

6

Distilling: How Spirits are Made

Aims and learning outcomes

This chapter aims to provide the knowledge and skills to understand how distilled spirits are made. On completion the learner should be able to:

- Outline the base ingredients and production methods of spirits.
- Explain the systems used for determining alcohol strengths and the influence of maturation on spirits.
- Demonstrate the knowledge and techniques involved in the evaluation and tasting of spirits

6.1 Introduction

The world of distilled spirits has benefited enormously from the dramatic increase in interest in the past couple of decades, due to the fact that consumers are widely travelled now and have been exposed to an increasing number of delicious, well-made and reasonably priced spirits from around the globe. Specialist drinks magazines carry many articles on distilled spirits and there are spirit columns in several national newspapers. Distilled spirits education is now widely available and is central to the continued success of these alcoholic beverages and their contribution to the overall business success of every bar.

Burroughs & Bezzant (1990) define spirits as a 'liquid of high alcoholic content which is obtained by distillation from such fermentable materials, they must be distilled only to a point where they are purified, yet still retain sufficient by-products to impart the particular characteristic of the original base material'. The appeal of spirits lies in their delivery of fruit and plant flavours but differently rendered with more complexity and intensity – and alcohol.

The word *distillation* comes from the Latin *destillare* meaning ‘to drip’. It is the extraction of higher alcohols from fermented drinks by using the action of heat to vapourize them. Basically, distillation is the concentration or increasing of alcohol strength. A wine of 8% alcohol by volume condenses into distillate of 20% volume after being boiled off in a pot still; if it is boiled a second time the strength goes up to about 60% vol. If, when vapourizing wine you take the wholesome middle-cut of the run, missing out the poisonous first part and the watery final part, as distillers learned to do, you have grape spirit, eau de vie, or brandy of about 70% ABV (alcohol by volume).

6.2 Raw materials and base ingredients

Raw materials

Anything that can be fermented can be used as a raw material for spirits – whether fruit, grain or vegetable. Where sugar is present in the primary material, as in molasses or fruit, the fermentation can be started directly. With grain spirits, the initial fermentation can take place only after the starch that is naturally present has been converted into sugar. To do this the grains (barley, etc.) are steeped in water for a period and then exposed to gentle warmth. This simulates the action of rain and sun, and the barley will start to sprout. As it does this, the germ of the grain gives forth an enzyme called diastase, which turns the starch of the grain into a sugar called maltose; this sugar can be fermented by yeast to produce an alcoholic wash.

Fermentation

This is the action of yeast upon sugar in solution, which breaks down the sugar into carbon dioxide (CO₂) and alcohol. This alcohol is contained within the original liquid which then becomes a fermented beverage.

Some spirits can be made from one particular material only, such as whiskey, vodka, genever, some schnapps and akvavit from grain. Other, such as vodka, can be made from a broad range of raw materials, including various grains, potatoes, and even sugar cane and grapes (see Table 6.1).

Base ingredients

The availability of the base ingredient and the uniqueness of the land where it is grown play an integral part in the different complexities and qualities found in distilled spirits. Listed below are some of the various base ingredients in which these distillates find their origins.

Table 6.1: Distilled spirits, base ingredients (adapted from Burroughs & Bezzant, 1990).

Base ingredient	Type	Distilled spirits and liqueurs obtained
Grains	barley, wheat, rye, corn	Whiskey, Gin, Vodka, Korn.
Other vegetables	sugar cane sugar beet potato	Rum, Gin, and Vodka. Vodka Neutral spirit, Vodka, Schnapps
Fruit, pips	Grapes	Cognac, Armagnac and other Brandies
Fruits	apples, pears plums dates	Calvados, Poire, alcohol Blanca. Slivovitz, Mirabelle. Arrack.
Soft fruits	strawberry, raspberry	Framboise, Fraise.
Roots	agave	Tequila
Roots	ti-Root	Okolehao
Stone	cherries	Kirsch
Sugar cane	cane juice molasses	Rum, Arrack Basi, Pinga, Cachao
Sugar beet	beet juice	Neutral spirit
Cellulose or milk sugar		Neutral spirit

6.3 Methods of alcohol separation

Let's consider a little science for a moment. Ethanol alcohol freezes at -133°C and boils at 78°C , which leads to two distinctively different methods to separate alcohol. The freezing method, commonly referred to as the congelation method or freeze distillation, and the boiling method or heat distillation, which is commonly referred to as the distillation method.

Congelation (cold extraction)

Congelation was originally used in the 8th century in Poland before distillation was discovered. It involved the cooling of the fermentable liquid (called the alcoholic wash) below 0°C or 32°F . This is a dangerous method of separation, because the poisonous fusel oils molecules tend to stick more closely together under cold conditions and can be left in. It is for this reason that most countries have made this method of alcohol separation illegal, but some operators use it to avoid paying taxes. It is sometimes used in Canadian homes to make Applejack. Cider is put out to freeze on a winter night. In the morning the ice formed is discarded. This process is repeated for 3 to 4 nights and the resulting residue is increased in strength. Less than 2% of the world's distilled spirits are made using this method.

Distillation (heat extraction)

Distillation is the separation by vaporization of the fermentable liquid to create alcohol. Alcohol has a lower boiling point than water (78.5°C or 172°F compared to 100°C for water), so the alcohol vaporizes into steam some time before the