**FISH SAUCE & FISH PASTE**

Fish sauce is a liquid condiment made from fish or krill that have been coated in salt and fermented for up to two years. It is widely used as a staple seasoning in East and Southeast Asian cuisine and some garum-related fish sauces have been used in the West since the Roman times.

Fish paste is fish which has been chemically broken down by a fermentation process until it reaches the consistency of a soft creamy purée or paste. Alternatively it refers to cooked fish which has been physically broken down by pounding, grinding, pressing, mincing, blending, and/or sieving, until it reaches the consistency of paste. The term can be applied also to shellfish pastes, such as shrimp paste or crab paste.

Fish paste is used as a condiment or seasoning to add flavour to food, or in some cases to complement a dish. Generally, fish paste is reduced to a thick, rich concentrate, which has usually been cooked for a long time. It can be contrasted with fish sauce, which is like a fish paste except it is not cooked for so long, is a thick liquid rather than a concentrated paste, and may include seasonings and other flavorings.

**Nutrition contents**

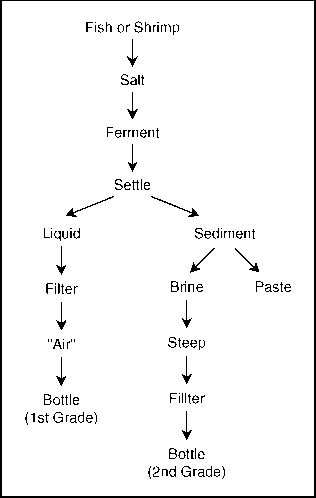
Common commercial brands of fish sauce generally contain about 50% to 60% of the FDA's daily recommended amount of sodium per tablespoon serving. Most commercial brands of reasonable quality contain one or two grams of protein per serving; however, higher-quality brands may have four grams of protein or more, while lower-quality brands may have less than one gram of protein per serving. Fish sauce has an insignificant amount of carbohydrates and fats. Vitamin B12, vitamin B-6, and magnesium are present in small amounts.

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| Product | Country | Description |
| Nam-pla | Thailand | Fish sauce |
| Budu | Malaysia | Fish sauce |
| Patis | Philippines | Fish or shrimp sauce |
| Ishiru | Japan | Fish sauce |
| Nouc-mam | Vietnam | Fish sauce |
| Nam-pa | Laos | Fish sauce |
| Bagoong | Philippines | Fish or shrimp paste |
| Mam | Vietnam | Fish paste |
| Trassi | Indonesia | Shrimp or fish paste |
| Belachan | Malaysia | Shrimp paste |

such as sardines (that otherwise have minimal commercial value), small shrimp, squid, or oysters). Fish is usually used whole and uneviscerated, although de-headed, eviscerated, ground, or cut-up pieces can also be used. The only other ingredient necessary to make these products is salt.The fish-to-salt ratio varies, depending on the product, but usually ranges from 3:1 to 5:1. Fish sauces do not undergo a lactic fermentation, per se, and are preserved mainly by salt and low water activity, rather than by pH. Thus, high salt concentrations are necessary.

After the salt is added to the fish (on wooden or concrete floors), the mixture is moved into tanks (often built into the ground) and covered. The material is held for about six months (or longer) at ambient temperature. At various times, the mixture may be uncovered, stirred, and exposed to air and sunlight, all of which are thought to improve flavor and color and accelerate enzyme activity. During this incubation period, the solid fish material is transformed, or more precisely, liquefied by the action of endogenous fish enzymes. These enzymes, primarily trypsin-like acid-proteases and various endo- and exo-peptidases, are ordinarily present within the intact cells of various fish tissues. However, in the non-living animal, the cells soon autolyze and those enzymes are released, result-

[Fish sauce flow chart](http://www.foodsafetysite.com/resources/pdfs/schoolhaccp/CommercialKitchen/1-1FlowCharts.pdf).



ing in extensive hydrolysis of muscle tissue. In fresh fish, autolysis and proteolysis result in tissue softening and spoilage; in fish sauce production, the result is liquefaction.

In addition to the physical transformation from solid to liquid, proteolytic digestion of the fish substrates results in formation of free amino acids and peptides. In intact tissue, for example, the soluble nitrogen concentration is essentially nil, but in nam-pla and nuoc-mam (Thai and Vietnamese fish sauce, respectively) there is more than 2% soluble nitrogen (mostly amino nitrogen). Glutamic acid, which, like in soy sauce products, is responsible for flavor enhancement, is among the amino acids that accumulate in fish sauce. Likewise, 5'-nucleotides may also be formed, providing a source of umami or meaty-like flavors (as described above).

Further hydrolysis of peptides and amino acids by enzymes that are either endogenous or microbial in origin (see below) eventually results in a large number of volatile aroma and flavor products. Among those that are most prominent and that confer "fish sauce flavor" are ammonia, triethylamine, and various alcohols, aldehydes, ketones, and lactones.Lipolysis also occurs during fish sauce manufacture, resulting in formation of volatile fatty acids, including acetic, butanoic, and propanoic acids. These compounds are particularly characteristic of fish sauce flavor, which is sometimes described as "cheesy."

After several months of enzymolysis and fermentation, the liquid is separated from the sed-imented material by decanting or filtering the liquid directly through the fish solids.This "first run" product has the highest quality. Additional brine can be added to the solid material, the mixture aged for several more weeks (or simply boiled), and then a second, lower quality, liquid is obtained. The remaining solids can then be recovered and used as a paste. Some fish sauces and pastes are aged in the open (and exposed to the sun) for several more weeks to allow partial dissipation of the strong fish aroma.The sauce or paste is then bottled. The final composition (weight basis) of fish sauces is usually about 60% moisture, 30% salt,

10% protein (including amino nitrogen),with a final pH of about 6.5. Pastes contain about 30% moisture, 20% salt, 30% protein, and 20% ash.