Homebrewer's Guide to Kegging

A MoreManual™

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This is a simple guide to properly and effectively cleaning, sanitizing, filling, carbonating and serving homebrew beer using Corny kegs.

The advantages to kegging are many, but they can be summarized in a few key points: Kegged beer is ready to drink faster than bottled beer because you will be using a Co2 tank to carbonate! You can also carbonate to any level you want – no more guess work that may come with natural carbonation! In addition, there will be no more sanitizing, filling and capping dozens of bottles!

Equipment and Supplies

A typical draft set-up (KEG400)

Common Equipment:

- Cornelius or "Corny" style keg *(KEG418/KEG420)*
- 5 ft – 3/16" Inner Diameter (I.D.) Beverage Line *(D1704)*
- 3 ft – 5/16" Inner Diameter (I.D.) Gas Line *(D1700)*
- Gas-In (Gray) Quick Disconnect *(KEG700)*
- Beverage-Out (Black) Quick Disconnect *(KEG710)*
- Handheld faucet *(D1260)* or other beer faucet
- Co2 Tank - 5lbs or more *(D1050)*
- Co2 Regulator *(D1060)*
- Refrigerator or Chest Freezer with Temperature Controller *(FE600/FE610)*

For Cleaning/Sanitizing:

- Brewery Cleaner such as PBW *(CL25A)*
- Sanitizer such as Star San *(CL62)*
- Soft Scrub Pad *(CE27)* and/or Carboy Brush (CE40)
- ¼" Line Brush *(CE45)*
- Deep Socket Tool – 11/16" *(TOOL120)* and/or 7/8" *(TOOL128)*

You May Also Need:

- Keg Lube, such as Lubrifilm *(CL50)*
- Replacement Keg O-Rings *(KEG500)*
- Replacement Poppets *(KEG540)*
- Replacement Body Connects *(KEG460/KEG470)*
- Co2 Tee *(D1860)*
- Manifold *(D1800/D1805/D1810/D1815/D1820)*
- Secondary Regulator *(D1067A/B/C/D)*
- Diffusion Stone – .5 Micron *(KEG594)*

Anatomy Of A Keg

The Cornelius, or Corny, keg is made from stainless steel and designed to hold up to 60 PSI (pounds per square inch) of pressure. The most common Corny kegs are made to hold 5 gallons of liquid, however, they can vary in size. A Corny keg is made up of the following:

5 gallon Corny Keg (KEG420)

Standard Corny Keg Lid (KEG440A)

Gas-In Body Connect (KEG460N)

Poppet for Corny Keg (KEG540)

Gas-In Dip Tube (KEG480)

The 5 different O-Rings on a Keg (KEG500-)

The Shell — This is the body of the keg that holds the liquid and is made of stainless steel.

The Top & Bottom — The top (handles) and the bottom of the keg are usually made of rubber; they can vary in color but are most commonly black.

The Lid — This is the piece that goes onto the top of the keg to close it. It consists of a bail to hold it in place, a pressure relief valve, and a large o-ring to form a seal against the keg.

Keg lids are normally interchangeable between kegs; however, some lids are a different shape than that pictured above, and will only fit certain style kegs. These less common lids are commonly called "racetrack" lids due to their unique oval shape.

The "Gas-In" Body Connect or Post — This is the part that the Gas-In Quick Disconnect fits on. This fitting is commonly identified by having either a star pattern and/or hash mark on the base. It usually takes a deep socket to remove these; typically they will be either 7/8" or 11/16".

The "Beverage-Out" Body Connect or Post — This is the part that the Beverage-Out Quick Disconnect fits on. This fitting will not have a star pattern or hash mark identifying it.

Poppet — In each of the body connects is a poppet. These are spring-loaded and allow either gas in or beer out when the Quick Disconnects are placed on the body connects. These sit on the dip tube flange.

Gas-In Dip Tube — These are made of stainless or plastic and are usually 1–2 inches long. There is a gasket that seals the connection where the tube slides into the shell. This is how the gas gets into the keg.

Beverage-Out Dip Tube — These are always made of stainless and can be curved or straight. These are made to reach all the way to the bottom of the keg. Beer-Out Dip tubes have a gasket around them to form a seal where they go into the shell. This is what draws the beer from the bottom of the keg.

O-rings — There are 5 o-rings on each Corny keg; 1 for the lid, 2 for each body connect, and 2 for each dip tube. O-rings should be replaced if the keg was used for something other than beer and periodically every couple years after that, depending on usage and storage. We recommend using a keg lube such as Lubrifilm on the o-rings. This will help prevent the o-rings from cracking and also make putting the quick disconnects onto the keg easier.

Cleaning/Sanitizing

To Clean:

1. Completely dismantle the keg by taking off the body connects, dip tubes, o-rings, the keg lid, etc., and put the small fittings into a bowl.

2. If the keg is dirty or has residue left over from the last use, use some brewery cleaner such as PBW and some warm water to fill the keg at least half way.

3. Use a carboy brush or a soft scrub pad (not steel wool) to clean the shell of the keg inside and out, paying close attention to the areas that are hidden to make sure they are cleaned thoroughly.

4. Clean the Beverage-Out Dip Tube with a ¼" Line Brush and some PBW solution.

5. Clean and inspect all pieces such as O-Rings, Poppets, Body Connects, etc., for signs of wear or breakage. Replace if needed.

6. Drain the keg and small parts and rinse them well. The PBW may be used on another keg/keg parts or dumped at this time.

7. Reassemble the keg.

To Sanitize:

1. Fill the shell completely with a sanitizing solution. We recommend Star San. Follow the directions for diluting the sanitizer you use.

2. Let the sanitizer sit in the keg for the recommended contact time (2 minutes for Star San).

3. Put the lid in a separate bowl filled with sanitizing solution and let this sit as well.

4. Once the lid has soaked in the sanitizer for the proper amount of time, put it onto the filled keg, making sure that it seals correctly.

5. Flip the closed keg over and let it sit for another 1-2 minutes. This will allow the sanitizer to get into all the areas in the keg including the dip tubes.

6. Drain the keg. When using "no-rinse" sanitizers, such as Star San, a small amount of foam or sanitizer will not impart any flavors or orders. You can drain the keg by:

a. Opening the keg and setting it upside-down for 5–10 minutes.

b. Siphoning the sanitizer out with a siphoning set-up.

c. Pushing the sanitizer out with Co2. This is the recommended way, as this will sanitize the serving lines as well as fill the shell with Co2 rather than air.

The Co2 Set-Up

The Co2 setup consists of two main parts: the Co2 tank and Co2 regulator. We highly recommend that a Co2 tank of 5lbs or more is used, along with a regulator like the one pictured. Although smaller, more portable systems are available, they are not very practical for carbonating.

Co2 (Carbon Dioxide):

Co2 is a gas that will take liquid form at certain pressures and temperatures. This gas is what we use to both carbonate and serve beer. Being that Co2 is in liquid form when in the tank, the tank must be upright when the tank is on and the regulator is hooked up. Turning the handle on the tank counterclockwise turns the tank on. Co2 tanks need to be hydrostatic tested every 5 years at about $15 each test, so we recommend "swapping" your tank rather than having it filled, when possible. One 5lb Co2 tank is usually enough to carbonate and serve 6 or more five-gallon Corny kegs.

The Regulator:

How it Works:

Dual Gage CO2 Regulator With Check Valve (D1060)

The Co2 Regulator essentially takes the pressure of the gas of the top of the tank and reduces it to a lower, controlled pressure. The regulator attaches to the tank with a female hex piece. The pressure going into the regulator is generally around 500-900 PSI, depending on the temperature of the tank.

The body of the regulator has two gauges: the one on top is the adjustable pressure and the one on the side reads the pressure of the gas in the tank. The gauge that measures the tank pressure can be a bit deceiving as it will show about 700-900 PSI if the tank is at room temperature, and 500-600 PSI at refrigeration temperature. This will remain fairly steady until most of the Co2 is gone from the tank. At that point, the gauge will start plummeting into the red, which means it is time to swamp your tank for a full one.

You can adjust the flow of Co2 by turning the screw in the main body of the regulator. This threaded fitting will usually be screwed all the way out when it is new, but it will not actually come completely apart from the regulator body. To engage it, thread it in slowly till the threads start to connect. The more you thread it in, the more the PSI will build. Once the desired pressure is reached, moving the nut until it hits the body of the regulator will lock the threaded fitting in place. Remember that you may notice some "drift" between PSI readings if the tank changes temperatures.

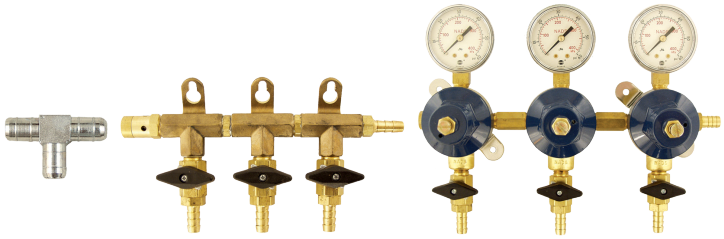
On the bottom of the regulator is an on/off valve as well as a one-way valve, commonly called a check valve. These allow for ease of turning the gas flow on and off, as well as protection from liquid working its way up into the regulator.

Connecting the Regulator:

Gas-In Quick Disconnect (KEG710)

The regulator connects to the keg via a Gas-In Quick Disconnect. The Gas-In Quick Disconnect is connected to the regulator with 5/16" I.D. tubing. A majority of Co2 equipment has 5/16" barbs, which is why 5/16" tubing is commonly used for gas equipment. However, the Gas-In Q.D. has a ¼" barb on it so the 5/16" tubing must be attached and secured with a hose clamp. We have never found this to be a problem with leaking, etc., as long as the tubing is clamped down tightly.

If you wish to run multiple kegs off of one Co2 Tank, you will need a Co2 Tee, Gas Manifold, or Secondary Regulator. The Co2 Tee will allow only one additional keg run at the same pressure as the other, the Gas Manifold will allow for many kegs at the same pressure and the Secondary regulator will allow for many kegs at different pressures. They are all easy to use and install, the one you choose depends on your ideal set-up.



The three ways to "split" Co2 between multiple kegs. From left: A stainless steel Co2 Tee, a gas manifold and a secondary regulator.

Checking the System For Leaks:

When you first build your gas system or add any modifications, you should always check for gas leaks. The easiest way to check for leaks is to put all of the tubing and any connections (excluding the regulator and any other parts that may become damaged in liquid) into a bowl of water with the gas turned on. If a leak is present, you will see bubbles when submerged under water. Another great way to check for leaks is to use Star San, which is known for foaming, in conjunction with a spray bottle or washcloth. Commercial leak detectors are available, but they are not necessary for small-scale draft systems.

Important Note: *It is possible to keg beer without a Co2 setup, however, much like leaving an open bottle of beer out overnight, beer served without Co2 will quickly spoil and lose Co2 or become "flat". Due to this, any beer served without Co2 will need to be consumed within 2-3 days from the time it is tapped.*

Filling

Filling and Sealing the Keg:

A Cornelius keg can be filled in a variety of ways, from just opening the lid and siphoning into it, to alternative methods such as Closed Brewing to help reduce bacteria pickup. Once the keg is filled, it is most important that the lid be seated properly before the bail is closed. To do this, turn the Co2 on, and set it to 10-12 PSI. Put the Gas-In Quick Disconnect onto the Gas-In Body Connect of the keg while simultaneously pulling up on the bail of the keg lid. The lid might move a second or so before finding the seal, but it should sit correctly relatively fast. Once the lid is sealed and held up by the gas, set the bail of the lid. To purge oxygen out of the air space in the keg, pull up on the pressure relief valve while the gas is hooked up. Now the keg is ready for carbonation!

Carbonating

Beer in a Cornelius keg can be carbonated a number of different ways. Keep in mind that all the methods of carbonating assume that an adjustable pressure Co2 regulator is being used and "the beer is at or below 60°F as Co2 is more readily absorbed into cold liquids *(see Carbonation Chart on the last page of this document)*. It is recommended that beer be kept very cold to allow the beer to absorb Co2 more easily. Please note that carbonation times may vary depending on the style of the beer, density of the liquid and the method used to carbonate *(see Typical CO2 Volumes Chart on the 2nd to last page of this document)*. It is always a good idea to test beer frequently to make sure the carbonation level is right for you. This portion of the manual will cover carbonating by:

- Saturation Over Time (recommended)
- Using a Diffusion or Carbonation Stone
- Shaking Co2 Into the Solution
- High Pressure Carbonation

Saturation Over Time:

The principal of this method is simple: If you leave constant pressure on the beer it will absorb the Co2 until the pressure pushing down on the beer equals the internal pressure of the gas dissolved in the liquid.

Depending on the temperature and Final Gravity (F.G.) of the beer, beer will usually take an average of 5–10 days to stabilize.

1. Hook the Gas-In Quick Disconnect to the Gas-In Body Connect and turn the gas on.

2. Adjust your regulator to the desired PSI and let the beer sit at this pressure for 7–10 days.

3. You can test your beer by pulling a pint off of the keg after 5–7 days.

4. If the beer is under-carbonated to your taste, let it sit for another 1–3 days, testing periodically as necessary.

The great thing about carbonating over time is you give your beer a period of cold aging while avoiding any chances of over carbonating, which can lead to excess foam and make serving beer very difficult. Although this method takes longer than the others, this is by far the easiest and least involved method.

Diffusion Stone (KEG594)

Using Diffusion Stones:

There are different ways of carbonating with stainless Diffusion or Carbonation stones. A diffusion stone is attached to tubing in the form of a carbonating keg lid, a stainless rod or gas line. Co2 is then pushed through the stone and into the liquid, which creates very small bubbles. Since the bubbles are so small, they have a faster absorption rate versus pushing Co2 through tubing alone or straight into the body connect.

Saturation over time:

Carbonation Keg Lid (KEG445)

1. With a Diffusion stone attached to a keg lid, tubing or stainless rod and submerged into the beer, start out with your regulator set at 1–2 PSI, hook your gas into the keg and let it sit for approximately 3–5 minutes.

2. Continue to raise the pressure 1–2 PSI until the desired pressure is reached, resting 3–5 minutes in between increases.

3. As an optional step, you can pull the pressure relief valve on the

keg lid 2–4 times after the gas has been applied. This will cause the head pressure to diminish and let more gas into the keg, which, in turn, causes Co2 to absorb quicker due to the increase in space for the Co2.

4. Take small samples of beer to taste and view the progress of carbonation.

Fast Carbonation:

This is the same method as above, except instead of setting the PSI to the recommended level, keep gradually raising it until the pressure is 4–5 PSI greater than what the chart recommends. Remember to test your beer frequently once the recommended PSI is reached to help avoid over-carbonating.

Important Note: *Since stones are made of many small pieces of stainless steel compressed together, they are very hard to keep sterile. The small holes make the stones a perfect hiding place for bacteria. Stones should be boiled for 15–20 minutes before and after every use and stored in a clean plastic baggy between uses. Stones should also never be handled with bare hands as the natural oils in skin can clog the holes.*

Shaking Co2 into Solution:

Another way to accelerate the absorption of Co2 into a liquid is to shake the keg that has pressure in its headspace. Shaking the keg creates more liquid surface area for the Co2 to hit, thus cutting the amount of time it takes for beer to absorb the Co2.

When using this method, the beer needs to be as cold as possible. To add gas to the keg, attach the Gas-In Quick Disconnect with the gas turned on until you hear the gas flow stop, then un-attach the Gas-In Quick Disconnect before shaking so that you don't accidentally send beer into your gas lines. You can shake Co2 into your solution using two different methods:

Method #1:

This is the fastest from start to finish, but the downside is that the risk of over-carbonating is much higher than with Method #2.

1. Start with the regulator turned up high to about 25–30 PSI.
2. Attach the Gas-In Quick Disconnect and let the gas flow in until you hear the flow stop.
3. Once the gas flow has stopped, un-attach the Gas-In Quick Disconnect & shake the keg. You can shake the keg by picking it up by the handles and shaking it, rolling it on its side, etc.
4. Shake the keg for a minute or more and then re-attach the Gas-In Quick Disconnect. You will most likely hear the gas flowing through again.
5. Repeat steps 2 through 4 as necessary.
6. Test your beer by pouring small sample glasses after you have repeated these steps a few times and every couple minutes after that until the desired carbonation level is reached. Optionally, you can lower the PSI slightly to help decrease the chances of over-carbonating your beer after you have done steps 2–4 a few times.

Method #2:

This is the same concept as *Method #1*, but takes longer since a lower PSI is used. Follow the same steps above except instead of setting the regulator to 25–30 PSI, start at 16–18 PSI.

Using High Pressure Over Time:

Much like using Diffusion stones and shaking the keg, etc., raising the PSI of the Co2 will cause the gas to dissolve into the beer faster. Much like some of the aforementioned methods of carbonation, setting the PSI high has risks as well. Since there are no readily published equations that show solubility to a predictable level at different PSI levels, there is a major risk of over-carbonating. This is how most of us learned to carbonate and most of us had major headaches trying to serve over-carbonated beer.

1. Set the regulator to 25–30 PSI and let the keg sit over a period of 24–48 hours
2. Test the beer every few hours.
3. Lower the PSI level before you over-carbonate. If the beer is turns out slightly under-carbonated, the Co2 will continue to saturate slowly until the proper carbonation level is reached.

Other Ways to Carbonate:

The above mentioned techniques of carbonating are the most popular but there are many other methods that work. Many methods of carbonating are simply variations of the above while some methods require high-pressure pumps and extremely specialized pieces. Any way you choose to carbonate your beer, just keep in mind that an over-carbonated beer is a hard beer to serve.

Over-Carbonated Beer — What do I do?

So you've accidentally over-carbonated your beer and are now stuck pouring nothing but foam? The good news is that not all is lost. The real problem is that too much Co2 is trapped in the solution, so the basic fix is to reduce the Co2 without damaging the beer. To do this:

1. Turn off the Co2 or un-attach the Gas-In Quick Disconnect.
2. Pull the Pressure Relief Valve on the keg lid repeatedly over time.
3. Test frequently.

Avoid attempting to fix an over-carbonated beer by racking the beer to another keg. This can cause oxidization of the beer, which will result in a "stale" tasting product. Also, don't try to serve the over-carbonated beer at 2–4 PSI as this can cause under-carbonation.

There are other ways to release Co2 without damaging your beer, but the above-mentioned method is the easiest and has been used for years with no problem.

Serving From a Keg:

When serving draft beer you want to maintain the saturation level of Co2 in the beer while balancing the pressure and resistance to allow an even flow from the faucet. Although it is not always practical or possible, it is recommended to store the keg, beverage line and faucet inside of the refrigerator altogether. The colder the beer stays, the less the Co2 will come out of solution.

If the beer is carbonated at 12 PSI, at 38F degrees, it will have 2.57 volume of Co2 in solution. You will want to maintain that Co2 level throughout, so you should serve with that same pressure set on your regulator.

Another factor when serving beer is line restriction. A simple way of calculating restriction is with tubing. Typical beer line is 3/16" I.D. tubing with a wall thickness of about 1/8". This tubing will give you roughly 2 PSI of restriction per linear foot used. You can also factor in some restriction from the beer going through the quick disconnect on the keg and the faucet itself. So, if you were to use five feet of typical 3/16" beverage line this would give you roughly 10 PSI so you would serve at 10–12 PSI to balance the restriction to maintain a balanced pour.

To Serve Kegged Beer:

1. Set your PSI to the desired serving level.
2. Attach the Beer-Out Quick Disconnect to the Beer-Out Body Connect.
3. Open the faucet and pour.
4. Enjoy!

Typical CO2 Volumes by Beer Style

American Amber Ale: 2.2–2.8	California Common: 2.4–2.8	Irish Dry Stout: 1.6–2.0
American Brown: 1.5–2.5	Cream Ale: 2.6–2.7	Kölsch: 2.4–2.7
American Dark Lager: 2.5–2.7	Doppelbock: 2.3–2.6	Maibock: 2.2–2.7
American Lager: 2.6–2.7	Dortmunder Export: 2.6	Märzen/Oktoberfest: 2.6–2.7
American Light Lager: 2.6	Dunkelweizen: 3.6–4.5	Münchner Helles: 2.3–2.7
American Pale Ale: 2.2–2.8	Düsseldorf Altbier: 2.2–3.1	Munich Dunkel: 2.2–2.7
American Pilsner: 2.6–2.7	English Best Bitter: 0.75–1.3	North German Altbier: 2.2–3.1
American Premium: 2.6–2.7	English Brown: 1.5–2.3	Oatmeal Stout: 1.8–2.4
American Wheat: 2.3–2.6	English Dark Mild: 1.3–2.0	Robust Porter: 1.8–2.5
Barley Wine: 1.3–2.3	English Light Mild: 1.3–2.0	Schwarzbier: 2.2–2.6
Belgian Dubbel: 1.9–2.4	English Old/Strong Ale: 1.5–2.3	Scottish Export Ale: 0.75–1.3
Belgian Lambic: 3.0–4.5	English Ordinary Bitter: 0.75–1.3	Scottish Heavy Ale: 0.75–1.3
Belgian Pale Ale: 1.9–2.5	English Pale Ale: 1.5–2.3	Scottish Light Ale: 0.75–1.3
Belgian Strong Ale: 1.9–2.4	English Strong Bitter: 0.75–1.3	Strong Scotch Ale: 1.5–2.3
Belgian Tripel: 1.9–2.4	Flanders Brown: 1.9–2.5	Sweet Stout: 2.0–2.4
Belgian White (Wit): 2.1–2.6	Foreign-Style Stout: 2.3–2.6	Traditional Bock: 2.2–2.7
Berliner Weisse: 3.5	German Pilsener: 2.5	Vienna: 2.4–2.6
Bock: 2.2–2.7	Helles Bock: 2.2–2.7	Weizen/Weissbier: 3.6–4.5
Bohemian Pilsener: 2.3–2.5	Imperial Stout: 1.5–2.3	
Brown Porter: 1.7–2.5	India Pale Ale: 1.5–2.3	

Carbonation Chart

To Read the Carbonation Chart:

First choose the average temperature of the beer on the left side of the chart and then find the level of carbonation you want in the center of the chart. Once you have determined the carbonation level, follow the column up to the top of the chart to find your PSI setting.

Degrees in Fahrenheit \ Pounds per Square Inch (PSI)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
33	2.23	2.33	2.43	2.53	2.63	2.74	2.84	2.96	3.06	3.15	3.25				
34	2.18	2.28	2.38	2.48	2.58	2.69	2.79	2.9	3.0	3.09	3.19				
35	2.14	2.24	2.34	2.43	2.52	2.63	2.73	2.83	2.93	3.02	3.12	3.22			
36	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		
37	2.04	2.14	2.24	2.33	2.42	2.52	2.62	2.71	2.8	2.9	3.0	3.09	3.18	3.27	
38	2.0	2.1	2.2	2.29	2.38	2.48	2.57	2.66	2.75	2.85	2.94	3.03	3.12	3.21	
39	1.96	2.06	2.15	2.25	2.34	2.43	2.52	2.61	2.7	2.8	2.89	2.98	3.07	3.16	3.25
40	1.92	2.01	2.1	2.2	2.3	2.39	2.47	2.56	2.65	2.75	2.84	2.93	3.01	3.1	3.19
41	1.88	1.97	2.06	2.16	2.25	2.34	2.43	2.52	2.6	2.7	2.79	2.88	2.96	3.05	3.14
42	1.85	1.94	2.02	2.12	2.21	2.3	2.39	2.48	2.56	2.65	2.74	2.83	2.91	3.0	3.09
43	1.81	1.9	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
44	1.78	1.87	1.95	2.04	2.13	2.22	2.3	2.39	2.47	2.56	2.64	2.73	2.81	2.9	2.99
45	1.75	1.84	1.91	2.0	2.08	2.17	2.26	2.34	2.42	2.51	2.6	2.69	2.77	2.86	2.94
46	1.71	1.8	1.88	1.96	2.04	2.13	2.22	2.3	2.38	2.47	2.55	2.64	2.72	2.81	2.89
47	1.68	1.76	1.84	1.92	2.0	2.09	2.18	2.26	2.34	2.42	2.5	2.59	2.67	2.76	2.84
48	1.65	1.73	1.81	1.89	1.96	2.05	2.14	2.22	2.3	2.38	2.46	2.54	2.62	2.71	2.79
49	1.62	1.7	1.79	1.86	1.93	2.01	2.1	2.18	2.25	2.34	2.42	2.5	2.58	2.67	2.75
50	1.59	1.66	1.74	1.82	1.9	1.98	2.06	2.14	2.21	2.3	2.38	2.46	2.54	2.62	2.7
51	1.57	1.64	1.71	1.79	1.87	1.95	2.02	2.1	2.18	2.26	2.34	2.42	2.49	2.57	2.65
52	1.54	1.61	1.68	1.76	1.84	1.92	1.99	2.06	2.14	2.22	2.3	2.38	2.45	2.53	2.61
53	1.51	1.59	1.66	1.74	1.81	1.89	1.96	2.03	2.1	2.18	2.26	2.34	2.41	2.49	2.57
54		1.56	1.63	1.71	1.78	1.86	1.93	2.0	2.07	2.15	2.22	2.3	2.37	2.45	2.52
55		1.53	1.6	1.68	1.75	1.82	1.89	1.97	2.04	2.12	2.19	2.26	2.33	2.4	2.47
56		1.5	1.57	1.65	1.72	1.79	1.86	1.93	2.0	2.08	2.15	2.22	2.29	2.36	2.43
57			1.54	1.62	1.7	1.77	1.83	1.9	1.97	2.04	2.11	2.18	2.25	2.32	2.39
58			1.51	1.59	1.67	1.74	1.8	1.87	1.94	2.01	2.08	2.15	2.21	2.28	2.35
59				1.56	1.64	1.71	1.77	1.84	1.91	1.98	2.04	2.11	2.17	2.24	2.31
60				1.54	1.62	1.69	1.75	1.82	1.88	1.95	2.01	2.08	2.14	2.21	2.27

Volumes Of Co2