item #18030 Lab Thermometer.

Preparing to Boil:

All-Grain brewers will be boiling large volumes. Your boil will start with 6 to 7 gallons of wort. A kitchen stove isn't up to the task. Barbecue side burners are even suitable. You need a brew pot with least 32-40 quart (8-10 gallon) capacity and a high-power outdoor propane cooker.

Psychology of the Advancing Brewer:

There are many different all-grain brewing techniques. As you learn more, it may seem as if you need to do a hundred things just to make decent beer. It's not true! But home brewers are hobbyists at heart and we like to try new things. We tend to say, "Been there, done that, what's next?"

Simpler methods reduce error. If you decide to expand your efforts there are plenty of things you can do next, like step-mashing, decoction-mashing, tweaking your water chemistry, and putting together the brew system of your dreams. If you enjoy experimenting we certainly encourage you! Remember that this is supposed to be FUN - don't get so bogged down that brewing isn't fun anymore.

We've tried lots of techniques and lots of equipment. These instructions include the vital steps for all-grain brewing with an emphasis on simplicity. We have put in the steps that are worth your time and effort, and left out steps whose difficulty & time requirement may outweigh their advantages. If you're keen to learn more you can find books, websites, clubs, videos, and classes to teach you more!

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Part 1 – BREWING: date:_____

□ **Step 1:** Decide what *mash consistency* (thickness or thinness) you want and how much *strike water* you need. Strike water is combined with grain to form the body of the mash. You can use between 1 and 2 quarts of water per pound of grain.

WORKSHEET 1: Check one line:

□ Thin Mash: Better efficiency but takes up more space. 2 quarts per pound: I have _____ pounds so I need _____ quarts.

□ Medium Mash: A good compromise between thick & thin mash. 1½ quarts per pound: I have _____ pounds so I need _____ quarts.

□ Thick Mash: Takes up less space but less mash efficiency. 1 quart per pound: I have _____ pounds so I need _____ quarts.

For chlorinated water consider using a faucet filter. Bottled water is also fine but avoid distilled or R.O. water for mashing.

Don't count water which lies below the false bottom. For instance, if you've decided to use 15 quarts of strike water you should first fill your pot up to the false bottom, and then add your 15 quarts.

□ **Step 2:** Determine your desired mash temperature. You can mash anywhere between 140°-160°F but you achieve different results depending on where you mash within that range.

WORKSHEET 2: Check one line:

□ Mashing between 140°-150°F results in wort with a little bit less nonfermentable sugar than average. The beer finishes with a slightly lighter body and a little less maltiness.

□ Mashing between 150°-155°F results in wort with an average ratio of fermentable and nonfermentable sugar. The beer finishes with average body and maltiness.

□ Mashing between 155°-160°F results in wort with a little bit more nonfermentable sugar than average. The beer finishes with a slightly fuller body and a little more maltiness.

Write down your desired mash temperature:_____ °F.

Important note: Mash temperature isn't the only thing influencing wort fermentability. The beer's strength, body, and flavor are primarily determined by the amount & type of grain in the mash. Adjusting the mash temperature merely shifts the balance a little bit one way or the other.

□ **Step 3:** Calculate your *strike water temperature*. This starts hotter than the mash since the grain will cool it a bit. The strike water & grain will combine to equalize at mash temperature.

WORKSHEET 3: Check one line to match Worksheet 1:

□ At 2 qt. per lb., grain cools the strike water by 8-10°F. Therefore your strike water temperature should be 8-10°F hotter than your desired mash temperature.

□ At 1½ qt. per lb., grain cools the strike water by 12-14°F. Therefore your strike water temperature should be 12-14°F hotter than your desired mash temperature.

□ At 1 qt. per lb., grain cools the strike water by 16-18°F. Therefore your strike water temperature should be 16-18°F hotter than your desired mash temperature.

Write down your strike water temperature:_____ °F.

□ **Step 4:** Heat the strike water. If you're heating in a separate pot, pour it carefully into the mash vessel.

□ **Step 5:** (Your grain must be at room temperature!) Slowly pour your grain into strike water. Allow the grain settle and then stir gently until evenly mixed.

□ **Step 6:** Cover the mash vessel (*mash tun*) and wait for 1-2 minutes while the temperature equalizes. Now take the cover off and verify the mash temperature.

□ **Step 7:** If necessary, add cool water or boiling water to adjust the mash temperature. If you run out of room, drain off some mash liquid and either heat in a saucepan or cool in a water bath, then return it to the mash. When mashing in a brew pot you can heat the pot directly but always stir while heating.

□ **Step 8:** When you're satisfied with the mash temperature put on the lid to conserve heat. Mash for 45-60 minutes checking the temperature every 15-20 minutes.

□ **Step 9:** When 20-30 minutes remain in the mash begin heating your sparge water to 175-180° in another pot. You'll need 1½-2½ quarts of sparge water per pound of grain.

BONUS – MASHING OUT: *This will increase mash efficiency but you can skip it with little ill effect.* Heat the mash to 168-172°F and wait 5 minutes. You may heat the mash directly, add boiling water, or drain off some liquid to boil and stir back in.

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□ **Step 10:** When mashing is complete open the drain valve and slowly collect a 1-2 quarts of mash liquid. Expect lots of grain particles in the first runnings. Gently pour the first runnings back into the top of the mash. Continue recirculating in this manner (vorlaufing) until the runoff clears.

□ **Step 11:** Begin lautering (collecting runoff) in your boiling pot or a bucket. Go slowly so it takes at least 20-30 minutes to collect it all. Add sparge water as needed to maintain 1-2 inches of *foundation water* on top of the grain bed. If possible keep heating the sparge water to prevent cooldown.

□ **Step 12:** Hot sparge water increases efficiency prevents a stuck mash. You may read that 175-180°F is too hot for sparging, but the real concern is not raising the grain bed above 172°. A little extra heat to stay ahead of thermal loss.

□ **Step 13:** Stop sparging when one of these things happens: (1) You run out of room in your boiling pot. (2) You run out of sparge water. (3) The runoff no longer contains much sugar.

> **Note:** You may stop sparging before you've collected enough volume for the boil. It's better to add water directly to the boil than to over-sparge. Tasting the runoff is great technique. The first runnings are very sweet, becoming less sweet while sparging. Eventually it tastes astringent like red wine. When you taste astringency or no sweetness it's time to stop.

□ **Step 14:** Add water to the boil pot if necessary.

□ **Step 15:** Turn on high heat. Leave the lid off; you should never cover a boiling brew pot. Adjust heat for a steady rolling boil. Keep a glass of cool water handy to stop a boil-over.

□ **Step 16:** When the boil is stable pour in the 1st bag of hops. It's labeled for the beginning of the boil. There's no need to stir. Now begin a 60-minute countdown to the end of boil.

> **Note:** Many recipes have more than one bag of hops. Add each at the time indicated on the label. Some recipes have "dry hops" which won't be used today.

□ **Step 17:** If using an immersion (coil) wort chiller, put it into the boil when 10-15 minutes remain. Heat sterilizes the chiller. When the countdowns reaches zero turn off heat and remove the pot from the warm burner if you can move it safely. **If you have any brewing sugars, add them now and stir to dissolve.**

□ **Step 18:** **From this point don't let anything non-sanitized touch the wort.** Cool the wort below 80°F as quickly as possible. Rapid cooling prevents off-flavors from building up in the wort. *If you don't have a wort chiller, a cooling bath is effective. Carefully move the covered pot to a sink and surround it with cool water. After 5 minutes drain the warmed water and refill the sink with ice water.*

> **Note:** Placing the pot in a refrigerator, outside in cold weather (even snow) isn't very effective. Water is best because it has lots of mass to absorb heat.

□ **Step 19:** While the wort is cooling, sanitize your fermentor. Follow the instructions on your sanitizer. *In a pinch you can use bleach at ½ cup per 2 gallons but it requires a long soak and lots of rinsing. Bleach is a common source of off-flavors - real brewing sanitizers are much better. Avoid other household disinfectants and "antibacterial" products.*

□ **Step 20:** Once the wort is cooled below 80°F pour it into your fermentor. For carboys you'll need a siphon or funnel. *You'll find sediment (trub) at the bottom of your brew pot. You can stop pouring when you reach the trub, but if some or all of the trub gets into your fermentor it won't harm the beer. Don't try to filter or strain the trub unless you have specific gear for it.*

□ **Step 21:** If necessary, add water to bring the batch up to full volume. Using chilled water helps with cooling. Ideally you'd use pre-boiled chilled water, but in reality most water is clean enough to use without bothering. We recommend bringing it up a bit above 5 gallons since you'll eventually lose a few quarts when siphoning. Our recipes are designed to finish with 5 gallons of beer so don't worry that you're watering it down!

> **Note:** In a 6½ gallon glass carboy we fill to 12½" above the floor. We recommend against using a 5 gallon carboy with blow-off tube because you'll be blowing out healthy yeast and weakening the fermentation.

□ **Step 22:** After cooling it's important to aerate or oxygenate the wort. Stir vigorously with a spoon or paddle. This can be tricky in a carboy. Fortunately several tools are available like drill-mixers and oxygen or air bubbler systems for home brewers. More oxygen makes faster, cleaner fermentation.

> **Note:** Mixing also blends any added water with the wort. Without vigorous you'll mess up the next step.

□ **Step 23: Optional but recommended.** Test the Specific Gravity (SG) of the wort. Pull a sample in a test jar or thief, ensure the hydrometer floats freely, and spin the hydrometer if bubbles cling to it. Look to the point where the SG scale lines up with the surface. That's your beer's Original Gravity (OG).

> **Note:** Don't obsess over your OG reading. It's easy to get a bad hydrometer reading especially in poorly stirred wort. OG is a result of how much malt extract went in so it's unlikely that there's actually a problem.

Write down your OG:_____

□ **Step 24:** Pitch (pour it) the yeast. Proper procedures for different yeasts are found on the page 1 of these instructions.

□ **Step 25:** Fill your airlock halfway with water and put the top back on it. If you're fermenting in a bucket, install the airlock in the bucket lid before putting the lid on the bucket. If you're fermenting in a carboy, insert the airlock into the stopper before securing the stopper in the carboy.

□ **Step 26:** You should see signs of fermentation within 24-72 hours. Fermentation produces lots of yeast foam and lots of CO2 gas, which pushes through the airlock making bubbles. *The "lag time" before visible fermentation is a major cause of unnecessary worry. Some yeast strains are naturally faster than others and that's not a problem. Cooler temperatures will slow down fermentation and that's not always bad. Dissolved oxygen also has a big influence - if you want shorter lag time consider using oxygen when pitching yeast.*

> **Note:** Bucket lids often leak; a leak too tiny to see or feel which won't harm the beer. But a leak does mean you may not see action in the airlock. If your airlock isn't bubbling after 24 hours, open the lid and look! If you see foam on top everything is fine. If you want to be absolutely sure check the Specific Gravity again. If it's lower than the OG then you have fermentation!

□ **Step 27:** Shield the fermentor from UV light. Most ale yeasts ferment best at 65-75°F. Most lager yeasts ferment best at 50-65°F, but some lagers tolerate warmer temperatures quite well. Wheat beer yeasts like ale temperatures or a little warmer. To find your yeast's ideal temperature range, look up the specific yeast on our website. Keep the fermentor at a steady temperature. In a basement, a fermentor will be coolest sitting directly on the floor and several degrees warmer on a table.

□ **Step 28:** Fermentation usually takes 5 to 10 days but may be much faster or slower. The only truth is that fermentation will be finished when it's finished! We can't predict how many days it will take because every brewer has different conditions. Experience will teach you what to expect. Fermentation is usually complete when you don't see any more activity. In rare cases fermentation can stop prematurely.

> **Note:** The only way to be sure is to take another Specific Gravity reading. SG always drops during fermentation. If you ignore the "1" before the decimal point the SG should drop 70-75% from the original reading. Example: A beer that started at 1.048 should end about 1.013. If you find incomplete fermentation move the fermentor to a warmer area, wait a day, and then stir it briskly to reinvigorate the yeast.

> **Note:** Beer that has finished fermentation shows no activity. No activity means no activity. Keep waiting for the fermentation to finish.

> **Note:** Just to confuse things a little, a finished fermentation can release CO2 and cause bubbles. If your fermentor warms up, or if it's disturbed in any way you may see "false" signs of fermentation.

Optional – SECONDARY FERMENTATION

Most beers can benefit from secondary fermentation but it's seldom absolutely necessary. The term "secondary fermentor" is misleading because most actual fermentation happens in the first (primary) fermentor. It's better to think of a secondary fermentor as an aging and clarifying tank.

For several reasons, a 5 gallon carboy is the best choice for a secondary fermentor:

First, you want exactly 5 gallons of volume – no more. Any headspace contains air, and the oxygen in that air degrades the beer. Although oxygen is necessary before fermentation it should be avoided after fermentation. This wasn't a concern in the primary fermentor because so much CO2 is produced that it blows out the air from the headspace. But now that your beer

is in secondary there's little or no CO2 production and you can't count on air being driven out before it does damage.

Second, you shouldn't use a bucket. Bucket lids are seldom perfect so buckets breathe a little. During primary fermentation this isn't a problem because so much CO2 is being produced. But in secondary even a small leak is significant.

Third, a carboy shows what's happening inside. You can observe settling and clarifying at a glance. There's no need to repeatedly open the fermentor and expose the beer to air.

Using a secondary fermentor is easy. Wait until fermentation is complete or nearly complete, and then gently siphon the beer from primary to secondary. Leave as much of the sediment behind as possible. Fill the carboy to the neck, topping up with pre-boiled water if necessary. Don't worry about watering it down - you're supposed to have 5 gallons! Let the secondary fermentor sit until the beer clears. Even clear beer still has enough invisible suspended yeast cells for carbonation.

> **Note:** If beer sits longer than 2-3 weeks in secondary the few remaining yeast cells will be quite dormant. The same is true of lagers that have been stored in a cold secondary. If you desire rapid carbonation in these cases, add a fresh yeast culture when you bottle.

Optional – CLARIFICATION

You can help your beer clear more quickly, and also reduce the chill haze which forms later. You don't even need a secondary fermentor to do this! The best method is a 3-part approach:

First, add Irish moss or a Whirlfloc tablet to the last 15 minutes of your boil. There is no downside to using these products. Irish moss causes more protein to out of the wort, reducing one of the main causes of haziness in the finished beer.

Second, add *finings* after fermentation is complete. Finings include Isinglass, SuperKleer, and Chitosan. They make particles stick together and settle more effectively. Just add finings to your primary or secondary after all fermentation is complete. Follow the recommended dosage on your finings. Stirring makes finings work! Stirring up the settled yeast seems like a bad idea but you actually need to get everything moving. Everything will clump together and settle again in a day or two, even clearer than before.

Third, PVPP clarifiers like Polyclar or Divergan can be added along with the finings. These don't dissolve. They just settle to the bottom while absorbing tannins which are a major source of chill haze and permanent haze. Stirring is necessary because PVPP must be completely dispersed for maximum effectiveness.

Part 2 – BOTTLING: date:_____

Which Bottles? Amber glass bottles with pry-off caps or flip-tops are best. You can't reliably cap twist-off bottles. Longneck bottles like Samuel Adams are ideal. Clear bottles like Corona are fine if you protect them from ultraviolet light. Some British & Canadian bottles like Bass & Molson are tricky for hand cappers due to their design. Bench cappers work best for these.

How Many Bottles? You'll need approximately:
(53) 12oz/375ml bottles
(39) 16oz/500ml bottles
(29) 22oz/650ml bottles
(19) 32oz/1 liter bottles

Home Brew on draft! Many brewers keg their beer. Although it requires more equipment, kegging is actually faster and easier. Keg systems generally require a dedicated refrigerator. There are also mini-systems like Party-Pigs which are popular for being small enough to fit in your current refrigerator.

□ **Step 1:** Confirm that fermentation is complete. This is easy to observe in a carboy but buckets can be trickier. Don't rely on watching the airlock since lids often leak. Remove the lid and look for a clear surface and tell-tale ring of crud showing where yeasty foam used to be. Disturbing the fermentor may make bubbles rise but this doesn't indicate renewed fermentation.

□ **Step 2: Optional but recommended.** Test the Specific Gravity (SG) of the wort. Ensure that your hydrometer is floating freely and spin to dislodge bubbles. This is your beer's Finishing Gravity (FG).

> **Note:** SG drops during fermentation. Ignoring the "1" before the decimal point, the SG should drop about 70-75% from OG to FG. Example: A beer with OG 1.048 should end at about FG 1.013. If your fermentation isn't complete don't bottle it yet.

Write down your FG:_____

□ **Step 3:** Clean any visible soil from your bottles or equipment with a brewing cleanser. Now mix up a few gallons of sanitizing solution in your bottling bucket. Run a little into each bottle, swirl, and return solution to the bucket. *Many gadgets are available to speed cleaning, sterilizing, and draining bottles.*

> **Note:** If your fermentor is set up to fill bottles without a bottling bucket, use another container to sanitize the items in steps 3, 4, 5 and then skip to step 12.

□ **Step 4:** Allow bottles to drain upside down. If you don't have a bottle drying tree you can use a dishwasher top rack. Don't actually use the dishwasher to sanitize bottles. Bottle caps are usually clean but you may sanitize them, just don't boil caps!

□ **Step 5:** Sanitize your racking tube, siphon hose, bottle filler, a big stirring paddle, a small spoon, and a glass measuring cup.

□ **Step 6:** Empty the sanitizer from your bottling bucket. Rotate the spigot to point upwards and attach the bottle filler. Use a 1" piece of siphon hose to splice the filler and spigot. Lift the fermentor onto a counter or table and place the bottling bucket on the floor beneath it.

□ **Step 7:** Siphon the beer from fermentor to bottling bucket. *If siphoning seems like a hassle you may want an auto-siphon.*

□ **Step 8:** You can usually let the racking tube rest on the bottom of the fermentor since the tip prevents most sediment pickup. Just don't let it move around and stir up the sediment.

□ **Step 9:** Transfer as gently as possible to reduce oxygen pickup. Thrifty brewers may want to tip the fermentor to siphon out every last bit of beer, especially in a secondary fermentor where there's less sediment. Just don't fret over every ounce of beer – we all leave a little behind.

□ **Step 10:** When siphoning is complete, lift the bottling bucket to a counter or table with the spigot hanging just over the edge. You can drape a clean cloth over the top. Rotate the spigot to point downward and put something below to catch drips.

□ **Step 11:** Boil a cup of water in your sterile measuring cup (microwaving is fine) and dissolve your bottling sugar into it. Pour the sugar solution into the beer and stir gently to evenly disperse it. Some people like to just siphon onto the sugar, but we find this trick doesn't reliably mix it evenly.

□ **Step 12:** Turn the bottling spigot on. Beer will flow into the bottle filler and stop at the tip valve. Now when you bring a bottle up onto the filler, the bottom of the bottle pushes the valve and makes beer flow. Fill your bottles to the very top since withdrawing from the filler drops the level about an inch.

> **Note:** If you're bottling straight from a fermentor you probably haven't yet added any bottling sugar. You need to add a little bit of sugar to each individual bottle. This is easiest with Conditioning Tablets made for this task, or you can add a scant teaspoon of normal bottling sugar to each bottle.

□ **Step 13:** Cap your bottle and repeat until you're done!

CONDITIONING: Store bottles at fermentation temperature for at least 1-2 weeks. Yeast cells will ferment the bottling sugar, producing more CO2 which is the source of carbonation! Some beers naturally take longer to carbonate so verify that yours is carbonated before moving too many bottles into refrigeration.

STORAGE: After the beer has conditioned (carbonated) it's okay (but not required) to move bottles to cooler storage. Steady cool storage keeps beer fresh longer. Most beers store well at room or basement temperature. Lagers can be stored at cooler temperatures.

MATURING: Almost all beer will improve with age. Most show the best improvement after 4 to 8 weeks. Storage conditions have a big influence, also the strength of the beer. Strong beer ages more slowly and light beer peaks more quickly.

SHELF LIFE: Storage conditions influence shelf life. Store beer at a steady temperature & away from ultraviolet light. Alcohol & hops are preservatives so high-alcohol, high-hop beers last longer. Even the lightest beers should be good for 4+ months.

SEDIMENT AND CLARITY: Naturally carbonated beer always has some bottle sediment. It's an inevitable product of bottle conditioning. The sediment is full of B vitamins and perfectly healthy to drink. Even crystal-clear beer forms haze when chilled which is why beer commercials talk about cold-filtering! Chill haze is flavorless and will settle out with extended refrigeration. To serve crystal clear beer, refrigerate bottles upright and uncap gently to avoid raising the sediment. Pour into a clean glass in one smooth motion and stop pouring when you reach the sediment.

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for
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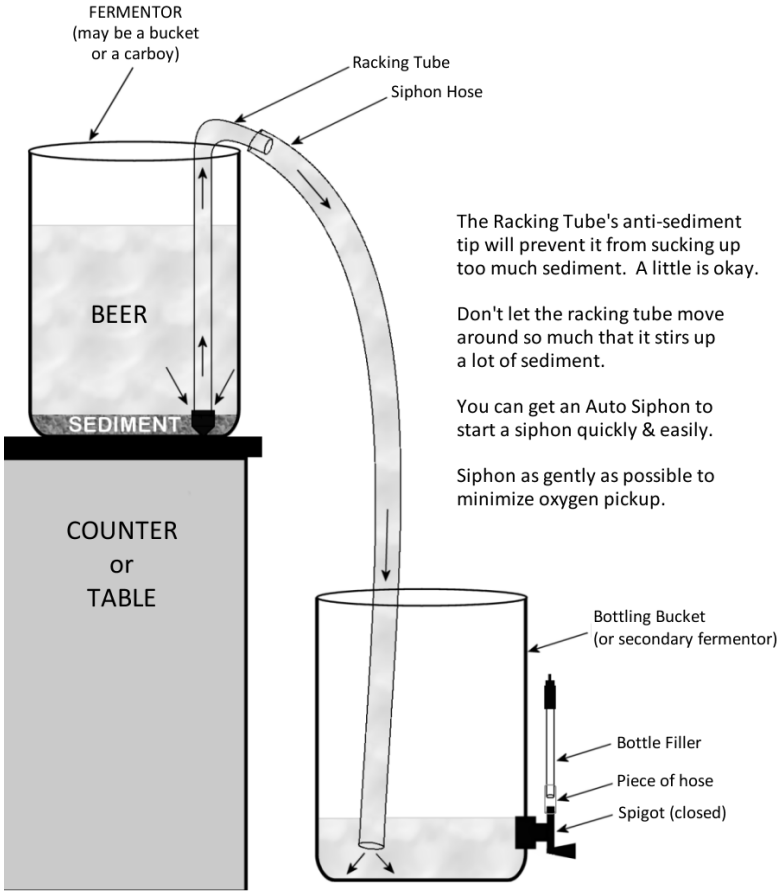
Siphoning



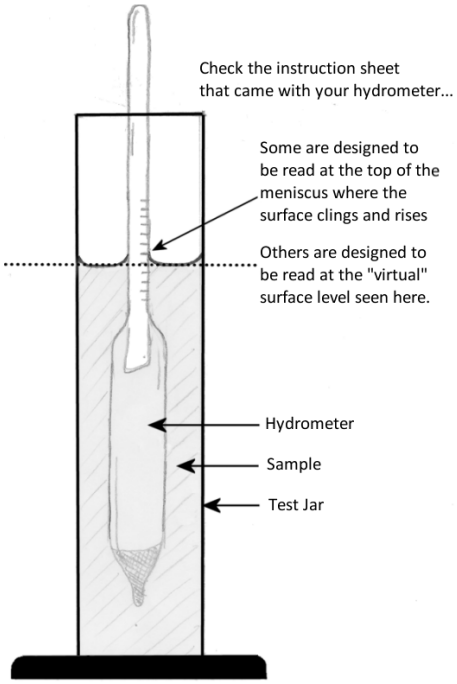
The Racking Tube's anti-sediment tip will prevent it from sucking up too much sediment. A little is okay.

Don't let the racking tube move around so much that it stirs up a lot of sediment.

You can get an Auto Siphon to start a siphon quickly & easily.

Siphon as gently as possible to minimize oxygen pickup.

Hydrometer Reading



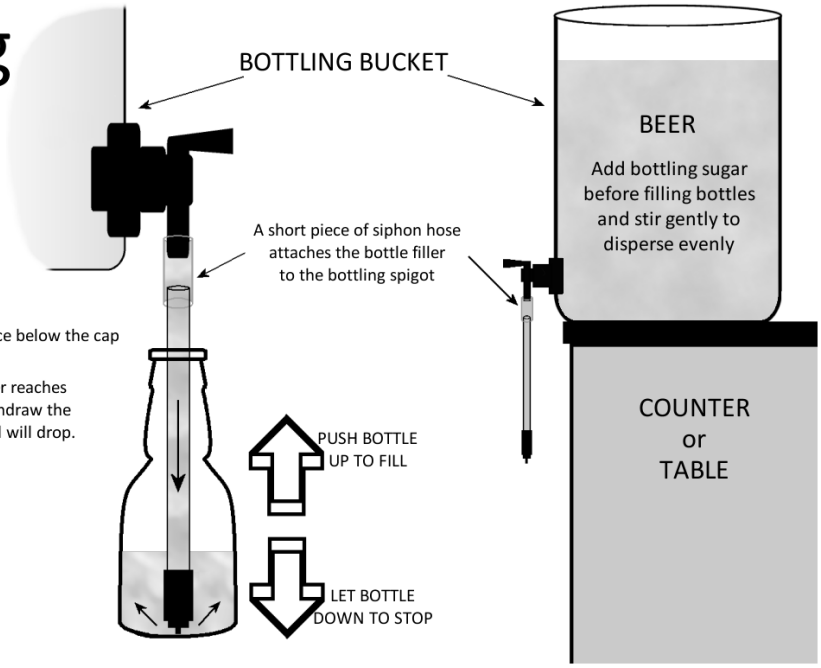
Check the instruction sheet that came with your hydrometer...

Some are designed to be read at the top of the meniscus where the surface clings and rises

Others are designed to be read at the "virtual" surface level seen here.

Don't use the clear shipping tube that the hydrometer came packed in to do your testing. It's not big enough.

Bottle Filling



You want about 1 inch of headspace below the cap

Fill each bottle until the beer reaches the very top. When you withdraw the bottle from the filler the level will drop.