Ohio Valley Homebrewers Association TAP

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2009
Upcoming Events

FEBRUAY

Wed, Feb 25, 7 pm: Meeting; Germania Mannerchor, Beer Style: Stout/Porter. Topic: *The Anatomy of a Beer* by Chris Alvey

MARCH

Wed, Mar 25, 7 pm: Meeting; Germania Mannerchor, Beer Style: Märzen/Bock/Maibock. Topic: No Tech Brewing by John Dipple

Sat, Mar 21, 2 pm: Upland Brewery Tour with the Dubois County Suds Club

APRIL

Apr 11: AHA's National Homebrew Competition Entry Deadline, Entries accepted between March 25 and April 8

Wed, Apr 29, 7 pm: Meeting, Germania Mannerchor, Beer Style: Pale Ale/IPA. Topic: Homemade Equipment by Brad Bredhold

Standby for an Important Presidential Message...

It's Brewing Season!

Sure, the trees from the latest ice storm are still lying in the yard and some furry, weather prognosticating groundhog just declared six more weeks of winter but we homebrewers know just what time is upon us —the beginning of brewing season. Time to get those kettles out of cold storage, assess the hop and grain inventories, and get those recipes written in time for the warmer weather.

One great thing to do is get a series of recipes together, list all of the necessary ingredients together in a spreadsheet, and take advantage of price breaks available by ordering in bulk. Hops, for instance, can be purchased by the pound much more cheaply than by the ounce-at-a-time pace many of us are used to. If you won't use a pound, this a great benefit of belonging to the club, as I am sure you could find someone to split an order. Same goes for grains and chemicals like PBW and Star-San that are less pricey in quantity.

Another advantage to planning your brews ahead is that you could benefit from re-using your yeast. With careful sanitation practices and care taken to provide plenty of oxygen, you should be safe using slurry of yeast through two or three batches of a moderate or low gravity beer. Utilitarian yeasts like California Ale (WLP001/Wyeast1056/US-05) or English Ale yeasts are great candidates for this as they are appropriate in a fairly wide range of styles.

Lastly, keep in mind that spring is competition season with beers due for the National Homebrew Competition in April and the Indiana State Fair in June. Brew your bigger and/or darker beers early—those can take some aging—and brew those beers like Hefeweizen—that are best consumed fresh—closer to the entry deadline.

Here's to Spring...
—Chris Alvey

Brewers of Indiana Guild (BIG) Winterfest

The first annual BIG Winterfest was held at the Indiana State Fairgrounds on January 24th. The 2,400 tickets sold out in an hour and that's not including designated driver tickets.

Turoni's Brewmaster Jack Frey served up Roudolph's Revenge, Pumpkin Ale, and Vinny's Light Lager with a little help from Don Heisler and Chris Norrick. In total, the event touted over 150 beers on tap including several cask ales served via gravity. A few rare beers spotted in the crowd: Three Floyds' "Bird 'O Prey" and "Oatgoop" – an oat wheat wine made in conjunction with Mikkeller of Denmark, Warbird's "Project-X" an unreleased experimental milk stout, and Sierra Nevada's brand new "Torpedo Extra IPA". The author spotted a couple of excellent barrel aged beers, one being a famous stout from Barley Island, the GABF 2008 Bronze Medal "Beastie Barrel Stout." There were plenty of good beers but the crowds were thick to say the least!

Plans are being made for the OVHA and the famous OVHA Bar to be in attendance next year.

Jack and Don keep the beer flowing.

Style of the month: **Stout/Porter**

BJCP (www.bjcp.org) Categories include: 12A. Brown Porter, 12B. Robust Porter, 12C. Baltic Porter, 13A. Dry Stout, 13B. Sweet Stout, 13C. Oatmeal Stout, 13D. Foreign Extra Stout, 13E. American Stout, and 13F. Russian Imperial Stout

12A. Brown Porter:

Aroma: Roasty aroma (often with a lightly burnt, black malt character) should be noticeable and may be moderately strong. Optionally may also show some additional malt character in support (grainy, bready, toffee-like, caramelly, chocolate, coffee, rich, and/or sweet). Hop aroma low to high (US or UK varieties). Some American versions may be dry-hopped. Fruity esters are moderate to none. Diacetyl low to none.

Appearance: Medium brown to very dark brown, often with ruby- or garnet-like highlights. Can approach black in color. Clarity may be difficult to discern in such a dark beer, but when not opaque will be clear (particularly when held up to the light). Full, tan-colored head with moderately good head retention.

Flavor: Moderately strong malt flavor usually features a lightly burnt, black malt character (and sometimes chocolate and/or coffee flavors) with a bit of roasty dryness in the finish. Overall flavor may finish from dry to medium-sweet, depending on grist composition, hop bittering level, and attenuation. May have a sharp character from dark roasted grains, although should not be overly acrid, burnt or harsh. Medium to high bitterness, which can be accentuated by the roasted malt. Hop flavor can vary from low to moderately high (US or UK varieties, typically), and balances the roasted malt flavors. Diacetyl low to none. Fruity esters moderate to none.

Mouthfeel: Medium to medium-full body. Moderately low to moderately high carbonation. Stronger versions may have a slight alcohol warmth. May have a slight astringency from roasted grains, although this character should not be strong.

Overall Impression: A substantial, malty dark ale with a complex and flavorful roasty character.

History: Stronger, hoppier and/or roastier version of porter designed as either a historical throwback or an American interpretation of the style. Traditional versions will have a more subtle hop character (often English), while modern versions may be considerably more aggressive. Both types are equally valid.

Comments: Although a rather broad style open to brewer interpretation, it may be distinguished from Stout as lacking a strong roasted barley character. It differs from a brown porter in that a black patent or roasted grain character is usually present, and it can be stronger in alcohol. Roast intensity and malt flavors can also vary significantly. May or may not have a strong hop character, and may or may not have significant fermentation by-products; thus may seem to have an "American" or "English" character.

Ingredients: May contain several malts, prominently dark roasted malts and grains, which often include black patent malt (chocolate malt and/or roasted barley may also be used in some versions). Hops are used for bittering, flavor and/or aroma, and are frequently UK or US varieties. Water with moderate to high carbonate hardness is typical. Ale yeast can either be clean US versions or characterful English varieties.

Vital Statistics:		OG:	1.048 – 1.065
IBUs:	25 – 50	FG:	1.012 – 1.016
SRM:	22 – 35	ABV:	4.8 – 6.5%

Commercial Examples: Great Lakes Edmund Fitzgerald Porter, Meantime London Porter, Anchor Porter, Smuttynose Robust Porter, Sierra Nevada Porter, Deschutes Black Butte Porter, Boulevard Bully! Porter, Rogue Mocha Porter, Avery New World Porter, Bell's Porter, Great Divide Saint Bridget's Porter

Hop Raffle!

Rob your piggy bank! It's hop raffle time again! Tickets will be $2 each or 3 for $5. If you have any hops you would like to donate to the raffle, bring them to the meeting.

Official OVHA T-shirts and polo shirts are still available. All shirts are only $20 each. Get one (or a spare) before we run out.

Recently Spotted In The Fermenter

John Dipple: Oatmeal Stout, Scottish Ale

Don Heisler: English Old Ale #42, Special Bitter, American Light Lager

John Mills: Flanders Red, Christmas Ale

Jimmy Pore: Belgian IPA, Belgian Stout

Chris Norrick: London Porter

Time to Brew for Competition

There is nothing like unbiased critique on your beers to help improve your brewing process. As everyone knows, this type of constructive criticism is difficult to get from friends and family who don't want to discourage your brew making hobby and most of them don't know a Bud from a Helles anyway.

Lucky for us, there is one way to get your beer reviewed by actual certified beer judges. All you have to do is enter a Beer Judge Certification Program (BJCP) sanctioned beer competition. Sure everyone likes to have an "award-winning beer" but the real reason most homebrewers enter beer competitions is for the judge's feedback. For every BJCP event, you will receive in the mail a judging sheet from each judge (usually 2 or 3) explaining in great detail what they perceive in your beer. If what they perceive happens to match what the BJCP style guide states is appropriate for the style you entered, you'll get a high score. But even if it doesn't match the style, it is priceless to have trained beer palates write down everything they see/smell/taste in your beer, and then send you the sheets for your review! If you are brewing strictly to win medals, these sheets can help tweak a recipe, but for most brewers the score sheets can reinforce what you already knew, or help train your own beer palates.

The BJCP maintains a listing of all sanctioned competitions at: http://www.bjcp.org/apps/comp_schedule/competition_schedule.php.

Dwayne DeLaney holds up his 3rd place ribbon at the 2008 Brewer's Cup awards ceremony.

Locally, there are two big competitions coming up. The Indiana State Fair *Brewer's Cup* is one of the largest beer competitions in the county. They had nearly 600 entries in the homebrew division in 2008. This level of competition brings in some very good judges including Gordon Strong who judges beer in *Zymurgy* Magazine and is the current BJCP president. **Entries are accepted between June 14 and June 28**. The club will be sending beer up for the competition via courier to the Indiana Homebrew Club Day in Indy on June 8, so you will not have to ship your beer. This is expensive and quasi-legal. See http://www.brewerscup.org for more info on the comp.

The second and fast approaching comp is the American Homebrewers Association's National Homebrew Competition. As the name suggests, this is a national comp that is run in two rounds. First through third in each category at the regional level moves on the final round. The finals are judged at the National Homebrewers Convention which happens to be in Oakland, CA this year. **Entries are accepted between March 25 and April 8** at our regional drop off. See http://www.beertown.com/events/nhc/index.html for more details.

IndianaBeer.com

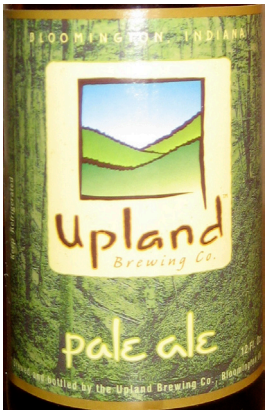
IndianaBeer.com is Indiana's source for all things beer. Their tag line states "The definitive guide to beers, bars, and breweries in the Hoosier state, ...and beyond." It even covers homebrew topics! It was started by retired software designer Bob Ostrander who has attended and reported on our own SWIRCA Brewfest each year.

Most of the Southwestern Indiana homebrewing info is a little out of date but the History section on Evansville is an amazing resource. It covers Cook's, Sterling, and Evansville Brewing in great depth complete with brewery photos and labels.

The Calendar is probably the most informative item on the site. It is always current and covers every item remotely interesting to Indiana beer makers or beer lovers including: beer tastings, new beer tapping parties, competitions, and area beer festivals.

A few other items of note include the current Breweries section. There is a through review of every brewery in the state, currently 28! And the Adventures section is always a good read.

Upland Brewing Co. Tour



The Dubois County Suds Club, founded by former OVHAer Justin Rumbach, has invited our club to their tour of Upland Brewing Co. of Bloomington, IN on March 21, 2009. They are taking a bus and are leaving from Jasper at 2 p.m. Eastern Time (1 p.m. Evansville time). The planned return time is 10 p.m. Cost for the bus ride is only $10 per person. For those who want to stay the night in Jasper, Justin says, "Hampton Inn is literally 50 feet from The Schnitzelbank."

Warning: Brewing Geek Content

The Anatomy of a Beer by Chris Alvey

"A beer is greater than the sum of its parts." While my inner physicist would disagree with that statement, my inner brewer thinks it undeniably true. As indicated in the image above, a beer can be thought of as a result of a collection of various ingredients, decisions, and brewing steps that the brewer chooses along the way in hopes of achieving a finished product. As anyone who has created a beer can attest, the beauty of our beloved product is, in the end, something seemingly greater than all that was put into it.

The following will be an overview of each of these constituent parts to see how each affects the final product. Some general guidelines will be presented with the idea that you, the brewer, can look at each of the constituents individually and manipulate them to create the beer that you intend to brew.

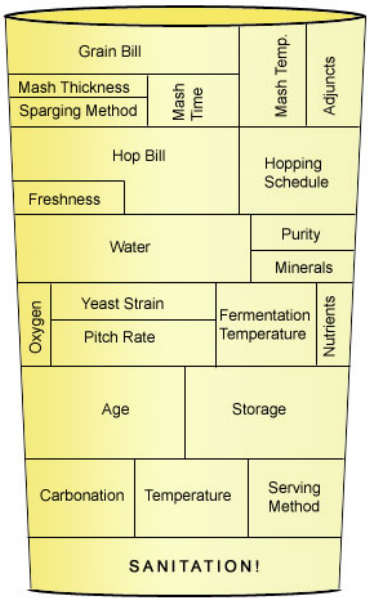
Grain

Grain Bill – From Pilsner to Porter, the fermentable grains chosen for your determine as much about a beer as any other factor. Each beer starts with a base grain – usually something like Pilsner, 2 Row Pale Malt, Wheat Malt or Munich Malt. While these grains have different flavor profiles, they are generally mild tasting and form a nice base for your beer. 'Malty' grains like Crystal Malt, Aromatic, and Melanoidin add a caramel color and a bit of sweetness. Bready or nutty grains like Biscuit, Victory, Vienna, and Brown malt can be added for a more bready and/or toasty flavor. Finally, dark grains like Black Patent, Chocolate, and Roast Barley are added to provide a very dark color and a deep roast to somewhat burnt flavor.

Adjuncts – Along with the fermentable grains that make up your grain bill, you can add other fermentable (or not-so-fermentable) products. These include specialty barley products like Acidulated malt that produces some tartness or Smoked Malts that add a rich smokiness. Other adjuncts are not barley at all, but still grains like rice, corn, buckwheat, and rye. Each has its own distinct addition to your beer.

Sugars are another class of fermentable that are often added. In general, simple type sugars have the advantage being wholly or mostly fermentable and add to the final gravity without adding to the sweetness. Sugars range from plain table sugar to exotic sugars like Jaggery (Palm Sugar) to sugar products like honey and molasses.

Fruits , fruit essences, and herbs are another whole class of adjuncts use to flavor your beer. The gamut ranges from familiar fruits like raspberries and cherries to more esoteric flavors like coconut in kiwi. One of the great things about brewing your own beer at home is the independence and fun in trying crazy new things in your beer. The worst that can happen is you make five gallons of 'unique' beer.



Mash Temperature – The temperature that the grains are held at during mashing determine the profile of sugars able to be fermented by your yeast during fermentation. Between the ranges of roughly 145F to 158F, enzymes activated by the warmth and liquid of the mash are able to take complex, relatively long-chain sugars that would normally be unfermentable by brewers yeast and break them down into more edible bits. The trick is, at the higher end of this scale, sugars are not broken down as thoroughly as they are at the lower end of the range. This fact is a tool that the brewer can use in the formulation of the final product. If you want a bit more body and apparent sweetness in the end product, you can mash at, say 155F. However, if you were looking for more complete fermentation and a resulting drier beer, you would want to mash more in the 149F range.

Mash Time – The conversion of the sugars in your grain to fermentable sugars depends on the action of enzymes. The amount of time generally accepted is 60 minutes for an optimum amount of conversion. The enzymatic action is both a function of the time and the temperature of the mash. A mash that is incomplete will produce a less fermentable end-product. Perhaps this is what the brewer has intended but, more often than not, it is better to manipulate the fermentability of your wort with the mash temperature itself as well as the ration of fermentable versus non-fermentable ingredients in your recipe.

Mash Thickness – Mash Thickness is the ratio of grains to the volume of mash water used. Mash thickness is most often cited in home brewing literature in Quarts of Water / Pounds of Grains in the mash tun. According to Fix: "It has been noted that thicker mashes favor proteolytic activity, whereas thinner mashes favor carbohydrase action because of the restraining influence sugar concentrations have on Alpha and Beta Amylase.[1]" In other words, a thinner mash will favor more complete conversion compared to the same grain bill mashed thicker (i.e., with less water.)

Sparging Method – Sparging (often referred to as Lautering by professionals) is defined as "The rinsing of the grain bed to extract as much of the sugars from the grain as possible…[2]." The sparging step comes after the mashing step has completed. While there are several typical sparging regimens, home brewers today generally follow one of two sparging methodologies: Continuous (or Fly) Sparging or Batch Sparging.

Continuous sparging is a method in where "The wort is recirculated and drained until about an inch of wort remains above the grain bed. The sparge water is slowly added as the wort is drained.[2]" Continuous sparging "demands more attention by the brewer [compared to batch sparging] but can produce a higher yield per pound of malt.[2]" There are a couple of drawbacks to continuous sparging to weight against the relative simplicity of the batch sparge method. The first is the risk of extracting bitter Polyphenol compounds into the beer by over-sparging. Sparges above 167 Degrees F (75C) will increase polyphenol extraction.[3]" Daniels continues that "Brewers should avoid oversparging; one method is to stop collecting the wort when the pH rises above 6.0.[3]" The dangers here are in polyphenol extraction as well. One other nuisance inherent in continuous sparging involves the 'stuck sparge.' If your grain bed is too dense or thick (often due to use of grains like wheat and maize) and the mash tun design does not compensate, wort will not drain out during the sparge.

Batch Sparging is a sparging method that has come into practice relatively recently. It differs from continuous sparging in that when the mash is complete the liquid is recirculated and completely drained into the boil kettle. A volume of water is then added and the mash stirred, recirculated and drained. This (optionally) is repeated again. The main advantage of batch sparging comes in the time saved and relative simplicity of the equipment required when compared to continuous sparging. Home brewers who may not have the money, time, or inclination to invest in a well-insulated container with optimal lautering apparatus can batch sparge in a simple cooler with nothing more than a wire/mesh type valve. The process itself also saves time in the brew day due to the fact that the volumes are emptied quickly, rather than very slowly as required by continuous sparging. Finally, the worry of polyphenol (tannin) extraction due to low pH are lessened in batch sparging "because you're not continually diluting the buffering power of the grains.[4]"

Hops

Hop Variety – Hops are the 'spice' of beer like salt, pepper, garlic, thyme, etc. are to a good soup. They provide a sensation of bitterness to the tongue and a pleasant aroma to the nose. Different hop varieties are produced by cross-breeding and mutation of existing varieties and are grown throughout the world. Like a varietal wine, hops have 'terrior,' which is to say that the same hop grown in different climates will produce differing flavors and aromas.

In an effort to categorize hops to choose what is best suited for a particular recipe, I like the method presented by Zainasheff and Palmer in their book *Brewing Classic Styles.* They roughly outline four general character categories 1. Herbal, Earthy, Fruity. 2. Floral, Spicy, Evergreen. 3. Citrus, Herbal, Spicy. 4. Fruity, Citrus, Floral. Generally, any hop can fall into one of these categories. It is up to the brewer to decide which category (or categories) is/are suitable for the particular beer and/or style to be produced.

Hopping Schedule – As hops spend time in your boiling wort, the alpha acid compounds react chemically and form the iso-alpha compounds that we recognize as bitterness. At the same time, the longer a hop stays in the boil; the essential oils that give each hop its recognized aroma and taste are released into the air leaving only a general sense of bitterness from the hop addition. Brewers want to approach a beer recipe with the intent of knowing how much base bitterness should be present and how much of the aroma and flavor holding essential oils they want to leave in the wort. In general, the nearer the end of the boil, the more flavor and aroma compounds are left to the beer instead of floating off as steam from the boil kettle.

Hop Freshness – As hops age, they tend to oxidize and lose the compounds that ultimately turn into both bitterness and aroma in your beer. For this reason it is important to know how old your hops are and store them in an air-tight and cool location to stem this oxidative process as much as you can. In addition, hops that have aged can take on a 'cheesy' aroma that smells and taste like over-ripe cheese or socks. Interestingly, there are some Belgian styles like Lambic that actually employ the use of intentionally aged hops.

Yeast

Yeast Strain – If one were to examine the grain profiles of a light style of Saison, an American Blonde, and a Bavarian Hefeweizen, you would find that, other than the proportion of wheat malt, the beers are reasonably similar. However, tasting these beers, they are vastly different in terms of mouth feel, esters, and various characters in the aroma. This is directly attributable to the true heroes of brewing – the yeast. Never before have amateur brewers had so many choices of such high quality brewing yeast as there is available today due to the work of companies like White Labs and Wyeast. In addition, there are now several very high quality dried yeasts strains available.

The difference in yeast strains is a study that could fill an entire book, but, essentially, the differences come down to the fact that when the yeast cell consumes sugar, it expels not only Carbon Dioxide and Alcohol, but also by-products that tend to contribute to the unique flavors in beer. Yeast strains have evolved in different parts of the world and under varying conditions to produce different off flavors. Hence, the identifiable yeast strains.

Pitching Rate – To ferment a beer completely, there must be sufficient amounts of yeast available to completely ferment the sugars available to them. In a stronger wort, this means more yeast is needed. If too little yeast is pitched, the yeast could tire and quit working before all the intended sugar is consumed, leaving a sweeter-than-intended.

Pitching too much yeast, however, is not a great idea either. When yeast enters the wort, the first thing it does is take up oxygen and nutrients in order to start reproducing. During this reproductive phase, several compounds are produced as by products (notably esters) that actually add some characters to your beer. If the yeast does not need to reproduce, some of this character will be missing in your final product.

Fermentation Temperature – Yeast producers always list an optimal fermentation range for each of the different strains used, and these vary widely from lager to ale strains. Each variety has been bred or selected to work within a given temperature range with the idea that there are a somewhat-known amount of fermentation by products that are released during fermentation at that temperature. There are many by products produced and, by and large, fermenting at the higher end of the range will produce more (or different) by products than intended. Often the high-temperature by products include fusel alcohols that taste 'hot' or like cheap vodka. Esters are a fatty acid that are also produced by high fermentation temperatures that have a high amount "of fruity aroma/flavors.[2]" Acetylaldehyde is another by-product of hot fermentations that are caused by rapid fermentation and has a solventy taste and a green apple type of aroma. It should be noted that in many Belgian style fermentations, it is preferable to ferment at a higher-than-normal ale temperature as some Esters and other fermentation by products are within style for that variety.

When in doubt, refer to your manufacturer's recommendations for fermentation temperatures and try for no more than the middle of the scale.

Oxygen – Oxygen is necessary to ensure a complete healthy fermentation. This means dissolved oxygen in the wort at the time of (or closely after) pitching the yeast. Oxygen is taken up immediately by the yeast in preparation of reproduction. Sufficient oxygen allows the yeast to reproduce and, ultimately produce a clean, healthy fermentation free of unwanted by-products.

Liquids dissolve gases into themselves through breaking of the surface. Brewers can take advantage of this by either shaking the fermentation container vigorously for several minute, or employing an aquarium pump and air stone fitted with a micron filter to bubble up through the wort and break the surface, thus infusing the wort a bit more efficiently than just shaking. An even better method is to use pure oxygen that is hooked up to a fine air stone and placed at the bottom of the fermenting container. A minute or two of bubbling oxygen plus some shaking to further mix in the oxygen rich air in the headspace is a good way to get plenty of oxygen into your beer.

Nutrients – In addition to oxygen, "Yeast also need minerals, nitrogen, and amino and fatty acids to enable them to live and grow. The primary sources for these building blocks are minerals in the water and Free Amino Nitrogen (FAN), lipids, and minerals from the malted barley…[2]." While typical wort has many of these ingredients present, some worts (especially those high in refined sugars) may need supplementation. There are products sold in brewing stores under the generic name of Yeast Nutrient or trade names like Servomyces that ensure your yeast has all it needs to complete a healthy fermentation.

Water

Purity – Beer is mostly made of the water that you use to brew, so it makes sense to have the best-tasting, most clean water source to serve as your base. As mentioned above, the yeast derives several nutrients from the water and part of your beer's character comes from the dissolved nutrients and minerals present (think of the famous Burton on Trent water for brewing English Pale Ales.)

When choosing a water source, there are a few ways to approach it. The simplest is to filter your tap water through a home water filter with activated carbon and allow the natural 'terrior' of your home brewery. This source of water should be adequate and produce a good beer. If your water is too mineral-laden you might want to buy spring water at the store for your beer. Spring water is clean, yet contains minerals. The last option is advanced, but involves buying distilled water and 'building' a base of minerals and nutrients to meet your specifications.

Minerals – The proportions of minerals such as Calcium, Magnesium, Bicarbonate, Sodium, Sulfates, and Chloride as well as factors like pH, Alkalinity, and Hardness are elements that ultimately will affect your fermentation and the taste of your beer. As mentioned above your can either build your water or just filter what you have and allow your 'house character' to be an ingredient in your beers (as long as that character is a 'good' one, that is.)

Serving and Storage

Age – As a beer ages, various and complex chemical reactions continue to take place. If you have tasted an old Pilsner, for instance, you will know that these reactions can be particularly deleterious to your beer's character. However, if you've tasted an aged Barley Wine or Robust Porter, you know that some aging can also be good for the beer.

One of the main constituents in aging comes from oxidation reactions. The periods of time are not exact by any means and are variable according to the condition and environment of the packaged product in bottle or keg. In general, oxidation first causes a decline in hop aroma[1] and perceived bitterness. There's nothing more disappointing than trying an older Pale Ale or IPA only to find out that the great fresh hop character has gone. Earlier in aging, there is also an increase in sweet or toffee/caramel notes.[1] As time continues, even less desirable chemical products react that bring about that cause flavors ranging "from papery or leathery to sherry- or vinegar-like notes[1]."

Storage – As a general rule, the temperature at which your beer is stored affects the speed of the chemical reactions taking place during aging. The colder your beer is stored, the slower the onset of the inevitable aging reactions.

The gases present in the headspace of a beer also affect the stability of the beer long-term. It is best to purge any oxygen-rich air from the headspace and keep a good blanket of less-reactive carbon dioxide (CO_2) on the beer to eliminate early oxidation.

Light of a certain wavelength (400 to 500 nm[l]) can also cause a "photochemical rearrangement of hop resins, resulting in a sulfury mercaptan compound with a pronounced skunky character[l]." For this reason, it is best to keep beer stored out of light in either a keg or at least brown bottles, which do not allow the harmful wavelengths of light to reach your beer.

Carbonation – The level of carbonation at which your beer is ultimately served affects the final taste sensation. Various styles of beer are traditionally served with more or less carbonation to add to the overall character. For instance, many traditional English style ales tend to be served with low carbonation to accentuate the malty characters of these beers. Hefeweizens, Pilsners, and other lighter style beers are served at a higher carbonation level to give them a "light and refreshing palate[6]." Carbonation tends to accentuate hop flavors as well due to the presence of carbonic acid on the palate.

Serving Temperature – Like carbonation, different styles of beer are best served at different temperatures. A higher serving temperature will accentuate malty and aromatic flavors as well as hop aroma while a lower temperature may be more appropriate for a simple, refreshing beer. In the end, the serving temperature is largely a function of the expectation of the drinker of the beer. Some people, particularly those who may be used to very cold beers served in frosty glasses, expect most any beer to be served cold. Consumers of cask conditioned ales expect a 'cellar' temperature that is approaching room temperature.

Serving Method – One of the many great things about the Belgian beer tradition is the practice of having particular glassware for individual beers. The glassware is chosen to accentuate the complex aromas and nuances of these beers. Beers like German Pilsner or Wheat are often served in a taller glass with a less-wide mouth to allow the drinker to funnel the less-present aromatics as well as allowing the visual appreciation of the CO2 bubbles as the rise and form the head of the beer. In general, the glassware will be determined by traditional serving vessels for that style of beer and, like temperature, may vary from geographic region to region.

In general, beer should be served in clear glassware to allow the drinker to gauge the relative clarity and color of the product. The glassware should also be very clean to allow just the right amount of bubbles to be formed by the nucleation CO2 onto the imperfections of the glass in order to release hop aromas and form a foamy head throughout the entire consumption of that glass of beer.

SANITATION!

The base of any beer is sanitation. Sanitation is, in my estimation, the most necessary and most simple concept in brewing. If all surfaces that the beer contacts after fermentation are not as free as possible from wild yeasts, air and surface bacteria, and foreign substances in general, there is a chance that these substances will cause changes in the end-product's flavor in ways that were unintended. This risk increases and/or becomes more obvious as the beer ages and any unwanted entities have time to multiply.

Sanitation as it relates to brewing really has two parts: cleaning and sanitizing. Cleaning involves the use of chemicals and physical action (i.e., scrubbing) to remove any solid matter from surfaces of fermentation vessels, kegs, bottles, bottling buckets and tubes and anything else that would come into direct contact with the beer. You can't sanitize a surface that is not clean. For this, products specifically meant for brewing like Powdered Brewery Wash (PBW), Sani-Clean, or One Step are ideal when used per the manufacturer's recommendations. These chemicals rinse clean and are quite effective. Please note that, no matter what a well-intentioned buddy or brewing shop owner might tell you, cleaners are NOT sanitizers.

Sanitizing is the second necessary step. Sanitation in the brewer's definition is a bit less lax than, say, in a laboratory where sanitation (sterilization) is achieved by raising materials in an autoclave to a high heat level to kill all organisms. Sanitation for brewers generally means letting equipment come into contact with an acid or oxygen based chemical for the process of killing unwanted living micro-organisms. Two good products for sanitation are Star-San and Iodophor. Brewers can use bleach for sanitation, however there are unwanted chemicals produced if the bleach is not properly rinsed so, for this reason, it is not recommend that bleach or any chlorine based solutions be used unless there is absolutely no other option.

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