

# The differences in ingredients between Thai and Japanese soy sauce and fish sauce

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## Abstract

This study compared the protein and salt content in two types of soy sauce and two types of fish sauce: dark soy sauce, light soy sauce, “shottsuru” (Japanese fish soy sauce), and nam pla. Dark and light soy sauce are typically used in cooking. The amount of protein was determined by measuring Kjeldahl nitrogen, and salt content in each sauce was determined using the Mohr method. Among the four types, fish sauce exhibited higher salt content than soy sauce, and the sauces that were higher in protein contained lower salt content.

**Keywords:** soy sauce, fish sauce, protein, salt, Kjeldahl nitrogen, Mohr method

## Introduction

Previous collaboration with a Thai researcher confirmed that Thailand has a native soy sauce and fish sauce. This study investigated the differences in ingredients between Thai and Japanese soy sauces and fish sauce. Two types of soy sauce and fish sauce were examined and compared: light soy sauce, dark soy sauce, “shottsuru,” and fish sauce.

Dark soy sauce is made by mixing equal parts of steamed soybeans and roasted wheat, adding seed malt, and salt water, and letting it ferment in a tank for 6–8 months under regular stirring. Light soy sauce derives its name from its lighter color compared to that of dark soy sauce.

Light soy sauce is made by adding rice and amazake (sweet sake) to the ingredients of dark soy sauce. It is characterized by a refreshing taste.

Shottsuru is a fish sauce that is made by mixing the meat and organs of the grouper fish with salt, letting the mix ferment, and then mature over a period of approximately 3 years. Nam pla is a seasoning that has been used in East Asia for a long time. It is a liquid made from raw fish that has been pickled and fermented.

Using these distinctly manufactured sauces, this study determined the differences in protein and salt contents by analyzing the relationship between the amounts of protein and salt in the soy sauce and fish sauce.

## Materials and Methods

### Measurement of protein content

Dark soy sauce and light soy sauce were obtained from Kikkoman Corporation. Shottsuru was obtained from Morojouzou Corporation. Nam pla was obtained from Allied Corporation. The amount of protein was determined by measuring Kjeldahl nitrogen.

First, 1.0 mL of each sauce was poured into a Kjeldahl flask. Then, 1.0 g of decomposition promoters and 10 mL of concentrated sulfuric acid were added. Next, the mixture was heated. After letting it cool down sufficiently, distilled water was used to dilute the mix to 100 mL. Then, it was distilled. The concentration of sulfuric acid was determined in a sodium hydroxide solution. Finally, the percentage of protein was calculated using the following formula. The amount of protein was expressed as protein equivalent using a conversion factor of 5.71.

$$\frac{0.14 \times (a - b) \times f \times 100 \times 100 \times 5.71}{5.0 \times w \times 1000}$$

*a*: Titration of 0.010 mol/L NaOH standard solution in this study

*b*: Titration of 0.010 mol/L NaOH standard solution in an empty test

*f*: Factor of 0.010 mol/L NaOH standard solution

*w*: Mass of the sample



Figure 1. Semi-micro Kjeldahl distillation

### Measurement of salt content

The salt content in each sauce was determined using the Mohr method. In the Mohr method, potassium chromate is an indicator, giving red silver chromate after all chloride ions have reacted. A total of 1 mL of the sauce was diluted to 200 mL with distilled water. Then, 10 mL were placed in a conical beaker. The mixture was then titrated with silver nitrate solution.

## Results and Discussion

The findings indicate that fish sauce exhibited higher salt content than soy sauce. In addition, among the four types of sauces, those with higher protein content exhibited lower salt content.

The differences in both salt and protein content in each sauce are likely attributable to traditional manufacturing methods, country-specific climate, existing hygiene conditions, and other factors. Contents are also related to shelf life and spoilage. However, based on this experiment no robust conclusions could be drawn regarding the relationship between salt and protein content. Therefore, future research will focus on the effects of water content on the fermentation progress of each sauce.

Table 1: Measurement of protein and salt

	<b>Protein content (%)</b>	<b>Salt content (%)</b>
Dark soy sauce	5.18	14.14
Light soy sauce	6.20	12.86
“Shottsuru”	6.84	23.59
Nam pla	7.63	22.20

## Conclusions

This study demonstrated that fish sauce contained more salt than soy sauce. In addition, sauces with more protein contained less salt. Further research will continue to investigate the relationship between protein and salt content, focusing on the role of water.

## References

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