QuickStill

How to Distill Alcohol

Table of Contents

Intro: How to Distill Alcohol

Here I am going to explain how to make alcohol safely at home using an Air Still. This is a very simple and effective bit of kit that is also reasonably safe compared to the alternatives. The distiller is built with an 'underfloor' low energy heating coil which is not in direct contact with the liquid and has a condenser coil located in the black housing cooled by blasting air through it. It also has an automatic lock out switch if the distiller runs dry.

There are no naked flames, no exposed heater elements, no running water, no electrical contact relays and lots of air circulation caused by the fan to blow away alcohol fumes. I'm not saying it's perfect, but there have been no reported accidents, as far as I know (Nov. 2016).

Paradoxically, to produce a safe product, a hazardous caustic chemical called sodium hydroxide or 'lye' needs to be used. This can be substituted with sodium bicarbonate if wanted, but a far greater quantity will be required to be effective.

The alcohol from an Air Still will never be fantastically pure, but will have plenty of interesting flavours due to the fact that the condenser is very close to the actual heating chamber, with little opportunity for reflux in the connecting pipework.

Step 1: Equipment

- Air Still
- pH paper
- Sodium hydroxide (pearl not flake), or sodium bicarbonate
- Alcohol meter
- Hydrometer
- Thermometer
- Conductivity Meter eg PRIMO Pocket TDS Tester (0 to 1999ppm)
- Gloves and Goggles
- Scales (0 to 50g)
- 50ml measuring cylinder
- 15mm copper pipe cut into 15mm sections x 20 of
- 3 litre receiver for alcohol produced
- Glass storage bottles
- Brita Water Filter


1
3
5
7
9
11
13
2
4
6
8
10
12
14


PH
广泛试纸
1-14 Q/3211821AB001-2002
UNIVERSAL INDICATOR PAPER
本产品已通过ISO9001— 2000质量体系认证


Primo 2

Step 2: Health and Safety

Potential hazards:

- Alcohol vapour explosion
- Alcohol liquid fire
- Heavy metal poisoning eg copper
- Sulphurous acid / sulphide poisoning
- Methanol poisoning
- Electric shock
- Irresponsible drinking
- Alcohol addiction
- Sodium hydroxide burns
- User error
- Drinking alcohol above 60% concentration

There should be no naked flames, electrical switching devices, hot surfaces or even mobile phones in the room. A mobile phone can cause an explosion as some of the internal components can get fairly hot:

Heat (about 400 degrees C) + alcohol vapour = self ignition

Make sure you have a sign on all entrance doors warning of the hazards.

Sodium hydroxide needs to be handled very carefully as it can cause skin / eye burns so gloves and goggles are required. Lock this chemical away in a safe when not used.

Ensure that there is plenty of ambient ventilation in the room eg windows and doors opened.

Use an electronic alcohol vapour detector if possible.

Are you confident / competent in handling chemicals and machinery? A competent person has had some experience with chemicals in a laboratory etc. and preferably some relevant training. Do not attempt alcohol distillation unless you are a 'Competent Person' or supervised by one.

Drink in a responsible manner - no more than a couple of units a day and do not drive vehicles or operate machinery whilst under the influence of alcohol. Be aware that even one unit a day can lead to alcohol addiction or dependency.

Step 3: Legal

Check your local laws for the legality of distilling your own alcohol. In many states / countries it is illegal. Also, there may be tax due on the product, even if you use it for personal consumption.

Step 4: Procedure

The starting point is a gallon or so of home made wine / cider / beer, BUT, the yeast used must be from a known strain and not wild yeast that may produce excessive methanol.

1. Measure the pH of the brew.
2. If the pH is less than 6, using gloves and goggles, add pearls of sodium hydroxide to the brew and stir until the pH level actually reaches 6. Some home brew can be quite acidic eg pH 3.0 and it's a good idea to try and weigh the pearls used to make it easier for the next batch. If the brew is acidic, it's quite likely that natural sulphides will turn into sulphurous acid vapour, which will react with metals such as copper to produce copper sulphate, which is poisonous.
3. Add the copper pipe segments to the still boiler - this is a fall back, just in case something went wrong in step 2 above. The idea is that any remaining acid will react with the copper and the copper sulphate produced will stay in the boiler rather than evaporate.
4. Add the brew to the boiler, no higher than the line gouged on the inside.
5. Place a 50ml measuring cylinder under the output spout and turn on the still, ensuring there is plenty of ambient ventilation eg open doors and windows etc.
6. Collect the first 30ml of distillate and discard it as it will be rich in methanol, which is poisonous. Technically, this is called the 'Heads Cut' and can be adjusted for different desired flavours. Some brews will require a greater heads cut to remove other chemicals such as aldehydes, ketones, esters etc.
7. Place a large 3 litre 'receiver' jug under the output spout and collect the main run.
8. Measure the alcohol content using the alcoholmeter every 15 minutes and stop the process when it reaches 40%. Never drink alcohol if it is above 60%. The exact point at which distillation is stopped depends on the flavour profile required - carry on for longer and more oily 'Fusils' will be produced which can give

interesting flavours but more chance of a hangover!

9. If the product is cloudy, this is probably copper soaps hanging in suspension in the fluid and so should be redistilled.
10. Test the alcohol with pH paper - it should be pH 6.0 and test the conductivity - it should be about a maximum of 10 ppm. If the pH was low there might be sulphurous acid present and if the conductivity was high there might be heavy metal contamination, again, poisonous.
11. If there is a problem at stage 9 above, pour the product through a Britvic water filter, which contains ion exchange resins and activated carbon for removing chemicals and repeat the test.
12. Taste and smell the alcohol - if it has a strange taste / smell, discard it.

Possible improvements to the procedure include using an electronic alcohol detector to help prevent explosions / fire. These are easy to build with a bit of electronics knowledge.

Step 5: Flavouring

The product can be flavoured with all kinds of herbs, berries and spices eg juniper, blue berries, sour cherries, angelica, bay, liquorice, caramel, molasses, mint, star anise, vanilla, oak chips etc. and even redistilled to get a clear product once more.

Step 6: Conditioning

It's not really necessary to store the alcohol product in an oak cask for 10 years, but it does need to be left for at least 10 days in a glass bottle to mature (Never use any kind of plastic). During this time, complex chemical reactions will be taking place between the hundreds of different chemicals in the product. The overall balance of flavours will change and the product should become more mellow and tasty. Leaving the product to stand for a month or a year will improve it further, but with diminishing returns.

Activated carbon can be used to remove certain chemicals and flavours. Experimentation is key.

Step 7: Tasting

Finally, we're going to need to try and drink the product. This is far more difficult than it sounds and actually 'tasting' is probably the single most difficult part of the whole process! When tasting, we need to have a clean palette ie no food or drink other than water in the last hour. First we swill the glass and then carefully smell the vapours - what do we notice? Then we taste the product - what other flavours are there present? Is anything too dominant? Are there any subtle flavours lingering in the background that need to be enhanced at all?

Experienced, professional, tasters experience a drink like ordinary people might experience a piece of music or a work of visual art. This skill can, however, easily be leant. A useful technique is to use sensory deprivation - blind fold yourself and use ear plugs - sit in a chair for a whole hour doing nothing and then carefully drink some of the product, making a mental note of the range and intensity of the different flavours. Also, ask some of your friends to do the same - it could be fun!

Tasting is divided into 3 parts - the smell, the main taste and the aftertaste. A good example of aftertaste is saffron. Drink something with this spice in it and you will experience the most amazing aftertaste that lingers for about 5 minutes! Try to be creative in describing the taste and relate it to personal past experiences eg Grandad's old desk, frolicking in a hay loft or arrival of the Flying Scotsman.

If anybody has any improvements / constructive criticism, please comment below. This instructable will be updated accordingly, and .....

Please in the competitions - top right - Thanks!

QuickStill