

How To Use A Hydrometer

The hydrometer is really our best friend when it comes to brewing. It will give us so much information: it confirms the yeast is working, shows how far through the fermentation we are, confirms when the fermentation is over and allows us to work out our finished alcohol content. But many brewers don't understand "how" to use it so don't actually take it out of the tube it was sold in very often.

First off, a hydrometer (basically means water-measure) doesn't actually measure alcohol itself but rather it measures the "density" or thickness of the liquid being tested. Hydrometers are calibrated, with those little ball-bearings fixed in the base, to float at a certain depth in a sample of cold water (usually at 20C). This means the top surface of the water should cut across the paper scale glued inside the stem of the hydrometer at the 1.000 line. When we take a hydrometer reading of the liquid we are brewing this reading is called Specific Gravity (S.G). A reading taken before fermentation has begun is usually called the Original Gravity (O.G) while the final reading taken when the brew is complete is simply called our final Specific Gravity (S.G). We will need to have both an OG and an SG reading for each brew to work out the finished alcohol.

The scale of your hydrometer begins at the 1.000 (reads as the one thousand) mark. You will see more numbers marked going down the scale from there, a mark that says 10, 20, 30, 40 and so on. This actually reads as 1.010 (one thousand and ten), 1.020 (one thousand and twenty), 1.030 (one thousand and thirty) and so on. In between each of these numbers is five smaller marks, these marks are in graduations of 2 points and would read, from the 1.000 mark -1.002 (one thousand and two), 1.004 (one thousand and four), 1.006 (one thousand and six) and so on. The scale will usually go down to at least 1.080 (one thousand and eighty) for a beer hydrometer and further down to as high as 1.150 (one thousand, one hundred and fifty) for a hydrometer suitable for wine, beer and spirit washes.

Above the 1.000 mark your hydrometer may have more numbers. If marked, this is 900 (nine hundred) gravity as we are now less than 1.000 (one thousand). It will have a number as 90 and maybe another one at 80. These numbers actually read as .990 (nine hundred and ninety) and .980 (nine hundred and eighty). Again they are graduated in those little 2 point marks so going upwards from the 1.000 mark — .998, .996, .994 (nine hundred and ninety eight, nine hundred and ninety

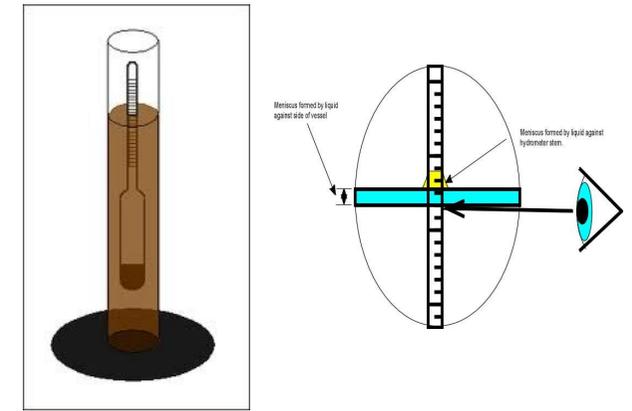
six, nine hundred and ninety four and so on. Only winemakers and spirit wash makers will use this end of the scale.

To use the hydrometer you will need to actually float it in the brew. It is best to use a small sample of the brew and put it into a Hydrometer Testing Jar. This will improve accuracy as it is difficult to see the hydrometer scale when floating in the brew itself. It will also remove the risk of infections to the brew. All instruments in contact with each brew must be cleaned and sterilised before each use but even good intentions allow that some bacteria survive and can be passed from brew to brew. But more importantly is the need to open the fermenter up to take a hydrometer reading that causes the most problems. Inside the brew is some (normal) amount of bacteria and wild yeast which generally lie "dormant" during our yeast activity as the yeast has utilised all of the available oxygen at the start. But when our yeast has finished working and oxygen is allowed in, by opening up the fermenter to take a hydrometer reading, then the dormant bacteria and wild yeast can begin to grow. Bacteria etc can also be introduced in at this point as it piggy backs in on this oxygen. The more times you open the fermenter up the greater the accumulation of risk of setting off an infection and we need at least two readings to confirm a brew is ready for the next stage. Basically at some point during your brewing career a brew will go off due to opening the fermenter up. So if we can avoid opening the lid we should. NB: This is why you need to be careful in how you handle a finished brew, not just with using the hydrometer, but with the addition of products such as finings, flavouring or sweetening packs or how you siphon or bottle your brew off.

So we recommend you fill the Hydrometer Test Jar up from the fermenter tap which only requires you to remove the airlock off the top of the fermenter. The very small amount of oxygen that goes in as you draw off approximately 100mls of brew will be absorbed into the layer of natural CO2 gas suspended across the brew and this gas actually inhibits bacteria and wild yeast for us.

Make sure there is enough brew sample used to make the hydrometer float in the sample, if its not floating then add a little more brew. To actually decide where the hydrometer reading should be measured you look across the very top surface of the brew sample and read the closest number on the scale that it "cuts" across. See diagrams attached to illustrate this. The picture on the front page shows a hydrometer floating in a brew at S.G 1.040 as an example.

To take an accurate Original Gravity (OG) reading on your



brew you need to make sure that the brew has all the ingredients, except the yeast itself, well mixed and dissolved so that the portion you test on is representative of the entire brew. To confirm this you should take a reading, mix well again, take another sample to read and compare. If the two readings are the same the Gravity should be recorded for later use. If the readings aren't the same this indicates one is incorrect and the brew isn't well mixed yet. Repeat until two readings are the same. It will be more difficult to get an OG when more product is used especially with spray-malt so keep stirring and stirring, the yeast will also love this added oxygen you provide for it at this point.

Liquids we intend to brew out have a lot more density than water. This is due to the various fermentable sugars (from malts, grapes, fruits, dextrose and so on) that we are using which are dissolved into our final brew volume. The hydrometer wont be able to sink into the brew liquid as far as it would with water as the sugars hold it up so the hydrometer stem will remain sticking out of the brew's liquid. The further out it sticks or the lower down the surface of the brew liquid cuts across the hydrometer's scale then the higher the density or specific gravity of the liquid. A beer OG will likely be around 1.040 for instance but a higher alcohol product like a wine or spirit wash will have a reading around 1.090 and will stick out further.

In contrast, the more fermented out a brew is when the reading is taken, the thinner the brew will be and the further into the sample the hydrometer will sink. Beers will end up generally somewhere between 1.010 and as low as 1.000 for a dry lager or cider. A dry wine and a finished spirit washes will reach .990.

When fermentation is complete the brew's density will

remain the same, that is it will not become thinner between subsequent readings. Changes occur quite slowly at the end of the process so we will always leave at least two days between taking these readings. These constant readings are most important to confirm when brewing carbonated beverages such as beer, ginger beer and ciders. We need the first fermentation to be complete before bottling and beginning our secondary fermentation to produce the CO2 gas we desire. If not complete we can explode our bottles with excess CO2 gas. This will be a waste of our efforts, makes quite a mess and if bottled in glass bottles, rather than plastic, it actually quite dangerous.

So it is highly recommended with brews to be carbonated to wait until you have two hydrometer readings at the same number taken at least two days apart. We should also specify these readings should be in a suggested range for each brew as sometimes brews "stick" temporarily at the wrong point for various reasons. For beers this can be due to using a Brew Enhancer Pack which is sometimes more difficult for the yeast to ferment out. They can sometimes stick a bit around 1.014-1.020 when they really need to ferment down around 1.010 or lower. Full all malt beers like Muntons Premium Gold 3.6kg are intended to bottle as high as 1.020 and beers that have a Low Carb/Dry Enzyme used will usually reach 1.000. Most average beers will end up constant under 1.010.

Wines don't have a specific number they will ferment to the same way as a beer does, it is a slow reduction in sugars towards the end as the wine yeast is getting a bit drunk at this point. Wine kits are more predictable and will normally ferment down to at least .996 for a medium-dry result and down to .990 for a full dry wine. Your own Fruit wines recipes will vary in final gravity due to different yeast types ability to ferment out and the alcohol percentage of the wine itself. If we try to continue on with the next step in the wine making process with out confirming the wine is actually finished we will either end up with a sweet finished wine that we didn't want or more likely we will simply continue the fermentation on in the bottle in error. This will mean the wine will be cloudy, drop a sediment in the bottle during storage or in worst case scenario actually break bottles. Let the wine ferment out as far as it can.

For distillers a normal 6kg sugar/dextrose based spirit wash made up to 25 Litres is intended to reach .990 before fermentation is rated as complete. Washes that use more sugar per 25 Litres should really ferment out thinner to show more concentrated alcohol so a 7kg wash should be more around .998-6 and an 8kg should sink it further to around .982-.984. If you think your wash is finished and you take a reading and it's not floating

ting at the correct reading then simply wait another few days before re-testing. If when re-tested if it has reached the correct reading then allow to clear before distilling. If it has stabilised at an incorrect high reading then you may have an actual "stuck" ferment. Please contact us with the hydrometer readings to remedy this, do not simply add another pack of Turbo yeast, this causes more problems. By confirming the hydrometer reading before distilling you will confirm all the sugar is converted to alcohol and you will get the correct yield each go. A lot of times a wash needs more days then the brewer realises so without the reading to slow them down a lot of distillers sacrifice their yield and their quality and may harm the actual still itself.

Finally a point on the "Meniscus". This is the where the liquid rises a little as it contacts the stem of the hydrometer. Traditionally we were told to take our reading at the bottom of the meniscus, imagining a dotted line continuing along the brew surface level to the hydrometer. Recently some brands of hydrometer have advised taking the reading at the top of the meniscus. It really doesn't matter which you choose to do as long as you take all your readings the same way. By always using it the same way and taking two readings to compare we will negate any error caused by how you read it versus another brewer and also any error due to temperature differences of the brew if it is noticeably higher or lower than the calibration temperature or 20C**.

Want to work out your alcohol strength? Use this formula if you have taken a start (Original Gravity) and also a finished (Specific Gravity) reading for a carbonated beverage.
OG - SG / 7.36 plus .5% = a/v
(This reads as O.G minus S.G = ?, then divide ? by 7.36 plus add on .5% for carbonation alcohol in bottle. The OG and SG readings will change between brews but the 7.36 figure remains the same each time. Eg OG 1040 minus 1008 = 32, divided by 7.36 = 4.34 plus 1/2 percent in the bottles makes a final alcohol strength of 4.84 % a/v

For wines (and washes) we can use the same formula but don't add on carbonation alcohol. This formula will slightly overestimate alcohol for these brews that go past the 1.000 mark so I also like to divide the OG figure by 7.36 which slightly underestimates alcohol and then take an average of the two answers to get the best answer.

**The exception to this is when using your Alcometer or Spirit Hydrometer, either test your spirit sample at 20C or use a temperature conversion chart for safety. Also take note your scale is normally in 1 degree markings not 2.



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