

Basic Brewing

Fall Bright, The Winemakers Shoppe

prepared by Thomas Mitchell

As Ken Shales pointed out in his book, Advanced Home Brewing,

"...There are only four ingredients one must have to brew beer: water, malt, hops and yeast."

Shale emphasized, "that even of these, there are different types and qualities and that for technical and economic reasons many other ingredients are employed, without which many popular types of beer could not be made at all."

In the past home brewing earned a probably deserved reputation of being not very inviting and was done by those too poor to be unduly critical. Tools of the trade, raw materials and technology were hard to find or nonexistent and the quality of the product left much to be desired. The criteria often strived for were quantity and alcoholic strength. The quality of the brew was a result of luck.

Well folks, things have changed! Never have the home brewers had more at their fingertips. Brewing apparatus ranges from the simple to as complex as one might imagine. Materials and supplies are from all parts of the world. Malts and malt extracts come from England, Germany, Australia, Canada and the United States. Additives, fining agents, yeast and chemicals once only available to commercial breweries are now stocked in most Brewing and

Winemaking Supply Shops. The quality of these supplies is first rate. Knowledge and technology are packed in books. Brew clubs are popping up everywhere. Shop owners and managers have the know-how to answer your questions, to get you started and to help you out should a problem arise.

This presentation is geared to the beginning home brewer. We are not going to discuss the more advanced techniques and practices in this session, as we want to impart a good understanding of the basics required in successful home brewing. If we can build a good foundation this afternoon there will be a better chance of you being pleased with your first attempts.

First we want to emphasize the absolute essentials to help insure success.

1st, 2nd, and 3rd Sanitation is important in every step of your operation.

In his book, The Big Book of Brewing, David Line explains, "...Beer is probably the most delicate of all alcoholic drinks and is very susceptible to infection at all stages of its production. The sugary malt is an ideal breeding ground for all sorts of airborne bacteria which can render a brew worthless in a very short period of time." This statement explains why many of the early attempts at brewing yielded such poor results. The home brewers just weren't aware of the contamination risks and the importance of attention to detail.

Contaminants to avoid all especially *oil* and *grease*, *including the wooden spoon*.

Wooden spoons used to stir anything with the possibility in which oil was used should be avoided.

Avoid iodine, such as in salt.

Cleaning agents to avoid: detergents

Cleaning agents to use: Potassium Metabisulfite, Sodium Metabisulfite, chlorine bleach, hot/boiling water, clean water, good quality nylon bristle brushes for cleaning, a large one for the fermenter and a bottlebrush for bottles.

An excellent cleaning solution is 2 tablespoons of household bleach in one gallon of water. The surfaces of everything can be irrigated with this solution and left to stand a few minutes, then rinsed with very hot water, followed by 2 – 3 thorough rinses of cold water, then flooded with a stock solution of potassium metabisulfite (3 oz. of potassium metabisulfite powder in 1 gallon of *water*): *The meta solution in itself can be used as a sanitizing agent*, however, when used after the chlorine has been thoroughly rinsed it will "blow-off" any residual chlorine and a cold rinse will eliminate the metabisulfite and leave everything ready for brewing.

4) GOOD QUALITY TOOLS AND UTENSILS YOU WILL NEED:

1. As large a boiling vessel as possible (1.5-5 gal) *stainless steel or enamel wear with no chips*

2. ***A primary fermenter (5 gal. or more) –*food grade plastic***
3. ***A secondary fermenter – *food grade plastic***
4. **A few 1-gallon glass jugs for measuring, etc.**
5. ***Rubber bungs and airlocks to fit.**
6. ***Plastic tubing, a racking wand for siphoning and bottle filler for bottling.**
7. **Some crown-capable beer bottles, crown neck type, no screw type**
8. **Crown caps to fit.**
9. ***Crown-capper**
10. **A strainer and or funnel with a nylon sieve to fit inside**
11. **A large plastic, nylon or stainless steel spoon**
12. **A hydrometer**
13. **A thermometer**
14. **A good scales for weighing hops, malts, sugars, etc.**
15. ***A good bottle brush**
16. ***A book, or several.**

Fall Bright Brewer's Best Start up kit includes all items marked with (*).

5. USE QUALITY INGREDIENTS – these are at least equally important as the equipment you use.

Malts- Use only high grade brewing malt products. *Avoid bakers malt and malted products designed for dairy products.* Malt is a complex subject that is the very soul of brewing. Malt gives body and the malty flavor to a brew which, when combined with the aromatic, bittering and flavoring components of hops form the basis of any true beer.

Malt Extracts are either in a syrup form or a dry powder form. These products are concentrated from mashed, malted grain and eliminate the tedious tasks of malting and mashing. Very high quality malt extracts are available to the home brewer in light, amber and dark syrups, also un-hopped or hopped selections. Dry malts are available in light and dark and may be hopped also.

Malted Grains can be uses in small amounts to provide more complex flavors. They are used by more advanced brewers in the production of "scratch beers" made from all malted grain. They are available in several different forms:

Pale Malted Barley- used in small amounts to provide more body and increase the complexity of flavors. It is the principle malt used in "scratch beers".

Crystal (caramel) Malted Barley is kiln dried at a

higher temperature than pale malt giving a darker color and stronger caramelized flavor. Used in amber, brown and dark brews.

Black Patent Malt- is very dark and very strong flavored. It contributes no fermentables to the wort and therefore is not normally crushed or mashed. It is used in dark beers and stouts.

Malted Wheat used at a rate of 2-3 oz. per gallon, it promotes body and roundness and a good head retention.

These products allow the competent brewer the opportunity to make a brew as good as the one you can buy.

Adjuncts: These can be used in addition to or substituted as part of the malt. They may or may not require mashing, depending on their formulation. Just to mention a few:

Adjuncts that requiring mashing (usually mashed with the malted grain).

Barley imparts a crisp grainy flavor to beer.

Roasted Barley is very dark, the color of coffee, and gives a drier taste than black malt.

Torrified Barley yields an interesting nutty flavor, some color and body to beer.

Wheat Flakes or Shredded Wheat added at a rate of 1 oz. per gallon gives a nice roundness to mild ale's.

Brewing Flour aids in head retention when used in very low amounts.

Flaked Corn produces more flavor than other adjuncts. It is used in pales ale's and bitters.

Oats rarely used in commercial breweries today.

Rye mainly used in stouts but very rarely used.

Flaked Rice gives crispness to beer but no perceived flavor or color.

Adjuncts requiring no mashing. The main use of these adjuncts is to give freedom of design to the brewer. They allow the brewer the means to fine-tune a recipe to their style and taste.

Syrups of wheat, corn and barley are available.

Sugar- In brews where only malt is used all the alcohol is derived from malt sugar (maltose). When a lighter bodied, less malty beer is desired; other types of sugar may be used to supplement the malt.

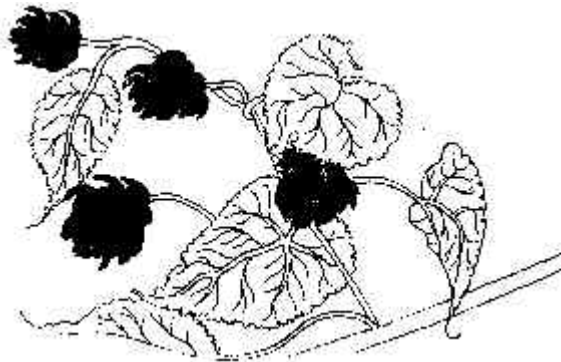
Corn Sugar (Dextrose) most used sugar in brewing. Readily fermentable and gives off less flavors than cane sugar. Too large amounts of either cane or corn sugar will produce a "cidery" taste.

Cane Sugar (Sucrose) produces slightly more alcohol per pound than corn sugar. Some prefer to

invert this sugar before adding to the wort, though it will invert in the wort.

Milk Sugar (Lactose) non-fermentable used to sweeten certain stouts. (However will cause cavities in your teeth)

Brown Sugar (or molasses) used in small amounts for flavoring dark beers.



Hops-The flower of the female hop plant. Hops originally served as a preservative but now principally are used as aromatic and flavoring agents. Hops are available in several different forms. All produce excellent results.

Dried Hops are available in many varieties in whole flower form. Use as flavoring hops or aromatic hops, *dependent on variety and preference.*

Hop Extracts are frequently available in liquid form. When used as directed they can be substituted for flavoring hops.

Hop Pellets are compressed hops that look like

rabbit food. They retain the fresh hop flavor and aroma very well. They can be used as flavoring or aromatics. When substituting for fresh hops, reduce the weight of pellets by 25-30%.

Vacuum packed Hops are excellent!! Very long shelf life especially when refrigerated. Used the same as dried hops.

Yeast- Use a good beer yeast. Avoid baker's yeast like the plaque! Baker's yeast when used in beer: produces an erratic fermentation, imparts a strong yeasty flavor *interfering with the subtle characters of good brews*, settles poorly and that which does not settle is easily disturbed when the brew is poured.

Beer Yeast on the other hand has been carefully developed for the purpose of producing beer. It is inexpensive and of two basic types:

Ale or "top fermenting" *Saccharomyces cerevisiae* used in ales, bitters, stouts, etc.- will ferment in the temperature range of 55-80°F. The optimum temperature is a steady temperature between 60-70°F.

Lager or "bottom fermenting" *Saccharomyces carlsbergensis* used in lagers and steam beers. Will ferment in the temperature range of 45-75 degrees F.

For lagers the fermentation temperature is between 45-65 degrees F. with the optimum a steady temperature under 60°F.

Steam beer is fermented with lager yeast at ale temperatures. (60-70 degrees F.)

Water and Water treatment: Most beginning brewers should opt to follow specific recipes.

For those of you who really want to understand the reasoning behind water treatment, I highly recommend, David Lines, "The Big Book on Brewing". It has an excellent chapter on water and how it relates to beer. He recommends the following additives for water depending on you water source and the product you may be brewing. You must read the chapter to fully appreciate the complexity of this subject. The following ingredients should be in most brewer's possession.

- A. Gypsum
- B. Epsom Salts
- C. Potassium Chloride
- D. Calcium Carbonate
- E. Common Salt (Sodium Chloride) non-iodized only!
- F. Distilled Water

David Line shies away from the additions of neat acids such as citric, phosphoric or sulfuric by home brewers, stating...."Acid tastes do not find flavor in beer, so

additions for that reason need never be used in beer making. Also undesirable salts will be formed on reaction with the malt, which adversely affect the flavor and the chemical reactions of the mashing."

I can attest to those statements. When I first started brewing I was very disappointed with some recipes. The common denominator ended up being citric acid, *which you will find in many recipes*. I discovered that when the citric acid was eliminated, the beers produced were much more to my liking.

Other Supplies

Yeast Nutrients - different forms available- not generally required when 4 pound or more of malt products are used in a recipe. But can be used according to directions for recipes using less malt.

Fining Agents – assist the brews in falling bright, including:

Irish moss is seaweed, dried and coarsely ground. When $\frac{1}{2}$ teaspoon is included in the boil, its presence assists in achieving the "hot break". Its use is highly recommended in all light colored beers.

Unflavored Gelatin: follow the directions on the packet. The dissolved gelatin will combine with the tannin from the hops and settle-out impurities (*a quarter teaspoon of grape tannin added prior to the gelatin will assist this process.*)

Isinglass is dried and ground fish swim bladders. It is relatively expensive. When used according to directions it does a marvelous job of settling impurities. It is probably the most gentle of the fining agents. It is not for bottom working yeast.

Polyclar is a synthetic fining agent that is very effective. It must be used properly to prevent over-fining, it can strip color and flavor when over-fining occurs.

Miscellaneous Ingredients

Heading Agents improve the head characteristic and retention.

Diastase Enzymes, including *Koji and Aspergillus oryzae* at the proper temperature convert starches to sugars. Useful in the mashing process.

Brewing Salts may include any number of additives: water conditioning, yeast nutrient, heading compound, Koji, etc. Hopefully they are labeled with instructions.

Anti-Oxidants such as Ascorbic Acid may be added prior to bottling.

6. SANITATION

Make sure all utensils are sanitized prior to starting, including the outside of the malt cans after you have removed the labels, the can opener, vessels, mixing and measuring spoons, thermometers, hydrometers and hydrometer jars and work surfaces. An excellent

cleaning solution is 2 tablespoons of household bleach in one gallon of water. The surfaces of everything can be irrigated with this solution and left to stand a few minutes, then rinsed with very hot water, followed by 2 – 3 thorough rinses of cold water, then flooded with a stock solution of potassium metabisulfite (3 oz. of potassium metabisulfite powder in 1 gallon of *water*): *The meta solution in itself can be used as a sanitizing agent*, however, when used after the chlorine has been thoroughly rinsed it will "blow-off" any residual chlorine and a cold rinse will eliminate the metabisulfite and leave everything ready for brewing.

7. BUILDING THE WORT

All worts should be boiled to the "hot-break" regardless of what the directions on the can or in the kit say. (This may be a debatable statement.)

Pre-heat open cans of malt extract in very hot water for 20 – 30 minutes.

Empty the contents into a gallon of hot water, rinsing the residue from the inside of the can. Add up to 2 more gallons of very hot water.

Add the mashed grain liquid and if applicable, sugar, gypsum, and $\frac{1}{2}$ the flavoring hops, and if a light or amber beer, $\frac{1}{2}$ teaspoon Irish Moss, etc. Mix until a uniform consistency.

Bring to a rolling boil for 20 minutes.

Add the balance of the flavoring hops and continue at a rolling boil for another 55 minutes.

Check for the "hot-break". Take a sample in a wine glass, carefully swirl and hold it up to the light. Gummy bead-shaped globules of residue will have formed and will settle to the bottom of the wine glass. The wort above the globules will be brilliantly clear. Most brewers don't learn this until they have been at it for 3 – 4 years. You already have a tremendous jump-start. If the hot break has not occurred-boil longer and check again.

If the hot-break has occurred or is nearly complete, add ½ the aromatic hops, and boil 10 more minutes.

Add the remainder of the aromatic hops and boil 5 minutes more.

Immerse the pan in cold water, if possible, change the cooling water frequently until the wort is~80 degrees F. If this is not possible, proceed to the next step.

Place a strainer lined with a piece of nylon sieve over the fermenting bucket and pour the wort through the strainer. Rinse the solids (boiled hops) with about 1 gallon of cold water. Pour that liquid into the wort.

Add additional cold water to bring the wort up to full volume.

8. FERMENTATION

Cool to 60 – 65 degrees F. for ales and steam beers and around 50 – 55 degrees F. for lagers. Take a hydrometer reading and record the specific gravity, pitch 1 –2 packets of the appropriate yeast on the surface of the cooled wort, wait 10 minutes, then stir to mix. Snap the lid on the fermenter and install an airlock with water. Try and maintain these temperatures throughout the fermentation and place out of direct light. Try fermenting another batch of the same beer at a warmer temperature, say 75-80 degrees F. You will be astounded at the difference.

When the specific gravity drops to 1.020 (20 points), rack the brew off the sediment into a secondary fermenter. A glass carboy is ideal. Add a fining agent such as grape tannin and gelatin, if you wish. Install an airlock and maintain the temperature for another 3 weeks. Your brew should fall bright and be at final gravity by then. Check the specific gravity and record. At this point you are ready to prime the beer and bottle.

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9. PREPARING FOR BOTTLING

Make sure you have a good supply of clean bottles, crown caps, a capper and a siphon hose equipped with a bottling attachment. (A short tube with a spring load valve that is depressed open by pushing on the bottom of the bottle. When the pressure is withdrawn the valve closes and lets you move to the next bottle with nary a drip.)

Carefully rack the beer into a bottling container, (clean food grade container) leaving behind any sediment, add priming sugar called for in the recipe. It may vary from 2 oz to 1 ½ cups. In any case the priming sugar should not change the specific gravity by more than 6 points. (i.e. from 1.000 to 1.6000).

At this point I like to pitch a packet of lager yeast to insure fermentation in the bottle. Lager yeast is bottom fermenting and forms a very compact painting of yeast on the bottom of the bottle. If you wish, ascorbic acid (an antioxidant) may be added at this time. When the yeast is dissolved, stir thoroughly to uniformly dissolve the sugar and disperse the yeast and ascorbic acid.

Check the specific gravity. Record.

10. BOTTLING

Establish a siphon and fill the bottles using a bottle filler. If not using a bottle filler, fill to about an inch and a half to an inch and three quarters from the top. Cap immediately and place in a cool, dark place.

11. AGING

If an ale, let age for three or more weeks. If a true lager, it will need to age for 4 to 6 months at 32 to 33 degrees F. How's your patience?

12. SERVING

There is a yeast sediment in the bottom of all homemade beers. This is natural. You will quickly learn how to properly pour your brews into a glass or pitcher before serving.

You will become so proficient that you'll only lose a few scant drops. Enjoy!!!!

I hope this starts you on a life long affair of making a quaffing better brews. It can be a most satisfying hobby.

May your brews *Fall Bright*.

Fall Bright the Winemakers Shoppe

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