

Q&A

Q1 What is the legal definition of sake in Japan?

Any of the following alcoholic beverages with an alcohol content of less than 22%:

- The filtered product of fermenting rice, koji rice and water;
- The filtered product of fermenting rice, koji rice, water, sakekasu and other items specified in regulations (the total weight of such other items specified in regulations must not exceed 50% of the total weight of rice, including rice for making koji rice. Items specified in regulations are alcohol, shochu (Japanese traditional spirits), sugars, organic acids, amino acid salts, and sake.
- The filtered product of adding sakekasu to sake.

Q2 Is sake rice also used as table rice?

Japanese people prefer table rice that is relatively sticky, but that rice is not suitable for sake production because it is hard to work with. It is possible, therefore, to eat sake rice, but because it is not sticky, sake rice does not make good table rice.

Q3 How much sake can be produced from 1 kg of polished rice?

In the case of junmai-shu, around 2.1 liters of genshu (18% alcohol) can be produced from 1 kg of polished rice. When diluted to 15% alcohol, the typical level in sake products, it comes to around 2.5 liters.

If the seimai-buai of the polished rice is 60%, the amount that can be produced from 1 kg of unpolished rice is 1.5 liters.

Q4 How much sake can be produced from a 1 ha rice field?

In the case of Yamadanishiki sake rice, roughly 4,000 kg of unpolished rice can be obtained from 1 ha. Assuming the same conditions as in Q3, some 6,000 liters of sake can be produced.

Roughly 6,000 kg of unpolished table rice can be obtained from 1 ha.

Q5 Ginjo-shu is made from rice, so why does it have a fruity aroma?

No fruit flavorings are added to the sake.

Analysis of ginjo-shu shows that it is rich in esters similar to those that give fruits their aroma. This aroma is created by yeast during the fermentation process. The fermentation must take place under the conditions described in Section 8.5.

Q6 Do weather conditions while the rice is growing affect sake production?

The weather can affect the amount of rice harvested from fields. In years when temperatures are low and there is insufficient sunlight at the time of panicle and grain formation, the rice grains that form are smaller in size and more soluble, resulting in heavier-tasting sake than normal. In years when the weather is hot, by contrast, the starch acquires a less soluble structure. This reduces the solubility of the rice, boosting the amount of sakekasu (filtered cake) and resulting in weaker-tasting sake (Sec. 8.1.3).

Q7 Where do breweries obtain the koji-fungi?

Sake breweries purchase a kind of seed koji, called tane-koji in Japanese, from tane-koji companies. Such companies make tane-koji by propagating koji-fungi spores on unpolished rice.

Q8 Are the taste and aroma of sake influenced by the type of seed koji (tane-koji) used?

Yeast is responsible for producing the aroma of sake, and the variety of koji does not play a role. Production of a large amount of enzymes by the koji is thought to result in a heavier taste because more of the rice is dissolved into the sake. However, rather than the specific strain of koji-fungi itself, koji making is understood to have the most significant effect on the amount of enzymes and enzyme balance.

Q9 Since koji-fungi are molds, are they safe?

Koji-fungi is related to *Aspergillus flavus*, a mold that produces one of the mycotoxins known as aflatoxin, so questions have been raised about whether koji-fungi might also produce toxins. However, studies have confirmed that the koji-fungi used in Japan do not produce mycotoxins. Recent genetic research has shown that koji-fungi lack the gene necessary to produce mycotoxins.

Q10 Why does sake have a higher alcohol content than wine or beer?

The concentration of sugar at the start of fermentation is a key factor in determining alcohol content. A high sugar concentration at the start inhibits the production of alcohol by the yeast, and in wine and beer, the sugar concentration is at its highest from the start. By contrast, in sake the sugar concentration is limited at the start because saccharification of starch by koji enzymes occurs gradually over the course of the entire alcohol fermentation process. This allows fermentation to proceed with little suppression of yeast activity, resulting in a higher alcohol content.

Q11 Why do many sake products have an alcohol content in the 15% range?

The alcohol content of genshu (undiluted sake) is 17%–20%, which is high for a brewed beverage. Because the alcohol content is too high for consumption with food, water is added to adjust the alcohol content to around 15% before shipping. The alcohol content of ginjo-shu, however, is often adjusted to a slightly higher 17% because of its delicate flavor. Another factor is that Japan's Liquor Tax Act previously prescribed an alcohol content of 15% as the standard for determining the liquor tax on sake, with every additional 1% attracting a higher tax.

Q12 Is low-alcohol sake also produced?

There are sake products available with an alcohol content ranging from 14% down to a low of around 5%. They include both sweet and acidic varieties, as well as sparkling sake.

Q13 What additives are used in sake?

No preservatives, coloring agents, flavoring agents, fragrances or other substances are added after production. Substances approved for use during production are salts to promote fermentation, and lactic acids and enzymes used in shubo. Active charcoal, persimmon tannin, silica dioxide and filtration aids may be used when removing sediment and filtering, but they do not remain in the sake.

Q14 What is the difference between the acidity of sake and the acidity of wine?

See Sec. 7.4 and Table 1.1

Q15 I want to learn more about the composition of sake, beer and wine.

See Table 1.1

Q16 At opening ceremonies and celebrations in which taruzake is served from a cask (Sec. 3.3.5), salt may be served along with it. Why does salt go well with sake?

Salt has the action of intensifying the umami produced by amino acids. For example, the addition of a small amount of salt to broth rich in amino acids, such as chicken soup, significantly enhances the taste. Sake is also rich in amino acids, which is thought to be the reason it goes well with salt.

Q17 Cheese and sake seem to go well together. Why is that?

Cheese is rich in amino acids and peptides resulting from the breakdown of milk-derived proteins by microorganisms. Although not exactly the same as those involved in sake brewing, the microorganisms involved in cheese making are lactic acid bacilli, yeast and molds, and the similarity of the aroma ingredients resulting from fermentation and aging is thought to be the reason that cheese and sake go well together (Sec. 5.2). Also, a great deal of salt is used in the production of most cheese varieties, and sake goes well with salt for the reasons explained in Q16.

Q18 Why do sake and seafood go well together?

Drinking sake with seafood largely eliminates any fishy flavor. The main cause of fishy flavors is aldehydes produced by the breakdown of DHA, EPA and other unsaturated fatty acids that abound in seafood. When DHA is added to sake, there is reportedly less formation of aldehydes compared to wine.

Q19 What is the aging potential of sake?

Pasteurized sake contains more alcohol than wine, so it does not spoil. The quality of sake remains almost constant for about six months after shipping when kept at room temperature and for about one year after shipping when kept in a refrigerator or cellar. Longer storage results in the gradual breakdown of amino acids due to the Maillard reaction inside the bottle, and the sake develops a color and a caramel- or nut-like aroma. Substances with a bitter taste also increase. This does not mean, however, that the sake cannot be drunk. If it is stored at low temperature away from light, it may turn into amber-colored koshu (aged sake).

It is recommended to drink ginjo-shu and other types of sake with a fruity or light flavor within one year.

Q20 How do the chemical components change when sake is heated?

The alcohol content declines by around 0.1%–0.3%. The amount of aldehydes is reduced by around 10%–22% compared to before heating, and there is also a decline in esters with a low boiling point, such as ethyl acetate, and of mercaptan and other sulfur compounds.

Q21 What is the calorie content of sake?

Alcohol contains 7.1 kcal/g and sugars and proteins contain 4 kcal/g. On average, 100 g of sake consists of 12.3 g alcohol, 4 g sugars and 0.5 g protein, therefore, based on the above figures, the calorie count is around 105 kcal.

Q22 Can sake be used in cooking?

Just as wine is indispensable in French and Italian cuisine, sake is indispensable in Japanese cuisine. In addition to stewed dishes and broths, it is used when grilling meat or fish, or cooking rice.

Q23 What sake competitions or shows are there?

(1) *Zenkoku Shinshu Kanpyo-kai*, National New Sake Awards

The National New Sake Award is the largest show in Japan with participation by around 900 companies. It was first held in 1911. It is now co-sponsored by the National Research Institute of Brewing and the Japan Sake and Shochu Makers Association. Exhibitors are limited to one ginjo-shu product per show and about 25% of products exhibited receive gold awards.

(2) U.S. National Sake Appraisal

This show has been held since 2001 in Honolulu. Four categories were judged in 2010: Daiginjo-shu A, Daiginjo-shu B, Ginjo-shu, and Junmai-shu.

(3) International Wine Challenge

Since 2007, a sake division has been included in the International Wine Challenge (IWC) held in London. Five categories were judged in 2010: Junmai-shu, Junmai ginjo-shu/Junmai daiginjo-shu, Honjozo-shu, Ginjo-shu/Daiginjo-shu, and Kosu.

Q24 Where can one learn sake making?

See Sec. 9.3

Q25 What is written on the Japanese-language part of the label?

Japanese law requires all sake labels to indicate items 1 to 7 in the example below. Items 8 to 12 may be applied to products that meet particular sake brewing quality standards specified by law (Appendix II). Labels may also state storage and consumption precautions, and additional information describing aging period, quality level, and use of organic rice ingredients.

