Making an Icewine Style Dessert Wine

By Steve Kroll

For those fortunate enough to have tasted it, Icewine (*Eiswein* in Germany, *Vin de Glace* in France) is a real treat. More dessert than wine, it can contain up to 20% residual sugar - along with copious amounts of alcohol. True Icewine is difficult and expensive to produce. Commercial wineries in Canada and Germany are forced to adhere to strict government regulations in order to label their product Icewine. Such regulations mandate grapes be left on the vine and harvested in the dead of winter, and only when the temperature is at a specific range. Furthermore, they must be crushed while still frozen, which requires specialized high end equipment. Juice yields are meager. If the winemaker is lucky, he may get a single drop of juice from each grape!

Fortunately, as home winemakers, we aren't bound by such rules and can create a close approximation by skipping the frosty harvest and employing a technique known as *cryoextraction*. While the term sounds impressive and high tech, it really involves nothing more than freezing a quantity of white grape juice and partially thawing it in order to concentrate the sugary goodness.

When making faux Icewine (sometimes called "icebox wine"), there are many white grape varietals that work nicely. What you want to look for is one that has an intense bouquet. Acidic varieties are also preferred, since the finished wine will need a lot of acid to help balance the intense sugar and not leave it tasting syrupy and flat. In Germany, Riesling, or sometimes Gewürztraminer, is used. In Canada, a hybrid varietal called Vidal Blanc is the grape of choice. Cabernet Franc is also sometimes used to create a red Icewine.

For the Icewine in this tutorial, I chose Muscat Canelli. Muscat has a wonderful floral nose that's reminiscent of tea roses and citrus, and is used to make the Italian dessert wine known as Moscato. I'll walk you through the general process below. I don't like to use the term "recipe" because it implies methods and measurements that must be strictly adhered to. In winemaking there are too many variables, and what works well for one person may not work for others.

The Cryoextraction Technique

Icewine requires juice with a high sugar content. If you were to leave grapes on the vine into the winter months, they would eventually freeze into hard, raisined little knots. The watery part of the grape freezes solid while the sugary pulp, with its lower freezing point, remains mostly liquid. The secret to making Icewine is in capturing the sugar by pressing the grapes while still frozen. It requires some heavy duty equipment. Your typical basket press simply won't do the job.

For my faux Icewine project, I purchased 23 liters (6 gallons) of refrigerated Muscat Canelli grape juice grown in the Lodi region of central California. This juice started at 25° Brix (Brix is a measure of the percentage of sugar), but what I needed was more like 32° to 40° Brix. Icewine typically has alcohol in the 11-13% range, and residual sugar levels of 8-20%. It's sweet and alcoholic, not unlike the famous Sauternes dessert wines of France.

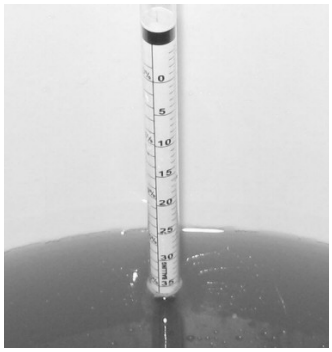
The first thing you need to do is freeze the juice. I divided the 23 liters into several plastic gallon jugs (making sure to leave some room for expansion) and put them in the freezer for several weeks. You could also use 2 liter soda bottles. Also, I could've just waited a few days, but I wanted to wait and start this project in the middle of winter - not because I'm trying to be traditional - but because I can use the cold weather to my advantage. I'll explain later.

Note that the juice I purchased already had sulfite added by the packer. If you use juice from fresh grapes, you may want to add 30-40 mg/liter sulfite before freezing. It will help protect it from oxidation. Yes, juice will still oxidize in the freezer, although at a slower rate than at room temperature.

Now comes the part where we increase the sugar. Once the juice has frozen solid, remove the containers and let them sit out for several hours until the juice begins to thaw and is a bit slushy. Remove the caps (or just punch some holes in the bottom) and invert each container and set in a colander over a bucket. Note that you don't have to use as many containers as I did, but I find that smaller containers make for quicker thawing.

From time to time you will want to collect the smaller buckets and empty them into your fermenter. Once you have enough juice in the fermenter, float a hydrometer in it so you can monitor the Brix level. Remember, you want the juice to be between 32° and 40° Brix, so don't let it thaw completely.

The thawing juice will start out very, very sweet because the first thing to melt is the sugary solids, which have a lower freezing point than water. As the thaw progresses, more water will melt and the Brix level will start to drop. This is where you want to start watching the hydrometer closely to make sure you don't end up with too little sugar.



Ideally you want to end up with about 13 liters or so of juice. Or at least I do, because I'm planning to eventually store this in an 11-liter glass carboy. Figure that with cryoextraction you will get about half of the juice you began with. If you extract the amount of juice you want and find that the Brix level is lower than 32°, add enough table sugar to bring the Brix up to at least 35°. As you can see, I ended up at 36°. Allow the must to come to room temperature. To do so, I just let it sit overnight in a fermenting bucket.

Note: all you should have remaining in your jugs is a slushy block of ice. You can discard it, or use it to hydrate a fruit wine must.

Brix vs. SG

I'm going to take a brief detour here to talk a little more about the Brix (pronounced "bricks", and sometimes called "Balling") scale.

My favorite hydrometer is a triple-scale model that shows Brix, SG, and Potential Alcohol (PA). Some of you may be wondering why I choose to use Brix to measure sugar rather than SG. The reason is very simple: Brix is directly related to the percentage of sugar in the juice. When I say 32° Brix, what I'm really saying is that the juice contains roughly 32% dissolved sugar solids.

As we'll see shortly, the Brix scale is also easier when it comes to performing calculations. For example, to find potential alcohol, all you have to do is multiply Brix by 0.58. So, if I want to know approximately how much alcohol I would have if my 36% juice fermented dry, I would punch the following into the calculator:

36 x .58 = 20.9% ABV

Preparing the Must

Time to prepare the juice for fermentation. Adjustments will almost always need to be made for dessert style wines. Since Icewine runs on the sweet side (to put it mildly!) we need a good level of acidity to balance it.

Using an acid titration kit, measure your starting TA. Mine was at 5.3 grams per liter (abbreviated as g/L). However, for Icewine it should really be at 9 or 10 grams per liter. That might sound very high, but it will come down some during fermentation, and some will also settle out as potassium bitartrate "wine diamonds" during the cold shock phase. So to bring the acidity up from 5.3 g/L to 9 g/L, I will need to add 3.7 g/L of tartaric acid or about 48 gms total for my 13 liters of juice.

A couple of things to keep in mind when adjusting acidity. First, never add the entire quantity of acid all at once. Add half, and then recheck TA to validate your numbers before proceeding further. One of the easiest mistakes to make in winemaking is to overshoot your target acidity.

Since it bears repeating, I'll say it again: **never add the entire quantity of acid all at once.**

Second, you should always completely mix the tartaric acid into a little distilled water before adding it to the main batch. There's nothing worse than trying to stir crystals into sugar-saturated grape juice. Trust me, it just doesn't work well.

Once your acidity is where it should be, we'll also add some pectic enzyme. I don't actually weigh it, but rather use about 1/2 teaspoon per 4 liters of liquid, or 1-1/2 teaspoons for my 13 liter batch. As you'll see later, we want this wine to clear as quickly as possible, and the pectic enzyme will help with that.

Reserve Juice

Since I may desire more sweetness when I'm finishing the wine, I am going to draw off two liters of juice and store it away in the freezer. The reserve juice may also come in useful if I accidentally overshoot the alcohol and need to blend to bring it down a little. I just put it in a 2-liter beverage bottle and pop it back in the freezer.

Important: be sure to draw off reserve juice *before* adding any yeast nutrient. We don't want residual nutrient in our finished wine.

Pitching the Yeast

Now is a good time to make up the yeast starter. For my Icewine, I chose to use Red Star Côte des Blancs yeast. I chose this strain for a couple of reasons. First, it tends to enhance the glycolytic and volatile esters responsible for aroma (translation: it makes wines that smell good). Second, it's a cold sensitive strain that more easily allows us halt fermentation at a desired point by simply "cold shocking" it. Most importantly, it struggles with alcohol levels above 13%. We're making icewine, not port and, therefore, don't want a lot of alcohol in the finished product. Never use EC-1118, Premier Cuvee, or other robust, high alcohol yeasts for Icewine. It's extremely difficult to stop fermentation with those strains.

I made up about two liters of active yeast starter for my Icewine. I also used about a packet and a half (approx 8 grams) of yeast for this small batch. You really need a strong starter for Icewine because the high sugar content will shock the yeast. They will never really reproduce properly so you want a good sized population for pitching. I won't go into detail about making yeast starters because there are a number of online resources that provide excellent information on the process. Just do a Google search on "wine yeast starter".

You also want to add some nutrient to your must before pitching yeast. You can use a general purpose yeast food, or even a crushed B vitamin tablet. If using yeast nutrient, add about half the dose that the package instructions recommend. Since we are going to be stopping fermentation down the road, we don't want to provide an all-you-can eat buffet for the yeast. We actually want them to struggle just a little. I don't use yeast food at all myself. I prefer pure diammonium phosphate (DAP) because it provides essential nitrogen, without all the extra fluff. For my (now) 11 liters, I'll add about 1/2 teaspoon of DAP.

Now we pitch the yeast and wait. Don't panic if fermentation doesn't start right away. From personal experience, I can tell you it may take as long as three days for fermentation to really kick into gear with a high sugar must. If you are interested in the "why", do a web search on "wine yeast sugar osmotic pressure". The important thing is not to panic.

Once things are rolling along you'll want to give this a gentle stirring once a day for the first few days. Normally stirring white wines isn't necessary but, in this case, it will introduce a small amount of oxygen and help distribute the yeast population. The little devils really struggle in this high-sugar environment, so we need to help them along just a bit.

Okay… we're off to the races now!

A Modicum of Mathematics

Now that fermentation is under way, it's time for some mathematical fun. We need to calculate the optimal point to stop fermentation in order to achieve a nice balance between sugar and alcohol. Most Icewines fall into a range of 11-13% alcohol by volume, with residual sugar between 10-20%.

First, let's do a little pre-calculation to see how much sugar it will require to generate this range of alcohol. We'll use the inverse operation of calculating potential alcohol and divide the desired ABV by 0.58. This will give us the Brix range to aim for:

Low end (11% ABV): 11 ÷ .58 = 18.9° Brix

Upper end (13% ABV): 13 ÷ .58 = 22.4° Brix

So to produce an 11% ABV wine, take the starting Brix level (36°) and subtract the Brix needed to achieve the target:

36° - 18.9° = 17.1° Brix

And we'll perform the same calculation for the upper range:

36° - 22.4° = 13.6° Brix

So we want to stop fermentation when the remaining sugar is between 13.6° and 17.1° Brix. This also tells us approximately how much residual sugar will remain in the finished wine. For my Icewine, I decided to aim for somewhere in the middle ground and try to stop fermentation when the remaining sugar reached 16° Brix. This would give me an alcohol level somewhere around 11.5%.

To monitor the sugar level, we just need to float a hydrometer in the fermenter and check it a couple of times each day.

Stopping Fermentation

It took 9 days from the time I pitched yeast until it reached my target stopping point of 16° Brix.

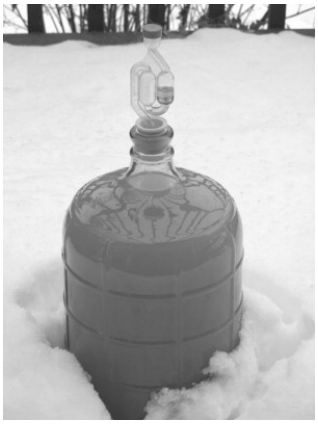
It should be noted that stopping an active fermentation is a little like stopping a runaway train. Once the momentum is built, you need to put up insurmountable obstacles to prevent it from reaching its destination. In our case, we're going to attempt to create an inhospitable environment for fermentation. We're already part of the way there. We've got a good deal of alcohol and very little remaining nutrient. There's still plenty of sugar, however.

My own method for halting fermentation is as follows:

1. Rack the juice from the fermenting container into a carboy to temporarily stun the yeast. Leave as much sediment behind as possible.
2. Add 100 mg/L potassium metabisulfite powder. This comes to 1.1 grams for my 11 liter batch.
3. Cold shock the yeast by quickly decreasing the temperature to near freezing.

If you follow these three steps, your fermentation will almost certainly come to a screeching halt. The first two steps are relatively easy. But how do you quickly lower the temperature to near freezing? Remember back at the beginning of this article when I said I wanted to wait and start this project in the dead of winter in order to take advantage of the weather? Here's why.

If at all possible, I try to time my Icewine fermentations for periods when there is adequate snow cover and the daily low temperature is between 10 and 20° Fahrenheit. Here in Minnesota, this is usually sometime in January. Then I find a shady spot in the yard and dig a hole in the snow large enough for the carboy. I then wrap it in a tarp or plastic garbage bag, place it in the hole, and pile up snow around it until only the airlock is exposed. If there is a lot of snow, you may also want to put some sort of marker in place so it's easy to find should more snow happen to fall. It will remain here for the next two weeks. Keep an eye on the daily temperatures, though. If the temperature falls below 10°, you risk breaking the carboy. In these instances, I temporarily move the wine into the garage and keep it wrapped in a blanket or sleeping bag. Once it "warms up" again, it goes back to the snow.



If you don't have snow and cold where you live, you can always use a dorm room refrigerator set to the coldest temperature. I just find the snow burial method convenient (not to mention a great conversation starter with the neighbors).

First Filtration

After two weeks in the cold, the wine should no longer be actively fermenting and will have started to clear. Most of the frozen and dead yeast cells will have settled to the bottom of the carboy. It's now time to rack and run the Icewine through the filter.

Normally I wouldn't filter any wine until it's clear, but in this case the filtering is done to remove as much yeast as possible.

After racking, I run the wine through two consecutive sets of pads. The first filtration is done using 5 micron (coarse) pads. For the next filtration, I drop it down to 1 micron (medium).

Yeast cells vary in size from a few microns up to 10 microns or so. Most wine yeasts average 6 microns in size. Although the paper filter pads can only offer nominal filtration, the successive filterings will remove more than 99% of the yeast. For those that survive filtering, we will ensure they are unable to reproduce by adding 220 mg/L of potassium sorbate. I also decided to add an additional 40 mg/L sulfite at this time for a little added insurance.

After filtering I put the carboy in my (slightly warmer) garage, where it will remain for another 2 weeks to continue clearing and cold stabilizing.

Final Adjustments

After two more weeks, I brought the wine back inside again for a final racking and polishing filtration with a #3 filter pad. I also had my first taste, and while it's very good, even at this young age, I've decided it needs just a couple of small tweaks. First, since some acid dropped out during the 4 weeks spent sitting in the cold, I want to add some back to brighten it up a bit. Citric acid works great for this purpose. No measurements here. The final acidulation will be based on taste only. It also could use just a little more sweetness and viscosity. I will probably add back some of the reserved juice, but not a lot - maybe a half liter or so. Again, it will be based on taste.

All in all, I feel that the end result is very similar to a commercially produced Icewine. It may not have all of the complexity of the real thing but, then again, it’s also a fraction of the cost to make yourself.