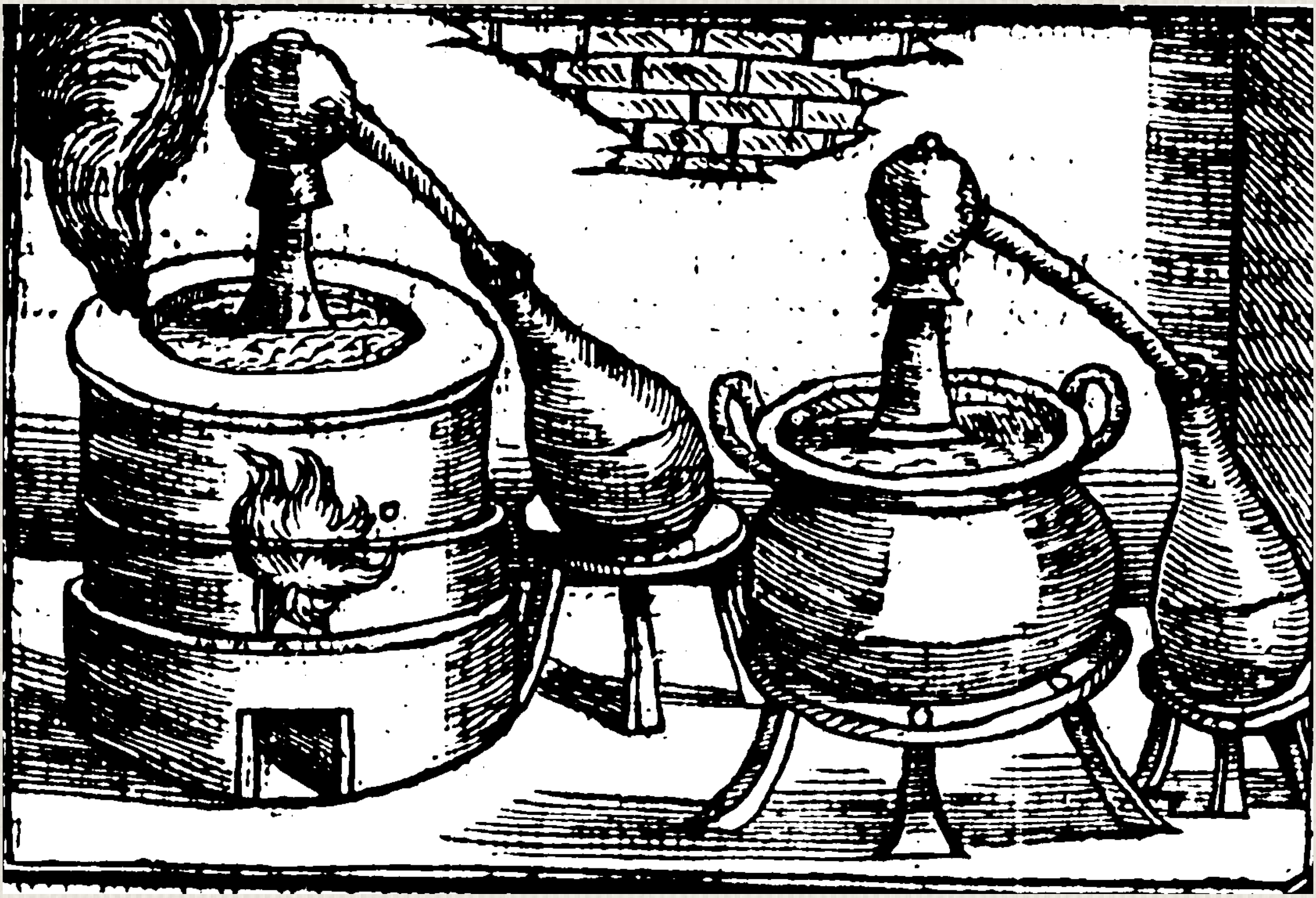
BOX

BOX ADVANCED MASTER CLASS NO. 2

INTRODUCTION – HISTORY OF DISTILLATION

No one knows. This is the simple conclusion after looking into the mysterious history of spirit distillation and the unanswered question regarding the birth of the art of distillation. Suddenly the practice materialised, geographically dispersed around the world, independent of each other. Sources of information are few and far between, guesswork and speculation is rife in literature, supporting different theories as to who discovered how a liquid mixture can be separated through heating it up and then cooling the resulting steam.

We can, with some degree of certainty, say that the art of distillation began to spread within Europe at the start of the 11th century. But how and where did it come from? Whisky literature generally advances the theory that it was travelling Gaelic monks who came into contact with alchemists in the Orient that practised the art of separating essential oils by heating up liquids. This art form is then said to have followed the monks back to Ireland where religious barbarians and even the clergy honed these skills. It wasn't long before the Gaelic monks discovered what happened when they distilled the beer made from local ingredients. Their primitive distillation equipment resulted in an ethereal drink. Those that drank the clear spirit became happy, danced, sang and prayed like never before. It was a religious drink that filled earthenware and leather pouches. The monks gave it the beautiful name: uisge beahta, water of life.



Wine literature often promotes the theory that the origin of distillation is linked to the Romans, Greeks and other ancient cultures early in the history of Europe. There are facts that support this. We know, for example, that Aristotle mentions distillation already in 400 BC, but he was by no means the first. Evidence exists of distillation in Mesopotamia already 3500 BC. From that era we have the discovery of earthenware which is believed to be used for distillation by the Indus Valley Civilisation in what is now Pakistan. Distillation equipment has also been discovered at archaeological sites in Persia from around the same time.

In 98 AD, that is to say 1000 years before the Gaelic monks started to distil spirits in Ireland, a Chinese emperor enforced a state controlled monopoly for fermented and distilled drinks. This led to widespread illegal production and as a consequence the death penalty was established as the punishment for this illegal activity in order to curb the practice. This in a country where the art of distillation via the process of freezing liquids was practiced as long as anyone could remember. Even in Mongolia, Russia, and Siberia and among Sami nomads the practice of freezing a container of wash (fermented liquid) outdoors during cold winter nights was common practice, the liquid that did not freeze was not the purest of spirits but had a higher alcohol contents.

Distillation was probably widely known throughout the world before the Christian monks became experts. Around the turn of the first millennium AD, there are numerous examples of Arab and Persian distillation equipment, and even evidence of how the resulting spirit was consumed. Marco Polo, for example, tells the story of excessive consumption in the court of Kublai Khans in the 13th century. When the Spanish landed in South America they were surprised to find that the Aztecs produced tequila from agave cactus juice. An art form, considered a gift from the gods, which no one remembers.

To speak of the origins of the art of distillation with any degree of certainty is not recommended, most likely the knowledge was built up in different areas of the world without any links or interdependencies between them. There is no one engineer that has designed a system and patented it. The art of distillation probably has its origins with the people themselves, just as the ability to build advanced constructions.

Nor do we know when distillation was established in Sweden. The first documented instance is from an unexpected source. Saint Bridget of Sweden, durring the early 14th century, describes in one of her visions how the Lord, as a distiller, divides people into good and evil. The earliest mention of distilling in Sweden is from Lund in 1349 where a man with the stately name of Hennichinus Brennewatn received royal permission to distil sprit for gunpowder preparation. The spirit was soon an appreciated medicine against the plague and the use of the drink spread like wildfire throughout the country.

Nor in Scotland are we on solid ground when it comes to the birth of distillation. The earliest mention here is a regular in whisky literature and is a tax note from 1494 where the monk John Cor from a monastery in Lindores receives a royal seal: "To Brother John Cor, by order of the King to make aqua vitae eight bolls of malt". But one can assume, with good reason, that the art of distillation, just as in Ireland, was already widespread. On the other hand it would be a stretch to assume that the liquid we know today as new make was the same spirit that ran from the first stills in Scotland. The whisky industry will often promote that whisky making is steeped in tradition and the methods used today are the same as those used in the distant past. This is a modified version of the truth. John Cors aqua vitae would, without doubt, elicit a snort of derision from today’s whisky drinkers. Even if the principle is the same the technology, regulation and methods have developed and improved over time. Gone are the small primitive “lumberjack” stills, the shape has standardised, the open fires for heating have gone, cooling methods have improved, out with worm tubs, purifiers and modern condensers are found instead. Modern spirit is so free from fusel oils that most producers make do with two distillations where as previously producers distilled the spirit three or four times to produce something that was drinkable. But even if much has changed over time, one thing has remained the same; the art of separating the heart from the head and the tail is in the hands of a skilled distiller. It is their ability to know when to cut the spirit flowing from the still and their knowledge that is key to the taste and character of the product. It is this aspect of whisky production that the Box Advanced Masterclass No. 2 – The Middle Cut – is all about.

POT DISTILLATION

Pot distillation is a process where distillation is carried out in batches as opposed to continuous distillation which is a never ending process. In general malt whisky is distilled in batches whereas grain whisky is distilled in a continuous process.

Nowadays it is the norm in malt whisky production to distil twice. In Scotland the only distilleries using triple distillation are Auchentoshan and Springbank, the later produces an unpeated whisky called Hazelburn that is triple distilled. A few distilleries have a partial third distillation, for example Benrinnes, Mortlach and Springbank all have their own variant of so called 2.5 times distillation. This means that the weaker spirit towards the end of the distillation process is wholly or partially distilled an extra time. Bruichladdich, known for its innovation, has even tested quadruple distilling in pot stills.

THE FIRST DISTILLATION

The wash is normally fermented over a period of two to four days and has an alcohol content of around 7-8% ABV (alcohol by volume). The wash is pumped into the wash still for the first distillation. Normally the wash is pre-heated through a heat exchanger using the 100 °C liquid flowing from the previous distillation, this is partially to conserve energy but also to minimise the build-up of residues on the warmer parts of the still. Heating of the still is nowadays done via indirect heating by pumping steam through stainless steel pipes in the bottom of the still. Historically the heating was from a direct source under the still such as an open coal fire or gas heating. There are still some distilleries that use direct heat, but only Yoichi in Japan uses coal. If a direct heating method is used on the wash still a “rummager” is also needed, this is a chain-link mat made from copper rings that is dragged around the sides and bottom of the still to minimise sugar remains and remove malt particles which are burnt onto the warm copper of the still. Direct fired stills can be found at Glenfarclas, Glenfiddich, Glen Garioch, Macallan, Springbank, Tobermory and Yoichi amongst others.

In the wash there is carbon dioxide and proteins which means that the heated liquid starts to foam. Just before the spirit starts to flow, at a wash temperature of 94 - 95°C, the foam rises in the stills neck. The still normally has a window (or sight glass) in the neck so the distiller can see the foam rising and turn down the heat. If the foam reaches the peak of the neck and spills over into the condenser this results in a cloudy spirit and contaminates the condenser. With help from a stream valve the heat applied can be finely controlled to hold the foam at the desired level in the neck. The heat should be enough to allow the carbon dioxide to escape but not too much so that the foam creeps above the window. Unfortunately it is commonplace to use antifoam in the wash prior to distillation. This is basically a foam reducing additive that reduces the surface tension and thus reduces foam build up. Those distilleries that use antifoam have a somewhat shorter distillation process and a reduced need to be observant during the start of the process.

The spirit coming from the first distillation is known as low wines and from the start has an alcohol content of around 47% ABV, dependant on the strength of the wash used. All the distillate is collected in the low wines tank (or receiver). The distillation process is normally stopped when the alcohol content has reduced to 1% ABV. The alcohol content of the liquid left in the pot still is now down at around 0.1% ABV and this is known as pot ale. Continued distillation at this point would be an ineffective use of energy. The collected low wine has an alcohol content of roughly 23% ABV and the volume is about a third of the original volume of the wash used.

SECOND DISTILLATION

The second distillation conducted in a second pot still, normally smaller than the first still, called the spirit still. During the second, spirit, distillation there is no risk of foaming, but despite this the process requires focus and care as it is this process that has the greatest impact in shaping the character of the spirit. This distillation is broken down into three parts:

1. Head, foreshots
2. Heart, middle cut, spirit cut
3. Tail, feints

The first part of the spirit coming from the second distillation process contains lighter particles that often have a bad taste and can be a health risk. After about 10 to 15 minutes the quality of the spirit is high and collection of spirit to be laid down in casks can commence. Many distilleries start the middle cut, the heart, after a pre-determined time, others follow the alcohol strength of the spirit flowing from the still and others the taste profile. As well as the lighter particles that flow at the start of the process there are also some partially volatile substances. These are substances that are not soluble in water and are left over from the tail of the previous distillation from the spirit still, these substances are dissolved by the higher alcohol content of the initial distillate in the next batch. A visual control is possible to ensure these particles have been washed away, if the spirit is watered down to about 50% ABV it will turn a blue hue if the substances are still present. Even if this test does not result in a blue colour is does not necessarily mean it is ready to start collecting the heart, it is the taste and character of the spirit that is important when deciding when to start collecting the heart. Some distilleries start as early as five minutes and others wait as long as 50 minutes.

When the heart is complete the flow of spirit from the still is re-directed to the low wine tank, this last part is known as the tail or feints. This tank collects both the low wine from the first still and the head and tail from the second still. The end of the heart and start of the tail is often decided on based on the alcohol content of the spirit. At Box the first cut is made 13 minutes after the spirit starts to flow for the unpeated recipe and stopped when the ABV has reduced to 67% (calculated at an effective temperature of 20°C). The heart of the peated recipe is cut after 30 minutes and stopped at 60% ABV. For the unpeated recipe the first cut is the most critical, and for the peated recipe the second cut is the most critical. A miss by two minutes can be the difference between success and disaster.

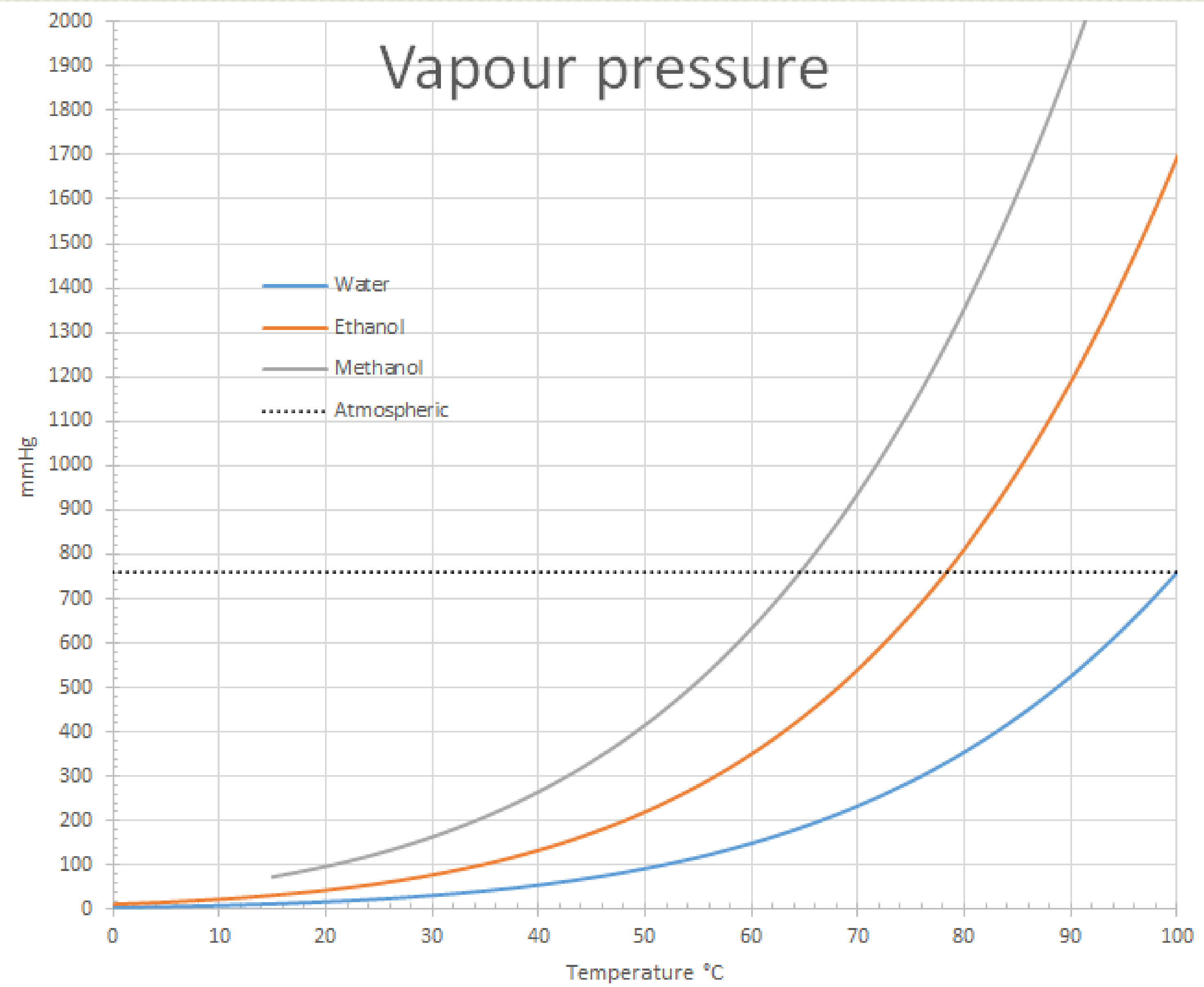
DISTILLATION

Distillation is the process of heating a liquid to its boiling point and the subsequent collection of condensation coming from the resulting vapours (steam). It is commonly known as a process by which liquids with different boiling points are separated. A liquid with lower boiling point, for example ethanol, boils and becomes vapour before a liquid with a higher boiling point, for example water. However this is not strictly true as the process is linked to vapour pressure.

VAPOUR PRESSURE

Molecules in a substance in solid or liquid form move with a speed that depends on temperature. A higher temperature means more movement, the molecules will cease all movement at absolute zero Kelvin (-273.16°C). In gas form the molecules move a lot faster and are disconnected from each other. When we heat a liquid eventually some of the molecules will break free of the links between them and become a gas. These molecules create a higher pressure. This is what we refer to as vapour pressure, partial pressure or saturation pressure.

All substances are subject to pressure from their own vapours. When the ambient pressure is the same as the vapour pressure of a liquid it is in equilibrium. At a lower temperature the vapour will condense to liquid and at a higher temperature the liquid will boil and turn into vapour. In other words the boiling point for a substance at a certain pressure is the same as the temperature when the vapour pressure of the substance in liquid form is equal with the ambient pressure.

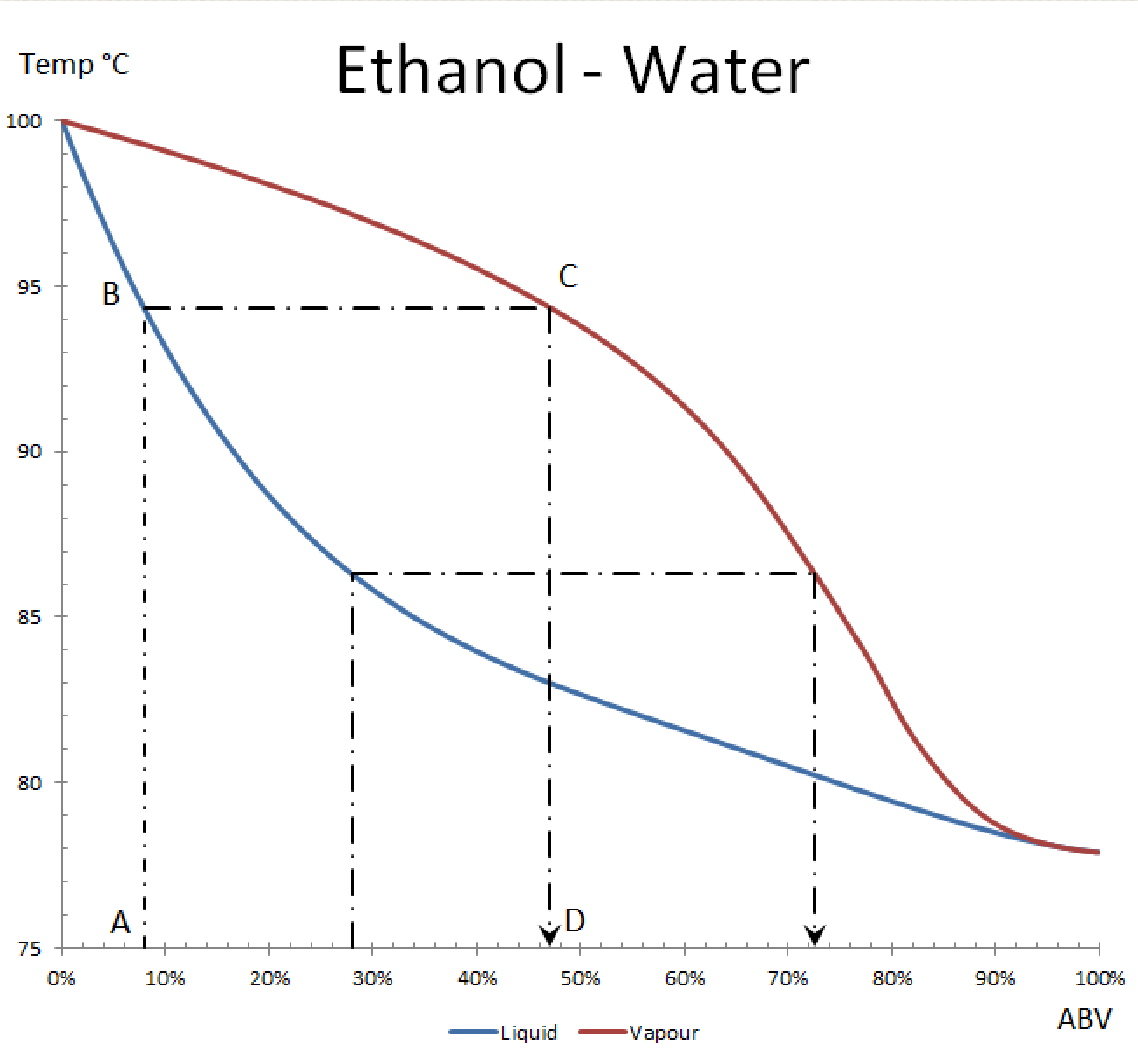


A substance with a higher vapour pressure has in its pure form a lower boiling point than a substance with lower vapour pressure. In the diagram above the boiling point, at atmospheric pressure, is 100°C for water, 78.37°C for ethanol and 64.7°C for methanol.

Water and ethanol are totally dissolved together which also means the resulting liquid has common characteristics such as boiling point, vapour pressure, freezing point, density etc. This means that not all the ethanol in an ethanol and water solution boils at 78.37°C just because pure ethanol boils at this temperature under normal atmospheric pressure. The boiling point for a water and ethanol solution is between 78°C and 100°C, where the boiling point increases as the alcohol content reduces.

Some of the liquid evaporates despite not reaching the boiling point. This is due to molecules, which are excited due to the heat, colliding with each other such that a single molecule near the surface of the liquid has enough energy to escape at the expense of energy from other molecules.

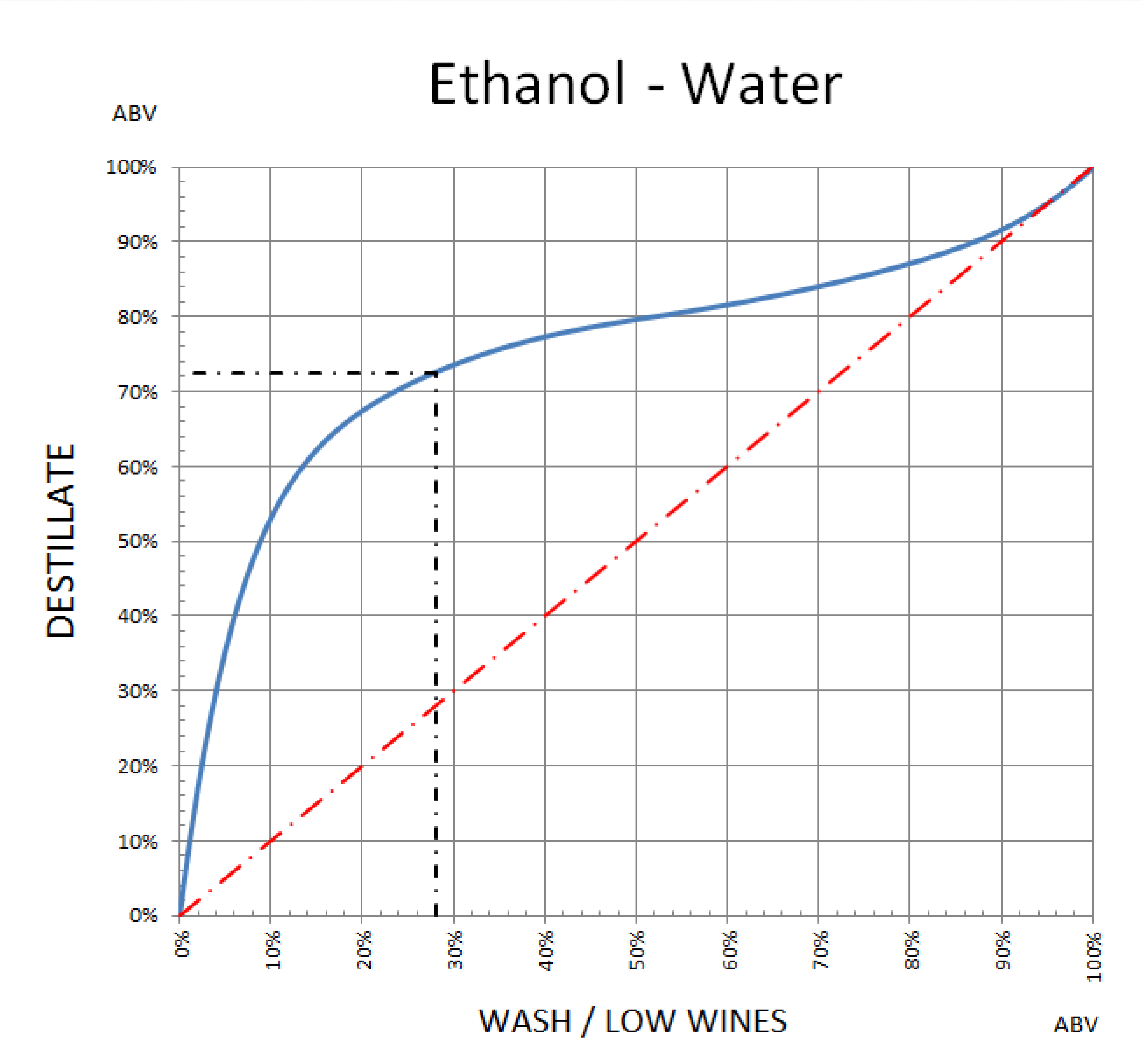
How fast a liquid turns into gas during the heating process is not dependant on the boiling point. Heat water at a normal atmospheric pressure and the boiling point is 100°C independently of whether it is heated aggressively or just simmered. What happens if water is heated aggressively (more energy used), is that it evaporates quicker. If the atmospheric pressure is reduced the boiling point will also reduce, for example the boiling point of water at the summit of Mount Everest is 70°C.



In the diagram above the impact on the spirit strength due to varying alcohol content of the liquid is illustrated. The first distillation is normally based on a wash with alcohol content of 8% ABV. In the diagram a line is drawn vertically from point A where it intersects the blue graph, point B, which is the boiling point for the binary mix of water and ethanol. Map point B horizontally across to point C on the red graph (vapour) and then down to point D results in an alcohol strength of 47% ABV for the condensed distillate. The alcohol content of the distillate reduces during the distillation and the process is stopped once the alcohol is as low as 1% ABV. The collected low wines normally have an alcohol content of around 23% ABV.

The liquid that is distilled in the spirit still is a mixture of the low wine plus the head and tail from the previous distillation in the spirit still. Due to the fact that the head and the initial part of the tail have a relatively high alcohol content, the resulting mixture has a strength of c. 28% ABV. Following the same process on the diagram above, the resulting distillate coming from the spirit still at the start of the second distillation will be 72.5 % ABV.

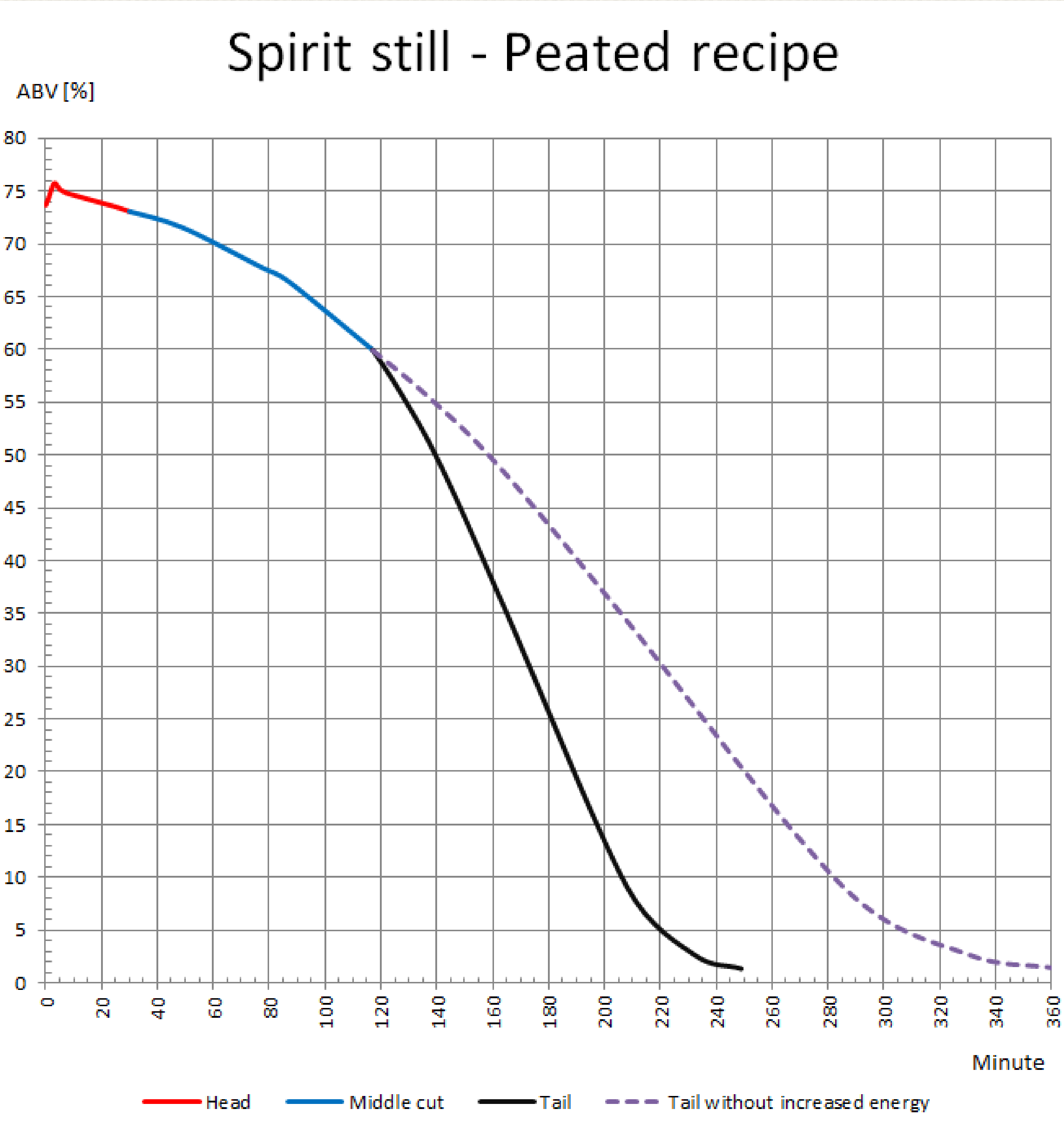
It is not possible to achieve 100% ethanol as a result of distilling a mixture of water and ethanol. At 97.2% ABV an azeotropic mixture is achieved whereby further distillation will not result in a higher alcohol concentration. The word azeotropic is derived from Greek and roughly translated means ”no change due to heating”. If additives are added to the liquid, for example benzene, this results in a new azeotrop point and the remaining water can be separated by heating. After this the benzene can be removed to leave 100% ethanol. The EU definition for whisky limits the strength of the spirit following distillation to a maximum of 94.7% ABV.



The diagram above illustrates in a simple manner how the strength of the distillate is dependent on the liquid that is heated.

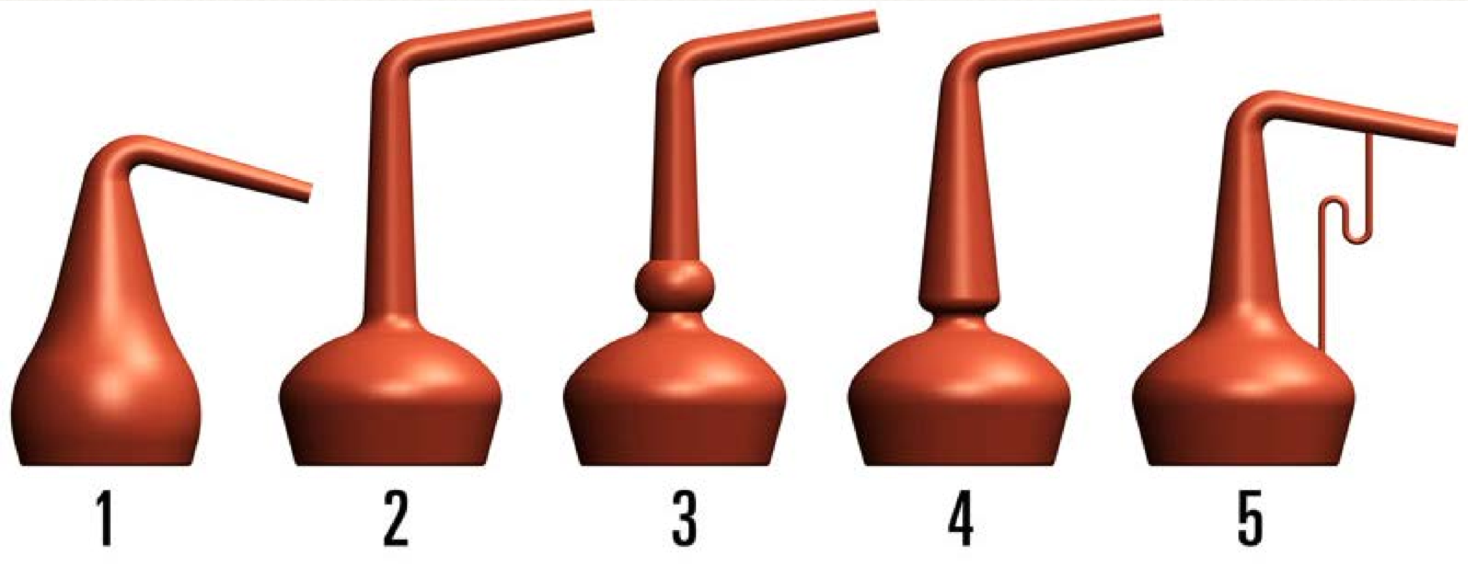
The theory holds if the evaporation from the ethanol and water mixture is collected and condenses directly. When distilling in a colon still there are a number of stages where the vapour condenses and evaporates repeatedly which results in a purer spirit with a higher alcohol content. This type of still is used to produce spirit such as vodka, gin and grain whisky amongst others.

But even using a single still (pot still) without the bottoms described previously the alcohol content will be somewhat higher than the diagram shows. When a liquid is heated in the still a mixture of water and ethanol evaporates with a higher alcohol content than the liquid from which it came. If the evaporated vapour mixture hits the neck of the still, which is significantly cooler, then it will condense, turn to liquid, and slowly run back down into the body of the still. This is called reflux. At the point of condensation heat is developed which means that a small part of the liquid evaporates again with a higher alcohol content. This is why the strength of the raw spirit will be somewhat higher than expected, and purer.



The diagram above shows the variation in alcohol strength during the complete distillation. The first part of the process, head or foreshot, is distilled carefully with a slow increase in energy transfer so that the alcohol can clean away the fusel oils in the neck from the previous distillation. Even the heart, or middle cut, which is the spirit to be used to fill the casks is heated in the same slow and careful manner. This is to ensure enough contact time with the copper still and achieve the correct character of spirit for the distillery. When the heart is complete and the tail starts the heat is increased and the rest of the liquid continues to be distilled and collected in the low wine tank ready to be re-distilled. The need for contact with the copper and reflux is not great at this stage, hence the increase in heat. This means that the processes in both the low wine and spirit stills can be completed in parallel, if the tail was heated at the same rate as the head and heart the process would take a couple of hours longer.

EQUIPMENT



POT STILL

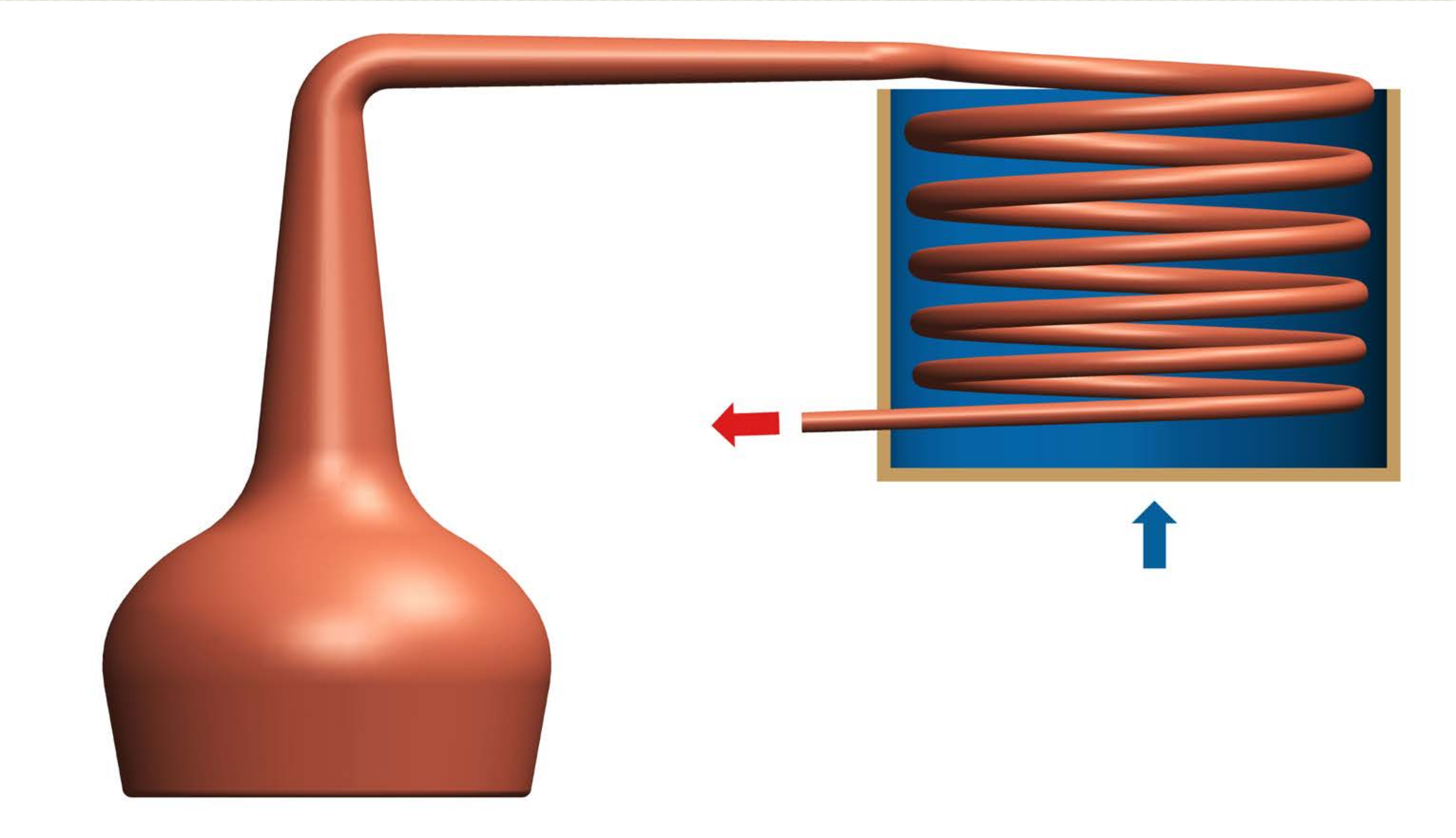
There is a wide range of different distillation equipment. In the production of pure spirit for the use in vodka, gins and grain whisky the most usual is the colon still which can be operated continuously. The colon still was developed by Robert Stein in 1826 and further refined by Aeneas Coffey in 1831 and as such is sometimes called a Coffey still. The classic single still, pot still, used in batch distillation is most commonly used for malt whisky production. They are made from copper for a number of reasons. The most common reason is that the copper removes undesirable sulphur compounds from the spirit. Copper also has good thermal properties and is a relatively easy metal to work with and form.

The size and shape of the still has a large impact on the character of the spirit. A short and wide neck (example 1 in the picture above) does not allow as much copper contact and has less reflux than stills with a tall and narrow neck (example 2) and results in a “dirtier” spirit with lots of “character”. In the wide neck some of the vapour will make it all the way through the neck without coming into contact with the copper.

The angle of the lyne arm, the section between the neck and the condenser, also plays a part. If the lyne arm is angled upwards (examples 2-4) this will act, in principle, as an extension of the neck and the vapour that condenses here will drop back down into the still, this results in a cleaner spirit. If the lyne arm is angled downwards the result will be a spirit with more character. It does not matter what the angle of the lyne arm is, the condensed liquid can only run in one direction.

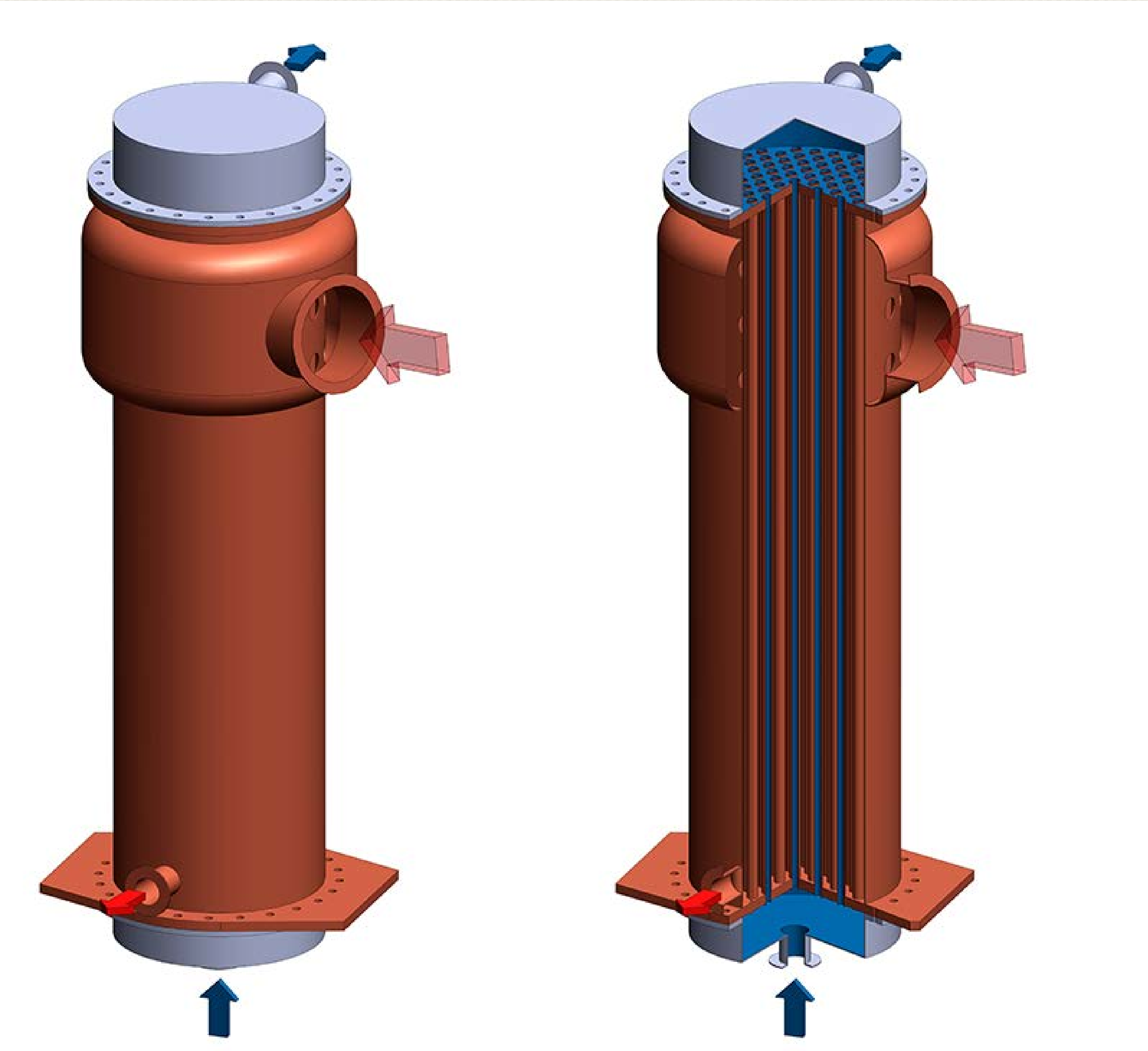
A still in the classic ”onion” form results in a relatively streamlined flow of the vapour from the heating process through the neck of the still. If a disruption of some form is introduced in the neck (examples 3 & 4) the flow will be more turbulent which results in more copper contact and reflux. If the disruption was placed high up in the neck it would not have an effect on the process.

If the lyne arm is angled downwards the vapour will condense after the neck finishes and run down into the condenser. If a lighter distillate is desired a purifier (example 5) can be installed which collects a large quantity of the condensed liquid which flows via a pipe back into the still. Purifiers are used at: Ardbeg, Glen Grant, Glenlossie, Glen Spey, Strathmill, Talisker and Tormore amongst others.



Condenser

WORM TUB CONDENSER



Shell and tube condenser

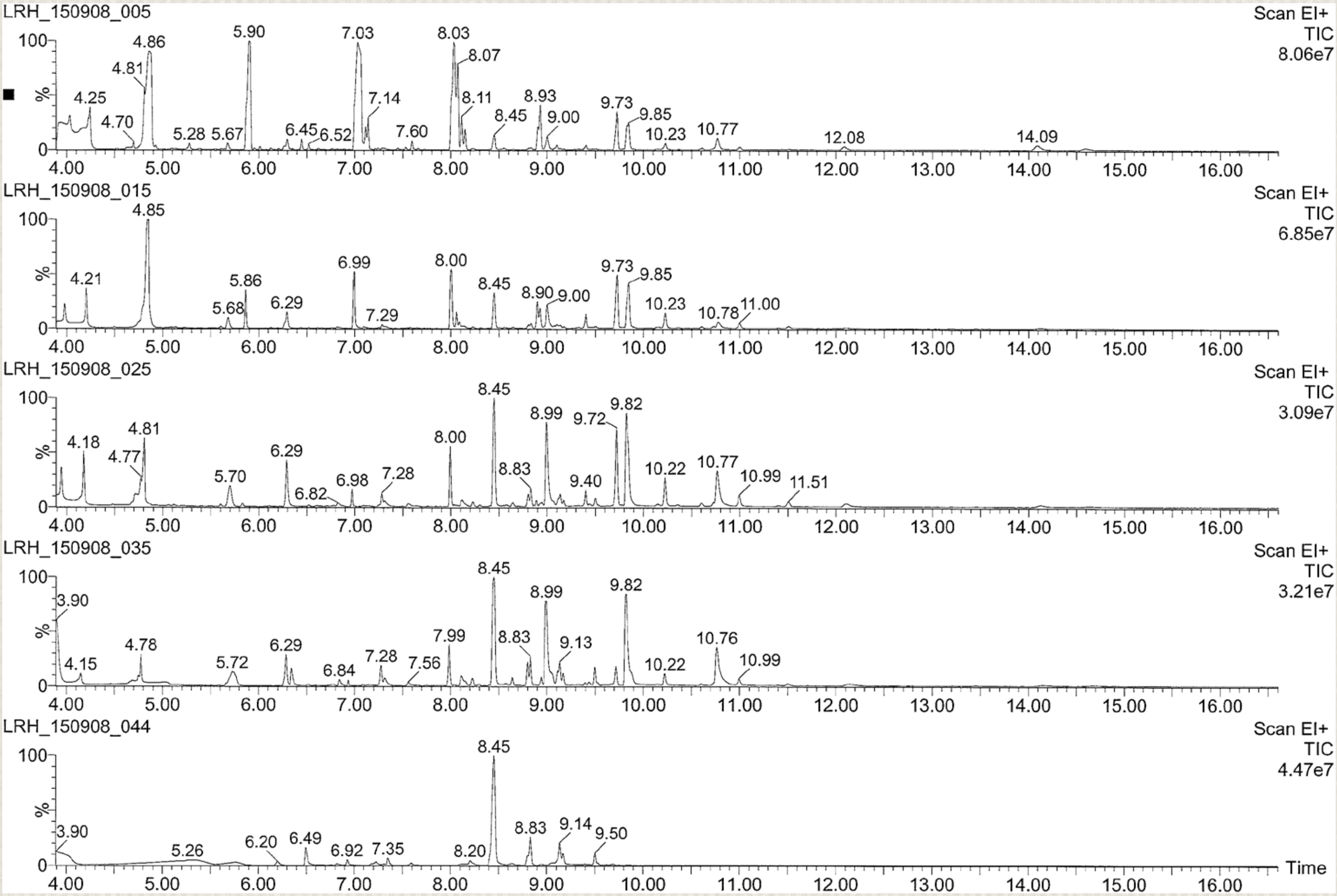
A more modern type of condenser is the shell and tube condenser. This often consists of roughly 80 to 100 copper pipes which are flushed with cooling water from the bottom. The alcohol vapour from the lyne arm enters via a double shell with holes inside and condenses to liquid when it hits the cooling pipes. The distillate then runs out from the lower part of the shell. If there are sulphur compounds present in the distillate, then it benefits from copper contact to help remove the sulphur, and as such it may be advisable not to use extremely cold cooling water as the distillate has higher copper contact as a vapour than as a liquid. If the undesired sulphur has been removed prior to reaching the condenser then copious amounts of cold cooling water will result in a clean spirit full of character. All distilleries are aware of the importance of cooling water and many distilleries are forced to shut down during the warm summer months. In the beginning of modern whisky production it was common with production from October to April. During the other months there is not enough water available and the water that is available may be too warm for a successful malting. The spirit will be of a slightly higher quality during the winter months, there are distilleries that warm up their cooling water in order to achieve a similar quality during winter as in summer. Even at Box, which has possibly the world's coldest cooling water, there is a small taste difference between summer and winter production. Even if the water temperature of the cooling water taken from the bottom of the Ångerman river increases during the summer months it is still colder than the cooling water available at other distilleries during the winter months.

Diageos gigantic distillery, Roseisle, is built to be able to produce a number of different styles of spirit and is able to copy the company’s other distillery’s spirits. Some stills at Roseisle are equipped with a two shell and tube condensers. One with copper tubing, the other with stainless steel tubing in order to be able to produce spirit with less copper contact, similar to that produced when using a worm tub condenser. The Lakes distillery in England also has two shell and tube condensers on both pot stills.

Double shell and tube condensers at the Lakes Distillery.

CHEMICAL ANALYSIS

On the 24th June 2015, 45 samples were taken during the spirit distillation (second distillation) of batch 947A. This was a peated recipe made using malt with a phenol content of 45ppm (parts per million). The samples were then analysed using a mass spectrometer by PhD student Per Ivarsson at the MTM Research Center at Örebro University.

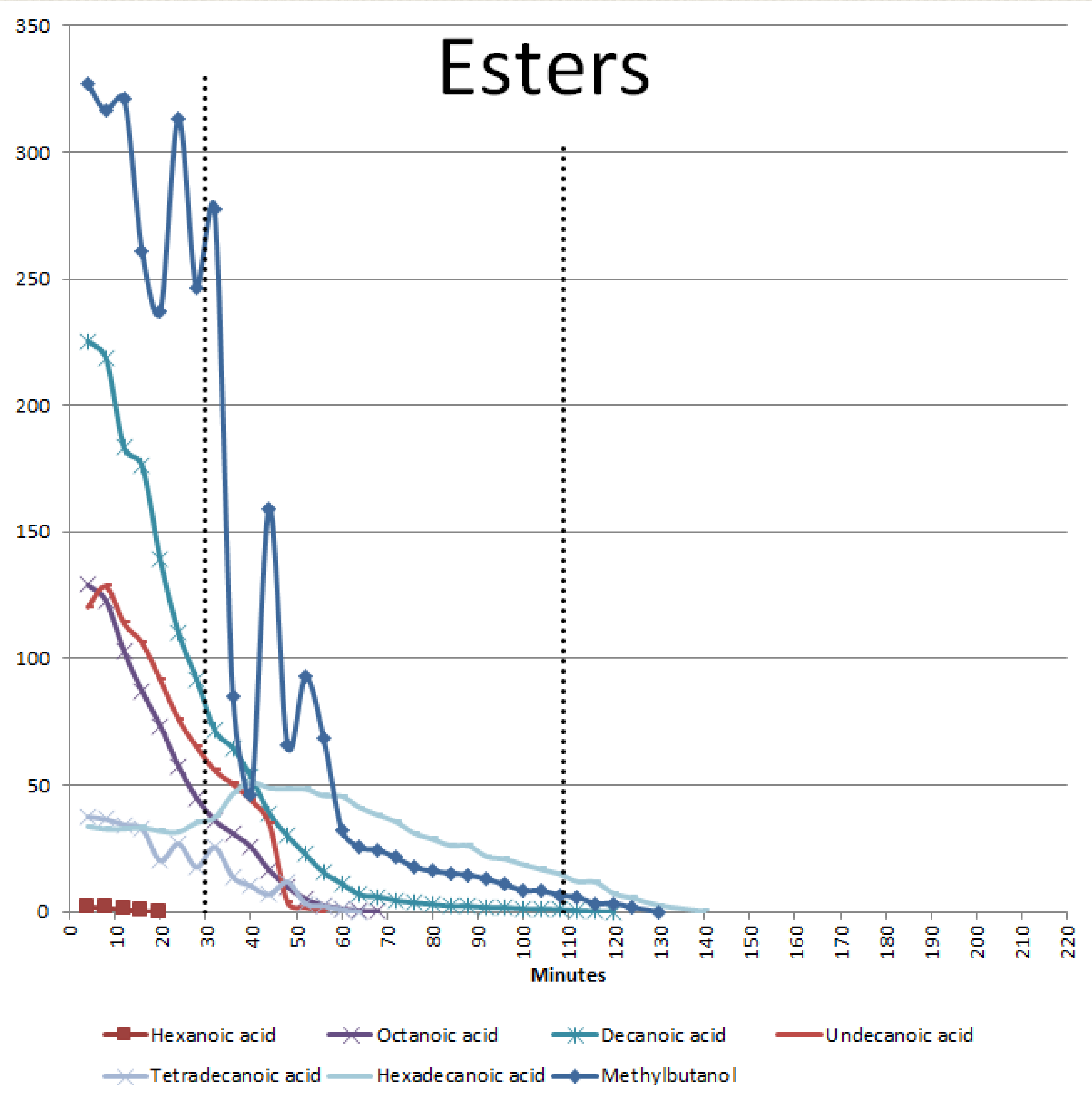


A chromatogram which shows the presence of substances in the samples at 4, 44, 84, 124 and 220 minutes respectively with the 4 minute sample the top graph in the series.

ESTERS

Esters are aromatic compounds that form when an acid reacts with an alcohol. A large part of the esters in a whisky form as a by-product of the fermentation process. They often have a pleasant smell and taste, reminiscent of fruit and berries. If the concentration is too high the esters can result in a less pleasant solvent aroma. The formation of esters during the fermentation process is influenced by the amount of sugar, the temperature and the oxygen supply. A higher volume of fermentable sugars in the wort promotes the formation of esters.

Esters come primarily at the start of the distillation process. If really fruity esters are desired then the heart should be started early in the process. BOX unpeated recipe is cut so the heart starts 13 minutes into the distillation, and the peated after 30 minutes, this is to tone down the fruity aromas so that they don’t clash with the peaty aromas.



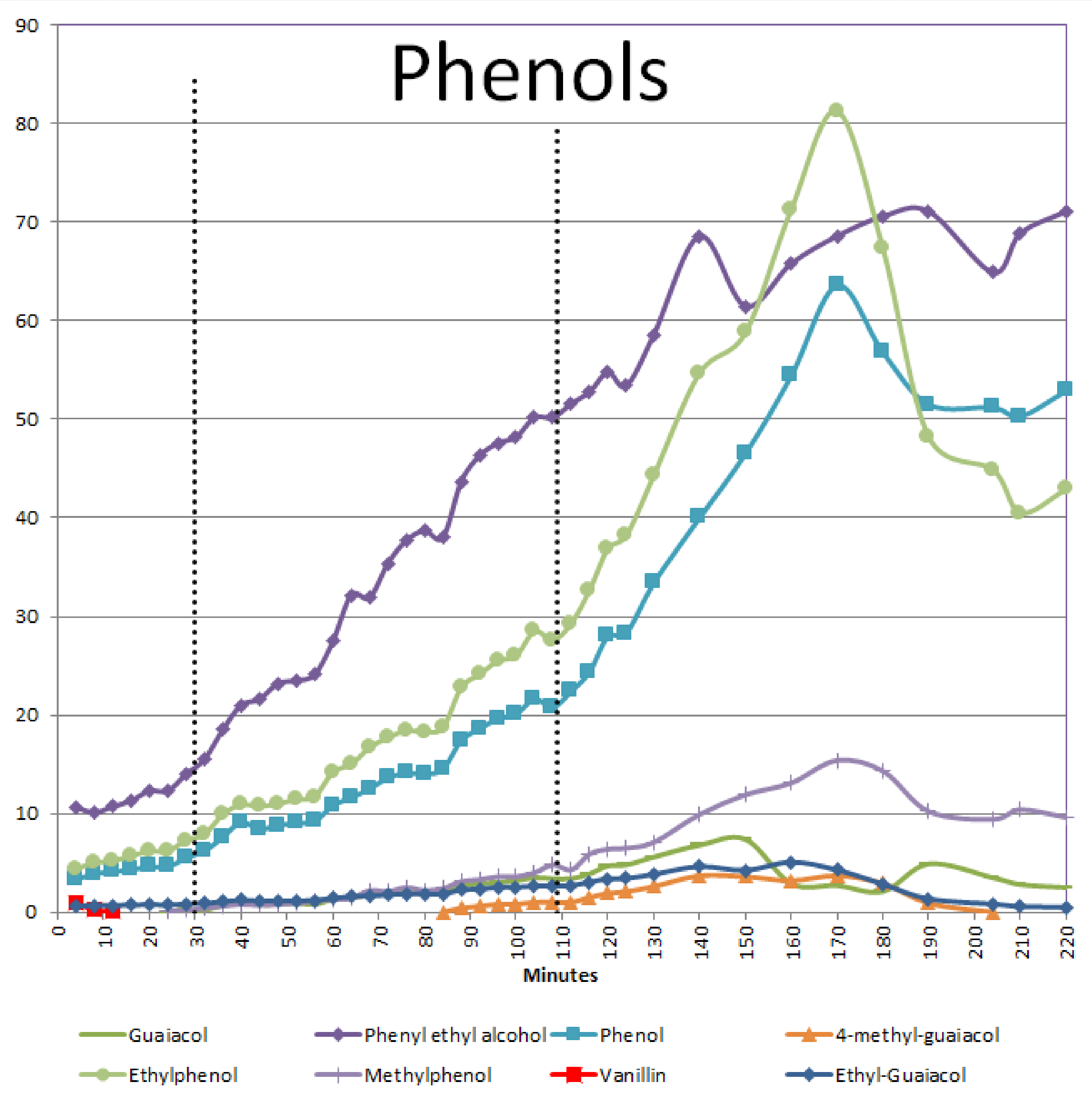
Ethyl esters are esters of ethanol and are grouped in the diagram above after they have reacted with ethanol. The collection of the heart from 30 min to 109 minutes is shown by the dotted lines.

PHENOLS

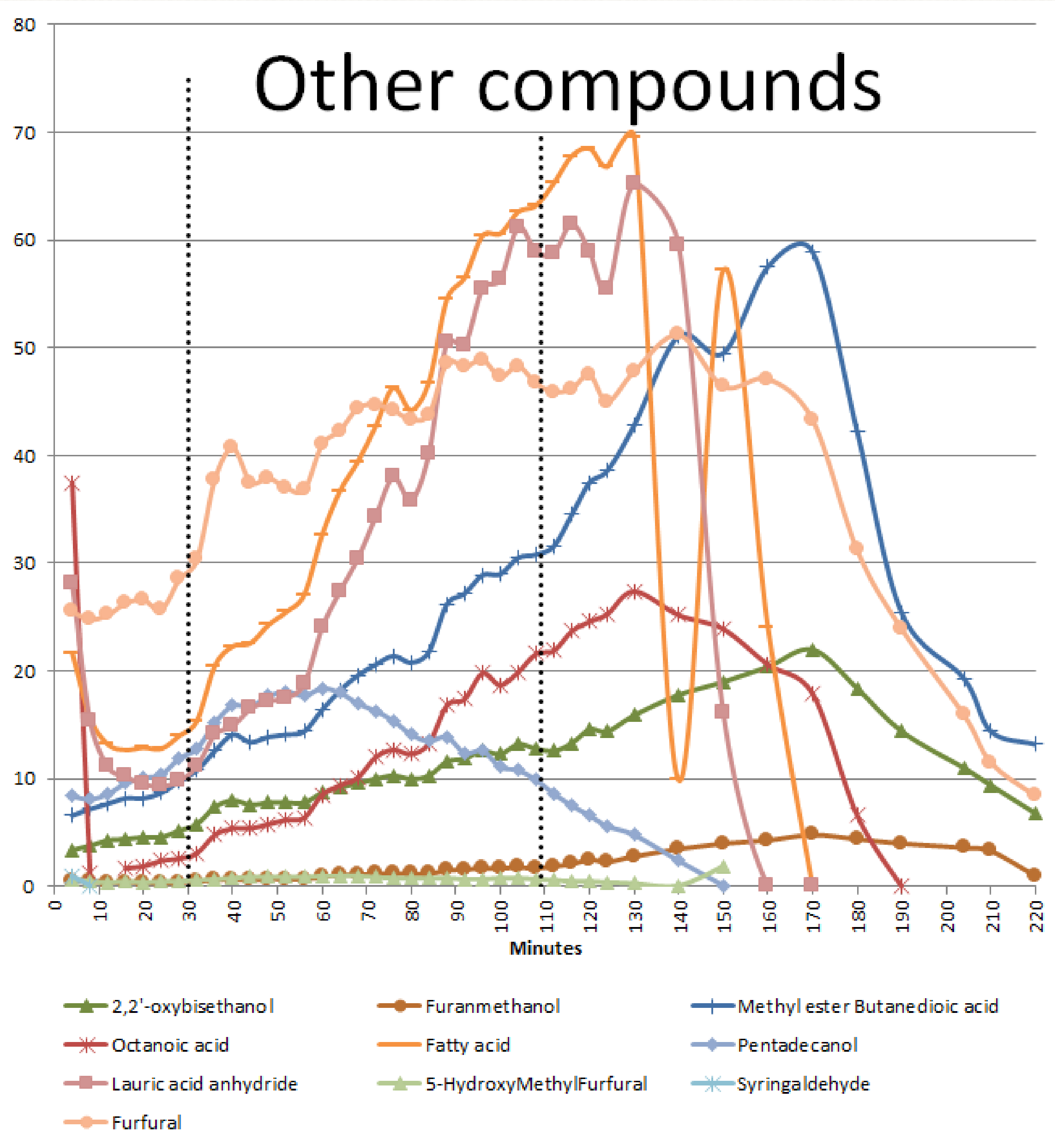
Distilleries that produce peaty whiskies often use the term ppm to describe how peaty a whisky is, e.g. 40ppm. But this is not the whole truth. This measurement indicates the total phenol content of the malt used, expressed in parts per million, ppm. Phenols are a substance that, in the whisky world, often come from the peat that is used when drying the malt at the end of the malting process. Some phenols also appear during the fermentation process as well as during the maturation process when maturing in casks that have been heavily charred or toasted. Certain phenols, such as Guaiacol, give a smokey aroma and taste. Whereas Phenylethyl alcohol has a flowery rose-like aroma. Many phenols give off a more medicinal aromas and are often linked to the smell of a hospital. Eugenol basically just has an taste and aroma similar to cloves, but is included in the group “phenols”

A large proportion of phenols in the malt disappear during the production of the spirit. Of the 35 different phenols present prior to production only 26 can be found in mature whisky. When distilling malt with a ppm of 27 evidence shows that 2.5% of all phenols are left in the draff which is often used as livestock feed. As much as 62.5% of the phenols are left in the pot ale which is the liquid that is left in the still after the first distillation. A further 8% of the phenols disappear with the spent lees which is the liquid left over after the second distillation. The phenol content of the spirit which is laid down in casks is approximately a third of the level present in the original malt. During the maturation of the spirit the phenol level reduces further, this is in part due to oxidisation whereby they change to vanillin. For the end consumer, a more correct description of the peatiness of a whisky would be achieved by measuring the peaty phenols in the bottled whisky and not the total phenols present in the raw ingredients used many years earlier.

Phenols in the distillate primarily come in the later part of the distillation. An early cut from the heart to the tail, with a peated recipe, would result in a spirit with a moderate amount of phenols.



An interesting and unexpected outcome from the chemical analysis is the appearance of vanillin at the start of the distillation. A simple and logical explanation in that phenols are left in the still, lyne arm and condenser at the end of the previous distillation. The alcohol content is so low at the end of the distillation that the phenols, which dissolve easily in alcohol but not in water, are left as a coating after the distillation has finished. In the time that passes before the next distillation the phenols oxidise to vanillin which later are picked up at the start of the next distillation where the alcohol content is much higher.



Even if it is possible to link some aromas and tastes to the specific compounds in the spirit, different aromas can be detected due to the combinations of these compounds. It is difficult, for example, to explain the tobacco aromas that appear for a short period during the latter part of the heart taken from the peated recipe.

IN THE BOX

In the box are 5 bottles containing spirit which has not been matured in a cask (new make). This is the heart of Box's peated spirit, split into 5 equal portions. The heart for the peated recipe is normally started 30 minutes into the distillation process and is stopped around 90 minutes later when the alcohol level of the spirit coming from the still has dropped to 60% ABV. To make it a little easier to identify the differences in these samples we have started the heart after 25 minutes, only for the purposes of this product. This captures more of the fruity esters that are found early in the heart.

The aromas and tastes vary widely between the different parts of the heart. But in general the spirit from the early part is fruitier, sweeter and has more body, this changes to a peatier, more medicinal spirit towards the end with less body. The alcohol contents also reduces during the distillation process.

TASTENOTES

The five samples from the heart are designated A, B, C D and E, where A is the first sample from the cut and E the last. But the bottles in the box are randomly labelled 1-5. The tasting panel consists of the well-known whisky aficionados Ingela Gustafsson, Lars Karlsson and Malt Maniacs Robert Karlsson. Using their recognised sensory expertise they have blind tested the spirit and here we have captured their nosing and tasting notes.

SAMPLE A (72.11 % ABV)

Ingela: Aromas from the malts husk and lots of fruit. Apple, sweet melon and even berries such as raspberries. Taste wise the malts fruity sweetness now contains peach and the after taste is like candy!

Lars: Unbelievably fine aromas. Very light, grassy, lots of pear on the nose and sour notes that remind me of blackcurrants, even a little acetone. The peatiness is almost non-existent and I only detect a hint meaty tones. Pears and blackcurrant on the initial taste which changes to white pepper at the end. A hint of smoked meat in the after taste.

Robert: Aromas: Aggressive young and chemical tones. These open up a little with some water, but it is difficult to enjoy. Taste: Taste wise this much more pleasant. Grassy? Light malt tones, only light peatiness, clean and pure. Pear? Citrus fruit?

SAMPLE B (71.32 % ABV)

Ingela: Huge nose of malt in the form of hard bread and light tones of Seville oranges. In the taste the hard bread is still present and this sample is oily when compared to the others. A dull peatiness in the taste.

Lars: Fine fruity aromas, mostly pears, some bubble gum, this feels a little chemically. Very pleasant taste with a good balance between the fruity tones (mostly pears) and a dry peatiness. A long after taste with fruit and ash prominent.

Robert: Aromas: Hard on the nose, aggressive. It has a sharpness to it and is clearly not matured. These characteristics calm down with a little time in the glass, toffee tones then appear. Taste: This is also hard on the taste buds, sharp and brutal.

SAMPLE C (68.98 % ABV)

Ingela: A spirity aroma with some citrus fruits. The hardest of the five samples to describe. Perhaps even some sawdust. Tastes of citrus and coarse malt, quite sweet and a little herbal.

Lars: Full medicinal aromas, hospital waiting room, a small metallic smell, aniseed and powerful peatiness. The initial taste is of blackcurrants and then a short but intensive peatiness takes over. Hint of iodine and bonfire smoke in the after taste.

Robert: Aromas: Light on the nose and relatively peat free compared to the other samples. A young malty hard bread? Young, but pure and clean, it opens up a little with time in the glass and a little water. Taste: Pleasant lighter peatiness, together with fresh citrus. Short and elegant.

SAMPLE D (66.71 % ABV)

Ingela: Light fire and damp peatiness on the nose. Even medicinal tones, chalk and leather. This tastes sweet, again damp peatiness and leather. The peatiness increases with a little water.

Lars: A medicinal and not so inviting aroma; plastic, sweet malt and nail polish. The peatiness has hints of forest and moss which I feel is quite sweet. The taste opens with sweetness and peat, the sweetness is then taken over by the peat and a peppery taste. The finish consists of light peppery tones and a sweet pear taste. Exciting, lots happening and fun to taste.

Robert: Aroma: An attractive deep peatiness. Young style, of course, but not excessively so. Fresh citrus and clean. Light bready tones. Taste: Very powerful to start with then an enjoyable peatiness develops. Heavy peaty tones and dried meat in the after taste.

SAMPLE E (62.05 % ABV)

Ingela: Dry peaty smoke, medicinal, leather and tobacco on the nose. The taste is the same. With a drop of water I find the smokiness and leather even drier.

Lars: Pea soup, forest/moss and lots of medicinal tones, plaster, and a touch of creosote with a sour smell like bile. Some bile still in the taste, sour smokiness (forest fire) appears but disappears quickly and leaves some fruity tones. A very dry and short after taste.

Robert: Aroma: An earthly dark and sooty smokiness. Hints of chocolate? Clear young tones but not directly unpleasant. Taste: Intensive initial taste, but surprisingly disappears quickly. Not much of a body and short. Oily. Short, very short.

HINDSIGHT

After reviewing the text, you should be able to place the bottles 1-5 in the order they were distilled in (A - E). Once you have received a proposal, you can click on the link below to get the opportunity.

Show hindsight

COMMENTS