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DREGS FROM THE KEG

February 2013



Get Brewing!!!

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Foam at the Top

[Rives Borland](#), Strand President

2013 has gotten off to an excellent start for the club. We had a great turnout out for our first meeting of the year and a very informative discussion about carbonation led by Jim Wilson. If you missed it, Jim has written an article about carbonation that is included in this edition of the Dregs.

I want to thank Jim again for kicking off our educational series this year. We are trying to have some kind of structured discussion, presentation, speaker, or hands on activity at each meeting this year. If you have ideas for topics you are interested in learning more about, or a speaker who you would really like to talk at one of our meetings, please email me at president@strandbrewersclub.com. We'll try to make it happen. At the February, June, and October meetings, we will be doing the Iron Brewer tastings, but there may be time for an additional activity, as well.

Strand Brewers Club Iron Brewer Challenge

Round 4

February 13, 2013 Club Meeting

Ingredients: Liberty Hops, Flaked Corn and Coriander

Round 5

June 12, 2013 Club Meeting

Ingredients: Saaz Hops, Lactose and Peppercorns

Round 6

October 9, 2013 Club Meeting

Ingredients: El Dorado Hops, Crystal Malt and Sour Cherries

We had several new people show up at the last meeting, many of whom have already joined the club and paid dues. So we are well on the way to reaching our target new member goal for the year, but don't stop trying to actively recruit!

At the upcoming February meeting on Wednesday, February 13th, at the [South Bay Brewing Supply Co. \(SBBS\)](#), we will be tasting entries for Round 4 of the Iron Brewer Challenge. We will also be tasting beers made with the WLP026 Premium Bitter Ale yeast strain (rumored to be the Marston's Ale strain). In case you didn't hear yet, Jim Wilson recently contacted White Labs and had them culture up a few vials of this strain, which they no longer sell. He brewed a batch, then re-packed the slurry and distributed it around to whoever was interested in brewing with it. Everyone who brewed with it will be bringing their beer to the February meeting for tasting. We are also compiling general notes about the yeast behavior and will send the report back to White Labs, with the goal of encouraging them to sell it again. We will also be tasting and selecting a club entry for the [March Club Only Competition](#), which is for Barleywine style ales.

We hosted the first club brew of the year on Saturday, January 26th, at SBBS. Mike Haisma led the group in brewing a traditional bock. He was extremely efficient and finished up the brew before 2pm. The Therminator plate chiller they used really helped to speed things along and chilled the whole batch in just a few minutes. Despite rain in the morning, there was an impressive turnout for the event and a lot of new brewers who hopefully learned a few things. We will try to host two club brews each month leading up to the Southern California Homebrewers Festival (SCHF) on May 4th. If you would like to host a club brew, please contact [Tammy](#) to schedule it.

Speaking of the SCHF, you have to be a member of the [California Homebrewers Association \(CHA\)](#) in order to attend the festival. Entry to the SCHF is free for CHA members, but you cannot purchase a membership at the festival. Memberships are not yet available online due to some website issues. Hopefully they will be available any day now. So keep checking. Become

members before the end of February because the fees get more expensive as the date for the festival gets closer.

Glenn Rollolazo of SBBS and I recently discussed hosting brewing demonstrations for the general public at the shop on a Sunday each quarter. The demos would be geared towards newer brewers and those who have never brewed at all. We would do an all grain brew starting early and an extract brew starting later and have someone explaining all the steps. We would advertise them heavily and well in advance for a good turnout. I'll keep you informed of the progress of these demos.

Tammy Minion has been doing a great job so far as activities coordinator, setting up club events and getting the word out about what's going on at the local craft beer spots. She has planned a bus trip to San Diego for Saturday, March 16th. We'll be going to the [AHA Rally at Stone](#), the [White Labs Tasting Room](#), and either [Societe](#) or [Hess Brewing](#), or both, if time permits. This is going to be a great trip with a lot to experience! At the AHA rally at Stone you will get to mingle with other homebrewers from around the region, meet the Stone brewers, participate in Judging for the [March Madness Homebrew Competition](#) and win prizes! I have entered a keg in the March Madness competition. Thirty kegs will be judged. At White Labs, you'll get to try many samples of beer that were fermented from the same wort, but with various yeast strains. We will hopefully also get a tour of the facilities. Societe and Hess are both relatively new small breweries and have excellent beer. The cost of the trip will be \$40 or less, depending on how many people sign up. Details are still being finalized, but it will be roughly a 12-hour day trip. Look for more details from Tammy soon. The trip is open to other clubs and the general craft beer loving public, but you must be an AHA member to attend the rally. You can sign up for a membership ahead of time or at the door, at a discounted price. But if you are planning to attend, you should [RSVP](#) now.

There have been a lot of great events happening recently at Naja's and Select Beer. I have been happy to see a good turnout of club

members at the events, especially the Strand Brewing Co. 3rd anniversary events at Select Beer last Sunday and Naja's this past Thursday. Joel Elliott and Rich Marcello, Strand owners, were very happy to see the support from the club. Tammy and I will do our best to keep you informed of what's going on locally. You can also subscribe to John Schreiber's [South Bay Brews News](#), which comes out every Thursday.

In case you didn't hear, El Segundo Brewing Co. [has begun bottling](#) some of their beers. They are also hosting a weekly beer education series on Tuesday evenings at 6:45 PM sharp. You must RSVP for each class. The upcoming class topics are:

February 5th – Hops, and their journey from Europe to California

February 19th – 5 Classic Belgian Styles and their Origins

March 5th – Barrel-aged Beers, Why are you so delicious?

The last thing I want to mention is that tickets for the 2013 [National Homebrewers Conference](#) in Philadelphia, June 27th through 29th, go on sale at noon PST on Tuesday, February 5th. Last year the tickets sold out in about a day, so if you plan to go, you should get them ASAP. If we have enough club members going this year, I would like to try to get a small booth set up at the Club Night, or sign up for a hospitality booth session. Also, the registration for the National Homebrew Competition opens on Tuesday February 26th. Please note there have been some [rule changes](#).

February Meeting

This month we'll meet on Feb. 13th at 7 p.m.



1311 POST AVE TORRANCE, CA 90501

Competition Calendar

[Jeff Sanders](#), Strand Vice-President

Club-Only Competitions

Strand Brewers Club Meetings. Second Wednesday of most months.

Time: 7:00pm.

Entries to be submitted on behalf of the Strand Brewers Club will be determined in a tasting at the club meeting the month before entries are to be submitted for the competition. For more info on club-only competitions, go to

<http://www.homebrewersassociation.org/pages/competitions/club-only-competitions>

March/April 2013

Barleywine Ales

Entries Due March 1st. Judging March 9th.
Entry Fee: \$7.

Hosted by Drew Boxrud and The Primary Fermenters Brewers & Vintners Club of Saint Paul, MN. This covers BJCP category 19B & 19C. For more information contact Drew Boxrud at drewboxrud@hotmail.com

May 2013

Extract Beers

Entries Due May 13th. Judging May 9th.
Entry Fee: \$7.

Hosted by Stan Backlund and the Hangtown Association of Zymurgy Enthusiasts club of Placeville, CA. This covers BJCP categories 1 through 23 where 50% or more of fermentable sugars come from malt extract. For more information contact Stan Backlund at backlunds@comcast.net

August 2013

TBD

Entries Due TBD. Judging TBD. Entry Fee: \$7
Hosted by Tom Folster and the Hudson Valley Brewers club of Millbrook, NY. This covers BJCP category TBD.

For more information contact Tom Folster at vp@hvhomebrewers.com

September/October 2013

European Amber Lager

Entries due TBD. Judging TBD. Entry Fee: \$7
Hosted by Rick Franckhauser and the Cincinnati Malt Infusers club of Cincinnati, OH. Covers BJCP category 3.

For more information contact Rick Franckhauser at franckenbrew@yahoo.com

Local Competitions: in order of entry deadline

America's Finest City Homebrew Competition

San Diego, CA Entries due Feb. 13th.

Judging Feb. 22nd. Entry fee: \$7.

Contact: Dominic Fountain. Phone (619)

920-1449. Email: domfountain@gmail.com

Romancing the Beer Homebrew Contest

Westlake Village, CA Entries due Feb. 15th.

Judging Feb. 24th. Entry fee: \$7.

Contact: Tim Kazules. Phone (805)

870-5109. Email:

thousandoakedtim@gmail.com

World Cup of Beer

Oakland, CA Entries due Feb. 16th. Judging

March 16th. Entry fee: \$not listed.

Contact: Tim McNerney. Phone (415)

647-1633. Email: bjcp@oneofus.org

Celebrewtion

Citrus Heights, CA Entries due March 9th.

Judging March 23rd. Entry fee: \$7.

Contact: Daniel Burke. Phone (555) 555-1234.

Email:

celebrewtion@goldcountrybrewers.org

Sonoma Community Center's Beervana

Sonoma, CA Entries due March 15th.

Judging March 22nd. Entry fee: \$12.

Contact: David Daniel. Phone (707) 327-9441.

Email: dangerddaniel@aol.com

AHA First Round, San Diego

San Diego, CA Entries due March 27th.

Judging April 12th. Entry fee: \$12 for AHA members; \$17 for non-members.

Contact: Jenny DuRose. Phone (831)

419-3650. Email: jdurose@gmail.com

Many more competitions going on around the country and around the world so.....

Go to www.homebrewersassociation.org for a complete list. For a complete list of BJCP competitions, go to http://www.bjcp.org/apps/comp_schedule/competition_schedule.php

Spent Grains

[Brian Kellough](#), Strand Treasurer

We enter February with about \$2,680 in the bank. Inflows included \$660 in dues, a final late PBC sponsor check, and \$90 in raffle & T-Shirt money. Thanks to all who purchased tickets and T-Shirts. Let's keep it up! We have some great prizes coming up at the raffles, so get your tickets at the meetings and let's have a great year for the raffle! We had 25 paid memberships, including 5 new members: Penny Wirsing, Christian Simms, Kelly Simms, Thomas Kulzak and Adam Pike. Welcome to the club! All the new members I just listed: I still need your applications. You can fill it out electronically and just email it now! [Click here](#). This is a great start for the year, and the most memberships we have had in the first month of any year I have record of! This puts us in great position to meet our goal for 2013 to see us get to 60 members strong. So spread the word about our club and the benefits it provides!

For 2013 there is an increase in membership dues to \$35 (\$37 through paypal) for individual membership and \$45 (\$48 through paypal) including a spouse. The increase in dues is a direct response to an improvement opportunity relayed from you the members when we sent out our feedback request last year. So, in 2013 we will now have snacks/foods available at the meetings for you to enjoy while enjoying each other's home brew. Please also feel free to bring some food to share or even better, a nice food pairing for the beer you bring. We'll also at least once per quarter have commercial tastings at the meeting where we'll match styles to the club only competitions and try some commercial examples of that style.

Membership Renewal Time!

We have 29 members from 2012 who have not renewed yet. Don't forget that dues for 2013 are due now. Dues are \$35 (\$37 through paypal) for individual membership and \$45 (\$48 through paypal) including a spouse. TO MAKE IT EASIER FOR YOU, WE HAVE AN ONLINE PAYMENT OPTION THROUGH PAYPAL! [Click](#)

[here](#) for information. It is nominally more expensive, but infinitely more convenient for all involved! If you don't like paying online, still fill out the application form electronically and email it, then just mail a check made out to "Strand Brewers Club" to me at 10890 Whitburn St, Culver City, CA 90230. You can also hand me a check or cash at the next club meeting (however, all applications should still be submitted electronically).

Attention returning and current members: If you think your contact information is different than what we have on file, please fill out the online membership application at the link above. It is a fillable pdf you can save and keep for your records. Annually we'll ask renewing members to check their forms and make sure the information is current.

What's on Tap?

[Tammy Minion](#), Strand Activities Director

Saturday, February 2nd

LA Brewery Tour - 12:30pm to 5:30pm

LA Craft Beer Tours takes you to two breweries, Golden Road Brewing and Eagle Rock Brewing, and to one craft beer location such as Pasadena Congregation, Lucky Baldwin's, or Stone Tasting Room. Tastings are provided at Golden Road and Eagle Rock. The cost of the tour is \$50. Check in time begins at 12:00. They meet at Dillons Hollywood and Vine. <http://www.lacraftbeertours.com/Scheduled-Tours.html>

Tuesday, February 5th

AHA Homebrewers Conference Registration

The Conference will take place in Philadelphia June 27-29. Last year it sold out in one day so don't delay. It's sure to be a blast. <http://www.ahaconference.org/conference/register/>

Tuesday, February 5th

Hops and Their Journey from Europe to California - 6:30pm to 7:30pm

El Segundo Brewing is offering classes every other Tuesday. The cost is \$20 and includes a flight of beers. You must RSVP to ciceronetom@gmail.com. The Taproom will be open until 8pm.

<http://www.elsegundobrewing.com/>

Tuesday, February 5th

Beer Education: Age or Not to Age – 7 to 9pm
Eagle Rock Brewery is offering a class on the do's and don'ts of aging beers. Covering whether you should age a beer, what styles are best, what can go wrong, and some tips on storage. There will be tastings of old, and not so old, beers to show what can happen over time, or what can happen in just a matter of months depending on the style. The cost is \$30 and you must purchase online. <http://eaglerockbrewery.com/events/beer-education-age-or-not-to-age>

February 8th through February 17th

San Francisco Beer Week

Just in case you are looking for a reason to get away. <http://www.sfbeerweek.org/>

February 9th through February 23rd

Lucky Baldwin's 14th Annual Belgian Beer Festival

It's the largest Belgian beer festival in the west with 51 Belgian beers on tap. They will have 80 different Belgian Beers over the two weeks of the festival. So many beers and yet so little time. <http://www.luckybaldwins.com/>

February 9th

Pasadena Pub Crawl via the Metro – 9:30am to 6pm

Let's celebrate Pasadena's good fortune of having great bars and the largest Belgian beer festival in the west. We'll start and maybe end at Lucky Baldwin's and hit Congregation Alehouse and Stone Taproom along the way. Meet at the Redondo Beach/ Marine Green line Station at 9:30 am. Metro pass is \$5.

Sunday, February 10th

Beer Dinner with Monkish Brewing – 6pm

City Tavern in Culver City. <http://citytavernculvercity.com/events/>

Monday, February 18th

Russian River Beer Dinner

Mediterraneo Hermosa Beach will be offering a Five-Course Beer Pairing featuring Pliny the Younger. Guest chef, Kelly Whitaker, from Boulder's Basta will be creating a one-of-a-kind menu to pair with each of the five featured brews. Call them to reserve a spot or

individual Pliny the Younger kegs at 310-318-2666. <http://themedhb.com/>

Tuesday, February 19th

Five Classic Belgian Styles and Their Origins – 6:30pm to 7:30pm

El Segundo Brewing is offering classes every other Tuesday. The cost is \$20 and includes a flight of beers. You must RSVP to ciceronetom@gmail.com. The Taproom will be open until 8pm.

<http://www.elsegundobrewing.com/>

Wednesday, February 20th

Woman's Forum – 7pm to 9pm

Eagle Rock Brewery hosts the forum on the third Wednesday of each month. The cost is \$10-20 and includes a flight of beer and a flight summary. Check their website for upcoming topics.

<http://eaglerockbrewery.com/page/womens-forum>

Saturday, March 2nd

San Diego Brewery Tour – 10:30am to 8pm

LA Craft Beer Tours heads to San Diego. Destinations include Stone, Ballast Point, and Green Flash. Tickets \$75 includes tastings at Ballast Point and Green Flash and a tour at one or the other. They also stop at Pizza Port San Clemente on return trip.

Pick up at Hollywood and Vine in Hollywood at Dillon's. Check in begins at 10am.

<http://www.lacraftbeertours.com>

Saturday, March 16th

Bus Trip – To the AHA Rally at the Stone Brewing World Bistro & Gardens and More

Join fellow homebrewers on a day trip to the AHA rally at Stone Brewing.* At the rally you will get to taste and vote on great homebrew from regional brewers, have a chance to win swag, and of course hang out with some really cool people in the brewing community. After the rally we will visit Hess Brewing at their nano brewery location and White Labs tasting room. If time permits we can visit Societe Brewing. It will be approximately a 12-hour trip starting around 10am. The cost will be \$30 to \$40, depending on the number attending. For more info and to RSVP email activities@strandbrewersclub.com.

* Everyone attending the rally must be an AHA member. Membership will be \$33 at the door and \$19 for the spouse. The rally is limited so please RSVP soon. <http://www.stoneworldbistro.com/marchmadness/>

Strand Brewer of the Year

[Mike Haisma](#), Strand Communications

Our first month of homebrewing activity is drawing to a close and I thought I'd share an update on the current leaderboard for the Strand Brewer of the Year. Before that, you should know that we have added a new activity to earn points! The new activity is "judge, steward, or volunteer in a BJCP competition" and it earns 2 points. To recap, here is a list of all activities and their associated points:

Activity	Points
Each different homebrew brought to a meeting	1
Win best beer of the meeting	3
Win an intra-club competition (Iron Brewer, etc.)	5
Host a club brew	3
Actively participate in a club brew	1
Each keg brought to a major event (casitas, summer party, etc.)	3
Bring a COC entry for mini-judging	2
Win the COC mini-judging	5
Write a technical article for the Dregs	3
Give a presentation/lead a discussion at a meeting	5

Activity	Points
Judge, Steward, or Volunteer in a BJCP competition -- NEW ACTIVITY!	2
Each entry submitted to a BJCP competition	1
Place 3rd at a BJCP competition	3
Place 2nd at a BJCP competition	4
Place 1st at a BJCP competition	5
Runner-up BOS at a BJCP competition	6
BOS at a BJCP competition	10
Place 3rd at NHC first round	6
Place 2nd at NHC first round	8
Place 1st at NHC first round	10
Place 3rd at NHC final round	12
Place 2nd at NHC final round	16
Place 1st at NHC final round	20
Win AHA homebrewer of the year	50
Win AHA Ninkasi award	100

Here is the Leaderboard after the first month:

Name	Points
Mike Haisma Jim Wilson	8
Rives Borland	5

Name	Points
Lee Richardson Hunter & Charlie Thacker	2
Steve Fafard Ryan Penrod Robert Hernandez Rick Wirsing Rich Thornton Nate Federman Lisa Thornton Jeff Sanders Janet Fukumoto Ethan Allen Doug Toperzer Christian Sims Charlie Wallace Brendan Binns Bob Wilson	1

You can earn points by performing any of the activities on the list, but you need to make sure I know about them or they won't be counted. The absolute best way to do that is to make sure your name is on any sign-up sheets for the corresponding activity (if there is one), and for activities like entering or judging in competitions, you can send me an email at communications@strandbrewersclub.com with some kind of documentation for that activity (e.g. confirmation emails, scoresheets, etc.). Please feel free to contact me if you have ideas for other activities, complaints about existing ones, or questions related to homebrewing or really any topic at all.

Carbonation

By Jim Wilson, Strand civilian

Beer is naturally carbonated by carbon dioxide (CO₂) that's produced along with alcohol during fermentation. For the first 9500 years of its history, beer was stored at atmospheric pressure and could have carbonation levels more or less like today's [cask ale](#). About [400 years ago](#) the invention of stoneware and glass bottles allowed beer to be packaged with a tied down cork closure that permitted higher carbonation. Drinkers liked the pleasant

effervescence and it became a desirable beer feature.

Chemistry was in a golden age at the time bottled beer appeared. Many scientists were working to uncover the basic properties of materials. Wikipedia has a good [article](#) about their efforts that led to our understanding the fundamental behavior of gases.

At that time, five gas properties related to carbonation were discovered.

- Gases can dissolve in water (or beer).
- The amount of gas that can dissolve in beer varies with different gases. [Polar molecules](#) like CO₂ can dissolve at higher concentrations than non polar molecules. For instance, 1.72 g of CO₂ can dissolve in a liter of water at standard conditions which is about 200 times the amount of non-polar oxygen that can dissolve.
- Gas solubility in water is inversely proportional to temperature and proportional to pressure. Table A presents a graphical representation of these properties with respect to CO₂ in beers.
- The amount of gas that can dissolve in beer depends on the partial pressure of that gas in the vapor space above the liquid.
- The rate at which a gas can dissolve in beer is proportional to the contact area between the two. If the contact area is large, for instance with small gas bubbles or agitation, the process is accelerated. If the contact area is small, like a beer bottle or corny keg, the process is slow. The other side of this coin is that with no agitation, it takes some time for beer that's super saturated to release its excess gas.

Keeping these properties in mind, you can carbonate your beer. First, decide how much carbonation is appropriate for the style you've brewed. Having units of measurement will make that easier.

Chemists use the concept of [molarity](#) to describe dissolved gas concentration. U.S. brewers typically use units of volumes of CO₂/volume of beer, just called volumes, while the rest of the world tends to use grams/liter. All these are related, but we'll stick with volumes.

PSI (Pounds Per Square Inch)																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
30°F	1.82	1.92	2.03	2.14	2.23	2.36	2.48	2.60	2.70	2.82	2.93	3.02	3.13	3.24	3.35	3.46	3.57	3.67	3.78	3.89	4.00	4.11	4.22	4.33	4.44	4.66	4.77	4.87	4.98	4.98
31°F	1.78	1.88	2.00	2.10	2.20	2.31	2.42	2.54	2.65	2.76	2.86	2.96	3.07	3.17	3.28	3.39	3.50	3.60	3.71	3.82	3.93	4.03	4.14	4.25	4.35	4.46	4.57	4.68	4.78	4.89
32°F	1.75	1.85	1.95	2.05	2.15	2.27	2.38	2.48	2.59	2.70	2.80	2.90	3.00	3.11	3.21	3.31	3.42	3.52	3.63	3.73	3.84	3.94	4.04	4.15	4.25	4.36	4.46	4.57	4.67	4.77
33°F	1.71	1.81	1.91	2.01	2.10	2.23	2.33	2.43	2.53	2.63	2.74	2.84	2.96	3.06	3.15	3.25	3.35	3.46	3.56	3.66	3.76	3.87	3.97	4.07	4.18	4.28	4.38	4.48	4.59	4.69
34°F	1.68	1.78	1.86	1.97	2.06	2.18	2.28	2.38	2.48	2.58	2.69	2.79	2.90	3.00	3.09	3.19	3.29	3.39	3.49	3.59	3.69	3.79	3.90	4.00	4.10	4.20	4.30	4.40	4.50	4.60
35°F	1.63	1.73	1.83	1.93	2.02	2.14	2.24	2.34	2.43	2.52	2.63	2.73	2.83	2.93	3.02	3.12	3.22	3.32	3.42	3.52	3.62	3.72	3.82	3.92	4.01	4.11	4.21	4.31	4.41	4.51
36°F	1.60	1.69	1.79	1.88	1.98	2.09	2.19	2.29	2.38	2.47	2.57	2.67	2.77	2.86	2.96	3.05	3.15	3.24	3.34	3.43	3.53	3.63	3.72	3.82	3.92	4.01	4.11	4.21	4.30	4.40
37°F	1.55	1.65	1.74	1.84	1.94	2.04	2.14	2.24	2.33	2.42	2.52	2.62	2.71	2.80	2.90	3.00	3.09	3.18	3.27	3.37	3.46	3.56	3.65	3.75	3.84	3.94	4.03	4.13	4.22	4.32
38°F	1.52	1.61	1.71	1.80	1.90	2.00	2.10	2.20	2.29	2.38	2.48	2.57	2.66	2.75	2.85	2.94	3.03	3.12	3.21	3.30	3.40	3.49	3.59	3.68	3.77	3.87	3.96	4.06	4.15	4.24
39°F	1.49	1.58	1.67	1.77	1.86	1.96	2.06	2.15	2.25	2.34	2.43	2.52	2.61	2.70	2.80	2.89	2.98	3.07	3.16	3.25	3.34	3.44	3.53	3.62	3.71	3.81	3.90	3.99	4.08	4.18
40°F	1.47	1.56	1.65	1.74	1.83	1.92	2.01	2.10	2.20	2.30	2.39	2.47	2.56	2.65	2.75	2.84	2.93	3.01	3.10	3.19	3.28	3.37	3.46	3.55	3.64	3.73	3.82	3.91	4.01	4.10
41°F	1.43	1.52	1.61	1.70	1.79	1.88	1.97	2.06	2.16	2.25	2.34	2.43	2.52	2.60	2.70	2.79	2.88	2.96	3.05	3.14	3.23	3.32	3.41	3.50	3.59	3.68	3.77	3.86	3.95	4.04
42°F	1.39	1.48	1.57	1.66	1.75	1.85	1.94	2.02	2.12	2.21	2.30	2.39	2.48	2.56	2.65	2.74	2.83	2.91	3.00	3.09	3.18	3.26	3.35	3.44	3.53	3.62	3.70	3.79	3.88	3.97
43°F	1.37	1.46	1.54	1.63	1.72	1.81	1.90	1.99	2.08	2.17	2.26	2.34	2.43	2.52	2.61	2.69	2.78	2.86	2.95	3.04	3.13	3.21	3.30	3.39	3.47	3.56	3.65	3.74	3.82	3.91
44°F	1.35	1.43	1.52	1.60	1.69	1.78	1.87	1.95	2.04	2.13	2.22	2.30	2.39	2.47	2.56	2.64	2.73	2.81	2.90	2.99	3.07	3.10	3.24	3.33	3.41	3.50	3.58	3.67	3.76	3.84
45°F	1.32	1.41	1.49	1.58	1.66	1.75	1.84	1.91	2.00	2.08	2.17	2.26	2.34	2.42	2.51	2.60	2.69	2.77	2.86	2.94	3.02	3.11	3.19	3.28	3.36	3.45	3.53	3.62	3.70	3.79
46°F	1.28	1.37	1.45	1.54	1.62	1.71	1.80	1.88	1.96	2.04	2.13	2.22	2.30	2.38	2.47	2.55	2.64	2.72	2.81	2.89	2.98	3.06	3.15	3.23	3.31	3.40	3.48	3.57	3.65	3.74
47°F	1.26	1.34	1.42	1.51	1.59	1.68	1.76	1.84	1.92	2.00	2.09	2.18	2.26	2.34	2.42	2.50	2.59	2.67	2.76	2.84	2.93	3.02	3.09	3.18	3.26	3.35	3.43	3.51	3.60	3.68
48°F	1.23	1.31	1.39	1.48	1.56	1.65	1.73	1.81	1.89	1.96	2.05	2.14	2.22	2.30	2.38	2.46	2.54	2.62	2.71	2.79	2.88	2.96	3.04	3.13	3.21	3.30	3.38	3.46	3.54	3.63
49°F	1.21	1.29	1.37	1.45	1.53	1.62	1.70	1.79	1.86	1.93	2.01	2.10	2.18	2.25	2.34	2.42	2.50	2.58	2.67	2.75	2.83	2.91	3.00	3.07	3.15	3.23	3.31	3.39	3.47	3.56
50°F	1.18	1.26	1.34	1.42	1.50	1.59	1.66	1.74	1.82	1.90	1.98	2.06	2.14	2.21	2.30	2.38	2.46	2.54	2.62	2.70	2.78	2.86	2.94	3.02	3.10	3.17	3.25	3.33	3.41	3.49
51°F	1.18	1.26	1.34	1.42	1.49	1.57	1.64	1.71	1.79	1.87	1.95	2.02	2.10	2.18	2.26	2.34	2.42	2.50	2.57	2.65	2.74	2.82	2.90	2.97	3.05	3.13	3.19	3.27	3.34	3.42
52°F	1.16	1.23	1.31	1.39	1.46	1.54	1.61	1.68	1.76	1.84	1.92	1.99	2.06	2.14	2.22	2.30	2.38	2.45	2.53	2.61	2.68	2.76	2.84	2.92	3.00	3.06	3.13	3.22	3.30	3.37
53°F	1.14	1.21	1.29	1.36	1.44	1.51	1.59	1.66	1.74	1.81	1.89	1.96	2.03	2.10	2.18	2.26	2.34	2.41	2.49	2.57	2.64	2.71	2.79	2.86	2.94	3.01	3.09	3.16	3.24	3.31
54°F	1.12	1.19	1.27	1.34	1.41	1.49	1.56	1.63	1.71	1.78	1.86	1.93	2.00	2.07	2.15	2.22	2.30	2.37	2.45	2.52	2.59	2.66	2.74	2.81	2.89	2.96	3.04	3.10	3.17	3.24
55°F	1.10	1.17	1.24	1.31	1.39	1.46	1.53	1.60	1.68	1.75	1.82	1.89	1.97	2.04	2.12	2.18	2.26	2.33	2.40	2.47	2.54	2.62	2.69	2.76	2.83	2.89	2.97	3.04	3.11	3.18
56°F	1.07	1.15	1.22	1.29	1.36	1.43	1.50	1.57	1.65	1.72	1.79	1.86	1.93	2.00	2.08	2.15	2.22	2.29	2.36	2.43	2.50	2.57	2.64	2.71	2.78	2.85	2.92	2.99	3.06	3.13
57°F	1.05	1.12	1.19	1.26	1.33	1.40	1.47	1.54	1.62	1.70	1.77	1.83	1.90	1.97	2.04	2.11	2.18	2.25	2.32	2.39	2.46	2.53	2.60	2.66	2.73	2.80	2.87	2.94	3.00	3.08
58°F	1.03	1.10	1.17	1.24	1.30	1.37	1.44	1.51	1.59	1.67	1.74	1.80	1.87	1.94	2.01	2.08	2.15	2.21	2.28	2.35	2.42	2.48	2.55	2.62	2.69	2.75	2.82	2.88	2.95	3.02
59°F	1.02	1.09	1.16	1.22	1.29	1.36	1.43	1.49	1.56	1.64	1.71	1.77	1.84	1.91	1.98	2.04	2.11	2.17	2.24	2.31	2.38	2.43	2.50	2.57	2.64	2.70	2.77	2.84	2.91	2.97
60°F	1.01	1.08	1.15	1.21	1.28	1.34	1.41	1.47	1.54	1.62	1.62	1.75	1.82	1.88	1.95	2.01	2.08	2.14	2.21	2.27	2.34	2.40	2.47	2.53	2.60	2.66	2.73	2.79	2.86	2.92
61°F	0.99	1.05	1.12	1.18	1.24	1.31	1.37	1.44	1.50	1.57	1.63	1.69	1.76	1.82	1.89	1.95	2.02	2.08	2.14	2.21	2.27	2.34	2.40	2.47	2.53	2.59	2.66	2.72	2.79	2.85
62°F	0.96	1.02	1.09	1.15	1.21	1.27	1.34	1.40	1.46	1.52	1.59	1.65	1.71	1.78	1.84	1.90	1.97	2.03	2.09	2.15	2.22	2.28	2.34	2.41	2.47	2.53	2.59	2.66	2.72	2.78
63°F	0.93	0.99	1.06	1.12	1.18	1.24	1.30	1.36	1.42	1.49	1.55	1.61	1.67	1.73	1.79	1.85	1.92	1.98	2.04	2.10	2.16	2.22	2.28	2.35	2.41	2.47	2.53	2.59	2.65	2.71
64°F	0.91	0.97	1.03	1.09	1.15	1.21	1.27	1.33	1.39	1.45	1.51	1.57	1.63	1.69	1.75	1.81	1.87	1.93	1.99	2.05	2.11	2.17	2.23	2.29	2.35	2.41	2.47	2.52	2.58	2.64
65°F	0.88	0.94	1.00	1.06	1.11	1.17	1.23	1.29	1.35	1.41	1.46	1.52	1.58	1.64	1.70	1.76	1.82	1.87	1.93	1.99	2.05	2.11	2.17	2.23	2.28	2.34	2.40	2.46	2.52	2.58

Table Key:

- Blue = Under-Carbonated, 0 - 1.40 volumes CO2
- Gray = Stouts and porters, 1.50 - 2.20 volumes CO2
- Green = Lagers, Ales, Ambers, most beers, 2.20 - 2.60 volumes CO2
- Yellow = Highly carbonated ales, Lambics, Wheat beers 2.60 - 4.0 volumes CO2
- Red = Over-carbonated (except for certain specialty ales) 4.1+ volumes CO2

Table A. Carbonation Chart

Carbonation levels for approximately 80 beer styles are generally described in the BJCP Style Guidelines. Typical levels of carbonation for various beer styles are shown in Table B.

Table B. Carbonation Levels		
High	Fruit Lambic Gueuze Saison Belgian Strong and Specialty Ales Bavarian Weizens Berliner Wisse	3.0 to 5+

Table B. Carbonation Levels		
Level	Style	Volumes CO ₂ /Beer
Low	Cask Conditioned Ale	1.0 to 1.7
Medium	Draft Lager and Ales Bottled Beers (US, Europe) Some Belgian Ales	2.2 to 2.8

Only one Style, Unblended Lambic, is typically not carbonated.

Carbonation is accomplished by capturing CO₂ that's produced during fermentation or by adding CO₂ back into fully fermented beer.

Let's see what we can learn from modern commercial carbonation practices.

- Closing the gas vent on the fermentor toward the end of fermentation, when the specific gravity (SG) is within about 1° [Plato](#) of the expected final gravity. This allows the last bit of CO₂ produced to be captured by the beer and requires a vessel that can be sealed and safely operated at about 15 psig.
- Adding 1½ to 2% of either unfermented wort or about 10% of actively fermenting beer to fully fermented beer and allowing a secondary fermentation to carbonate the beer in a closed vessel.
- Injecting CO₂ through a [sintered](#) stone into fully fermented beer. This can be done during transfer from the fermentor, while recirculating the bright beer tank or into a still tank. CO₂ may be purchased or recycled in house.
- Capture and addition of CO₂ may be combined in sequence to achieve the desired carbonation level.
- [Bottle conditioning](#) or re-fermenting by priming fully fermented beer that contains live yeast with sugar, bottling and capturing the resulting CO₂.

Bulk carbonation has some benefits. It allows testing by measurement and/or taste and adjustment, if necessary, to reach the desired carbonation level. Direct testing instruments like the [Zahm and Nagel model 1000](#) CO₂ meter are pricy for small commercial or home breweries. Large brewers can afford to use indirect methods like infrared spectrography which has the advantage of continuous digital measurement.

It's tough to adjust carbonation in bottle conditioned beers until another batch is brewed.

As far as forced carbonation goes, it's not affordable for most of us to use a pressure vessel for fermentation. It's definitely not economical to capture and recycle CO₂ at home. We get around these restrictions and carbonate one of two ways:

1. Bottle conditioning, just like commercial brewers. Use the carbonation chart, Table

A, along with a nomograph like the one shown in Figure 1.

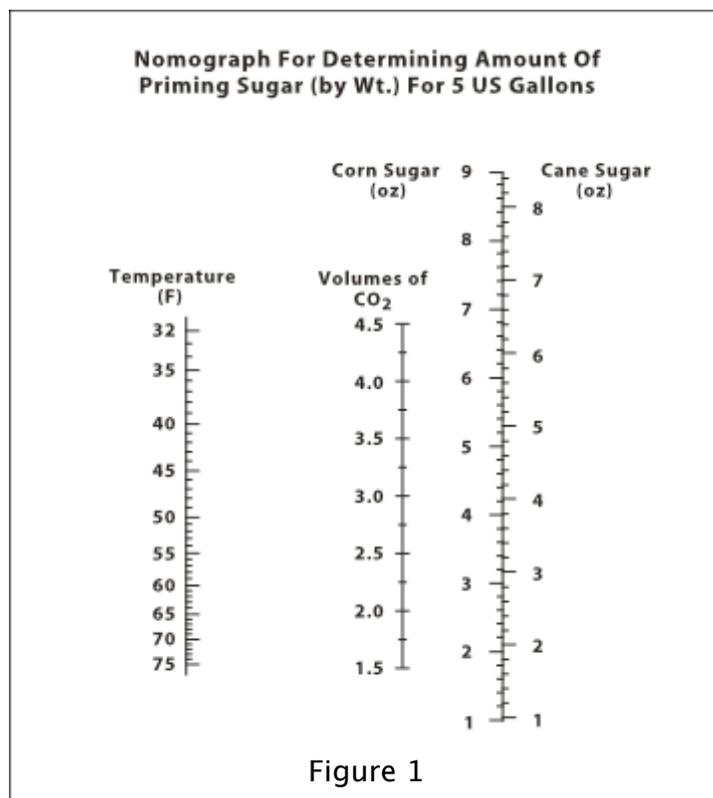


Figure 1

As an example, you'll need about 3 ounces of table sugar to get 2.7 volumes of CO₂ in five gallons of beer at 40°F. Measuring sugar by weight is more precise and repeatable than measuring by volume. Using sugar syrup makes mixing with the beer easier than fussing with a solid. Plus, you can briefly boil it to sanitize.

Bottle conditioning requires about 10⁶ cells/ml of live yeast in the beer and is typically carried out at 70 to 75°F for ales. The re-fermentation step finishes in a day but about two weeks are required for the CO₂ to dissolve into the beer unless the bottles are agitated. Table sugar works just fine for bottle conditioning. Corn sugar, invert sugar, dark flavorful sugars and honey can be alternatives.

There can be some uncertainty about the level and timing of carbonation in bottle conditioned beer. Quantity of yeast, its viability, the amount of available sugar, temperature and pressure all affect carbonation levels. One thing we can do is to bottle in a plastic soda bottle and squeeze out

some of the gas before screwing on the cap. Use this as a test. The beer is ready to taste when the bottle inflates, and either you shake it or wait 2 weeks to allow the CO₂ to dissolve.

2. Injecting purchased CO₂ into chilled, kegged beer. If the CO₂ tank is connected to the keg at the appropriate pressure for the style, up to two weeks may be required for the CO₂ to dissolve. Agitating the keg (which increases the beer/CO₂ contact area) can reduce the carbonation time to 5 to 10 minutes. Carbonating through a stone and then transferring the beer to another keg for serving is another possibility.

Homebrew carbonation methods are well established and have been used for scores of years. There are good discussions in books like Dave Miller's classic [Homebrewing Guide](#) or his new one, [Brew Like a Pro: Make Pub-Style Draft Beer at Home](#) and many online articles too.

Concerns about carbonation don't end until the beer is consumed. For example, balancing a draft system to allow beer to be served well, with just the right amount of carbonation in the glass or repackaging bulk carbonated beer in bottles while maintaining its pressure are also important but will have to be topics of a future presentation.

Tell Us What Are You Doing

Your stories are welcome in the Dregs. Upgrade your brewery? Fine tune your practice? Take a road trip? Do well in a competition? Have recipes to share? Read a good beer book? Have club related pictures, especially for the Dregs cover? Send all those, or anything else you think would be interesting to [Rick Wirsing](#). Thanks!

What We Stand For

The objectives of the Strand Brewers Club are to brew beer and share information about brewing, presentation, consumption, judging and history of beer. We promote and encourage homebrewing competition and hope to foster general goodwill through the making and consuming of this noble and most excellent beverage. We aim to brew the best damn beer.

It is our policy to brew and consume beer strictly for fun. Under no circumstances does Strand support or condone in any manner the sale or barter of homebrewed beer, the operation of a motor vehicle under the influence of alcohol by a member or participant in any club event or the provision of alcohol to minors.

Mentors

The following members have volunteered to answer your brewing questions and to help beginning brewers learn the craft. You should take advantage of their expertise.

Bill Krouss	310-831-6352	bkrouss (at) cox dot net	Rancho Palos Verdes
Dave Peterson	310-530-3168	diablo390 (at) aol dot com	Torrance
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Jim Wilson	310-316-2374	jim 7258 (at) gmail dot com	Redondo Beach
Steve Fafard	310-373-1724	sfafard (at) cox dot net	Rolling Hills Estates

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