

Make Sparkling Wine using Dialysis Tubing

by Tino Montopoli (AWO News # 20)

"A fellow Krusher found an article on how to make Sparkling wine using a specific dialysis tubing. I obtained a sample of the tubing and tried it.

It worked !!! In short the tubing is like a sausage casing with tiny pores so that glucose and carbon dioxide can go through it but yeast cells cannot as they are too big.

The tubing is tied at one end with fishing line (alternately you can tie a knot in it) then 10mls of yeast culture is placed in the tube and then it is closed with fishing line. This tube is placed in the bottle (Canadian sparkling wine type) with wine + sugar + water (as specified in detailed instructions) and a crown cap is placed on the bottle. Wait for 3 months then chill bottle, take crown cap off and remove the tube with yeast, add syrup if you want it off-dry, top up and cork with plastic cork and wire.

Voila - champagne style wine without daily riddling. I have a source of the tubing but the minimum order is 100 feet at \$2.10 per foot. One foot is good for 2 bottles of wine if fishing line is used. One hundred feet is too much for any one winemaker. Is any one or club interested to share?

Making Sparkling Wine – Dialysis Tubing Method

Many amateur wine makers appreciate a fine bottle of sparkling wine and the way that it can enhance most any occasion, but few attempt to make their own. I believe that there are several reasons for this with the most important being that the production of sparkling wine is perceived to be too laborious, expensive, and time consuming a process for the amateur to attempt. Another less tangible explanation is that sparkling wine, Champagne in particular, is perceived to have almost mystical characteristics. It is assumed that it is not something that anyone could make. In this article I hope to explain my departure from these beliefs and take you through my introduction into making sparkling wine. Hopefully you will be convinced as I now am that good quality sparkling wine can be easily produced by amateur wine makers and that it is worth the small amount of extra effort involved.

Initially I was very hesitant about making sparkling wine. It is something that my wife and I enjoy very much but to make my own sounded like too much work and trouble to be worth it. The thought of disgorging the spent yeast from bottles of sparkling wine made in the traditional Method Champenois was very intimidating. Several factors came together though to change my mind. The first had to do with the location of where I live. I am lucky enough to be in an area that has a wealth of fine amateur wine makers. We meet regularly to discuss, learn about, and enjoy wine. All of us are better wine makers for this with each pushing one another to improve. This atmosphere of cooperation and friendly competition led me to seek something new to contribute to the group. Sparkling wine was an area that few members were involved with. So I began to consider making a sparkling wine as a way to add to the group knowledge and show off a little in the process.

The next step on my way to making sparkling wine occurred as I was looking through the available AWS reprints list searching for articles related to pH (which there are several good ones). An article entitled "More About The Dialysis Method For Sparkling Wine" caught my eye. I ordered this reprint

along with the others and received a well written piece by Christian Schuster on how to make sparkling wine from commercial still wine using dialysis tubing, a cellulose material that is imposing sounding but quite easy to obtain and use. This article is a must read for anyone considering making sparkling wine.

The last push I needed to become a sparkling wine maker came from Mother Nature. I made a still wine from some 1990 Vidal grapes that had to be picked sooner than at ideal ripeness. This was due to the weather and to a large flock of migratory birds that decided not to fly south when such a feast was to be had in the vineyard. It forced the grower to pick early or have nothing to pick at all. After correcting the juice to the best of my ability I made a wine that was perfectly acceptable (what wine isn't to it's creator?) but definitely no prize winner. It lacked body and had a slightly tart finish to it. What struck me about this wine was that when sampling it from the carboy it reminded me of Brut Champagne that had gone flat. (Who would ever let that happen?). This led me to the conclusion that if I was going to try a sparkling wine, here would be a good base to start from.

So I decided to give sparkling wine a try using the dialysis method. I began cautiously by making a single test bottle of wine. That is a major advantage of making sparkling wine. You can make as little or as much as you want from wine in the carboy, barrel, or bottle. The process that I describe below in making my test bottle will work just as well for any amount of wine.

The first thing that I did was order 25 ft. (the minimum order quantity) of 25mm wide "Spectrum Spectra/Por 4" dialysis tubing from Thomas Scientific.

The current price for 25 ft. of tubing is \$21.45 plus shipping and handling which is under \$1.00 per bottle of sparkling wine. You can order this by phone with a major credit card by calling 1-800-345-2100 and ordering part number 3787-D20. While you are at it ask them for a copy of their current catalog. It contains over 1600 pages of scientific equipment, some of which is useful to serious wine makers. Sound like you know what you are doing or say you are with "such and such" winery and you should get it for free.

The above dialysis tubing is a cellulose material full of microscopic holes that are small enough to keep yeast cells inside of it but large enough to let wine and it's dissolved sugar move freely through the tubing and allow fermentation to take place.

In addition to the tubing, I also ordered crown caps and a hand capper from Presque Isle Wine Cellars. The caps cost about a penny each and the hand capper cost about \$10.00.

I have also used plastic sparkling wine closures and wire hoods successfully but they are more expensive in quantity than crown caps.

The rest of the items that I needed, A "Champagne" bottle, yeast, sugar, and a plastic drinking straw, I already had. It turned out that not all of the Champagne bottles that I had been saving would work with the crown caps that I purchased. Some bottles had larger lips than others and the crown cap would not seal over them. Once I discovered this, it was easy enough to place a crown cap on the lip of a newly emptied bottle and see if it fit properly.

If the lip of the bottle fits fully inside the cap then it will seal properly. The yeast that I used was a packet of "Red Star Pasteur Champagne". This type or "Prisse de Mousse" is well suited to secondary fermentation in the bottle.

When all of my supplies arrived I was eager to get started and make that first bottle of sparkling wine but I realized that there were two important calculations that I needed to make to insure success. I needed to know how much water to add to my base wine to reduce the alcohol content and how much sugar to add to fuel the secondary fermentation.

Through some research I found that to make sparkling wine, the proper alcohol content for a base wine is about 10% - 11%. If you are planning to make sparkling wine right from the start, you can make an 11% alcohol wine and use it as is but since I was beginning with a 12% alcohol wine I added water. It turned out that the amount of water needed per bottle could be expressed in the following equation:

$$\text{water} = 750 - ((750 \times \text{desired alcohol \%}) / \text{starting alcohol \%})$$

Table 1, which is derived from the above equation, also lists the amount of water to add per bottle for various starting and desired alcohol levels.

Table 1.

| Water Needed per Bottle to Achieve Desired Alcohol in mls | | | | | |
|---|--------------------|------|------|------|------|
| Desired % Alcohol | Starting % Alcohol | | | | |
| | 11.0 | 11.5 | 12.0 | 12.5 | 13.0 |
| 10.0 | 68 | 98 | 125 | 150 | 173 |
| 10.5 | 34 | 65 | 94 | 120 | 144 |
| 11.0 | 0 | 33 | 63 | 90 | 116 |

The amount of sugar placed in the bottle will determine the amount of CO2 or bubbles produced and the amount of pressure in a sealed bottle. The amount of pressure in commercial sparkling wines varies from 4-6 atmospheres of pressure or about 60-90 psi. Pressure of 4 atmospheres is more than acceptable for a sparkling wine especially if you are just starting out. To raise the pressure of 1 liter of wine by 1 atmosphere requires 4 grams of sugar. Table 2 shows how much sugar to add for various lot sizes of wine to obtain 4 atmospheres of pressure per bottle.

Table 2.

| Approximate amount of Sugar to add to obtain 4 Atmospheres | | |
|--|--------------------|----------------------|
| Amount of Wine | Amount of Sugar gm | Amount of Sugar Tbsp |
| 1 Bottle | 12 Grams | 1 Tablespoon |
| 1 Gallon | 60 Grams | 5 Tablespoons |
| 1 Case | 144 Grams | 12 Tablespoons |
| 5 Gallons | 300 Grams | 25 Tablespoons |

Now that I knew how much water and sugar were needed to add to my wine, I simply mixed the two together at the last moment with no noticeable ill effects. Upon further research I learned that it is good practice to simmer the sugar and water together for about 30 minutes and then adjust the water back to it's original amount. This helps the sugar to invert, which means that the sucrose that is table sugar breaks down into glucose and fructose. These two sugars are easier for the yeast to metabolize thus giving you a better chance of success.

I then made a yeast starter from 1 packet of yeast, 2 tablespoons of sugar, 1/8 teaspoon citric acid, and half a cup of water. I allowed this to sit for several hours while I prepared the rest of the materials. It would however, be best to make this starter the night before use.

After the starter was made I cut an 8 inch piece of dialysis tubing from the roll and placed it in boiling water for 30 minutes. This softens the tubing and makes it easier to handle. Once the tubing was finished boiling, I rinsed it several times in warm water to remove any impurities and left it soaking until I was ready for it.

The next step, once both the starter and tubing were ready, was to fill the tubing and seal it off. To do this I first tied a knot in one end of the tubing as close to the end as possible.

Next I cut a piece of plastic drinking straw about 2 inches shorter than the tube and placed it halfway into the tube. I then added 10 ml of yeast starter, that I first stirred to get a good mixture, into the tubing through the straw. I used a syringe to measure and add the starter but an eyedropper or pipette will work just as well. The straw isn't an absolute necessity but it helps to keep the tubing open and keep the starter from contacting the outside of the tubing. After the tube was full I then pushed the straw inside and twisted the tubing to remove any air inside and then tied the open end shut with another knot. I then rinsed the closed tube thoroughly to remove any yeast that might have been on the outside.

The would-be sparkling wine was now ready for final assembly. I added the sugar and water that I had mixed together earlier into a clean "Champagne" bottle. Then I added the sealed dialysis tube to the bottle and filled the bottle with wine. The tubing had a neutral buoyancy and barely stood upright in the bottle. I capped the bottle off and stored it on it's side in a cool dark spot in my cellar.

I left the bottle closed for three months which of course seemed like an eternity. I did check on the bottle about twice a week to make sure it hadn't exploded. I also shook the bottle to distribute the yeast in the tubing. (The yeast will tend to settle in one spot in the tubing.)

I wore safety glasses and heavy gloves while handling the bottle and always kept the bottle pointed away from me as a precaution. Defective or over-pressurized bottles can explode and should be handled with caution. The reason for removing excess air from the dialysis tubing before tying it off became apparent as the fermentation in the bottle progressed. A gas bubble appeared in the dialysis tubing and grew over the three months. This caused the tubing to rapidly rise to the top of the bottle when held upright and was an excellent indicator that something indeed was happening.

Finally the three months were up and I could check on the progress of my wine. I chilled the wine thoroughly and then opened the bottle. Much to my delight a slight but audible sigh came forth from the bottle when the crown cap was removed. Also the dialysis tube shot up to the top of the bottle where I could reach the end. It would not come out though until I pierced the tubing to release the built up gas in the tube. The tubing then came out easily with all the spent yeast still inside, which is the major advantage of using dialysis tubing.

No lengthy riddling procedure was required and no complicated disgorging technique was needed.

There was one step left before the wine was ready to drink and that was adding the final dosage of sweetened wine to the bottle to top it off. The amount of sugar to add is up to the wine maker. Commercial sparkling wine with no sugar added at all will be labeled NATURAL or BRUT NATURAL. A BRUT sparkling wine will contain between 5 and 8 grams of sugar and an EXTRA DRY will contain about 15 grams per bottle. This dosage can also be enhanced by a small amount of Cognac or good quality brandy. The dosage was chilled in advance of adding it to the wine in order to minimize the

amount of foaming. The bottle was then recapped and shaken lightly to mix in the dosage. The process was then finished except for the enjoyment of the bottle's contents.

Needless to say this bottle did not lay around for a long time before it was opened. When poured the wine had less mousse than commercial wines but a good quantity of bubbles that lasted quite a long time. The light mousse was probably due to my initial caution in adding sugar to that first bottle. In my opinion the Vidal wine took well to being sparkled. Three months of aging was not enough to bring out the yeast contributed aromas and flavors in the wine but subsequent bottles stored for a full year had much improved fresh bread aromas and more complex flavors.

As you can see, by using dialysis tubing to make sparkling wine, the difficulties of riddling and disgorgement are eliminated and the process becomes quite simple. And for less than \$1.00 per bottle you can turn any quantity of still wine into sparkling wine. I guarantee that you will be the center of attention when you open and pour your very own sparkling wine to appreciative friends and guests. So save a few "Champagne" bottles and give it a try. If you are like me, sparkling wine will become a regular part of your yearly wine making efforts.

REFERENCES:

1. Schuster C, More About The Dialysis Method For Sparkling Wine, American Wine Society Journal Reprint.
2. Jackish P, Modern Winemaking, 1985, Cornell University Press.
3. Wagner P, Grapes Into Wine, 1986, Alfred A Knopf