

# A Study of Iodized Salt Used in Soy Sauce Processing

## I. Foreword:

Soy sauce is closely linked with our life and is one of the important condiments. However, till now, salt used in soy sauce production and processing is still non-iodized block one. Whether is it possible to use iodized salt in soy sauce has aroused general concern. There is no production factory that has done a research about using iodized salt in soy sauce. To study the effect of iodized salt used towards the quality and the preservation rate of soy sauce, this study has been carried out.

## II. Testing material and method

### A. Testing material:

All salt for pickling used in this study is provided by Beijing Salt Company. One group is refined iodized salt (Brand--Luhua, iodine content-- 61.95mg/kg). The other group is refined non-iodized salt (Brand—Haiwangxing, iodine content—0mg/kg).

### B. Sample preparation:

Soy sauce samples with iodized salt and non-iodized salt inside are all prepared by Beijing 6<sup>th</sup> Brewage Factory. For the duplication of the testing result, they prepared two groups of different samples.

### C. Preservation Test

Preserve the samples of non-iodized soy sauce and iodized soy sauce with the common temperature for 3 months. During preservation, test those samples periodically in different ways, such as physics and chemistry performance test, quality estimation by sense organs and iodine content estimation.

### D. Estimation by Sense Organs

Estimation by sense organs adopts expanding triangle testing method. Over 10 experienced engineers will be involved in every test. They will tell the difference between iodized soy sauce and non-iodized soy sauce. First, carry out triangle test. Meanwhile, do partiality choice. Then, carry out data treatment by mathematical statistics. When doing mathematical statistics, test if there is prominent difference among samples of the same group. If prominent difference exists, test partiality.

### E. Physics and Chemistry Performance Test

The physics and chemistry performance test includes color and luster and content of iodine. After the preparation work of samples done, carry out tests every one-month of preservation, altogether 4 times, including test of color and luster and content of iodine.

a. ND101-DP • 101 chromaticmeter is used when testing color and luster. The method is liquid chromatic difference cup testing. Different data, such as *L* (lightness),

*a* (Red and Green) and *b* (Blue and Yellow). As soy sauce is in liquid state, therefore, tissue rigidity and elasticity are not tested. After analyzing the estimated data and test the prominent difference, we get the prominent level  $\alpha=0.05$ .

b. Measure the Content of Iodine.

Method—catalytic colorimetric analysis (GB107860) and confirm the preserving rate of iodine in soy sauce according to content of salt and iodine inside soy sauce.

### III. Conclusion and Discussion

There is no prominent difference in four estimations by sense organs, but the third one. In the third estimation, prominent difference appears in the first group. Therefore, partiality test was carried out. 9 persons were involved in the partiality test. 5 of them prefer soy sauce with iodized salt inside, while 4 of them liked that with non-iodized salt inside, which shows the partiality test is meaningless (A meaningful result—at least 8 people has the same choice). Therefore, we can come to this conclusion, although people tested can tell the difference between iodized soy sauce and non-iodized soy sauce, there is no difference between the quality. In conclusion, there is no prominent difference of quality by sense organs between iodized soy sauce and non-iodized soy sauce according to four estimations. In other words, iodized salt does not affect the quality by sense organs of soy sauce.

In the test of color and luster, there is no prominent difference about *a* (Red and Green) in the four tests. One-time prominent difference appeared in the test of *L* (lightness) and *b* (Blue and Yellow), while no prominent difference exists in the other three tests. We can come to this conclusion, that is, there is no prominent difference about color and luster between iodized soy sauce and non-iodized soy sauce.

Although the ferment period of soy sauce is long and the ferment process is openly managed, the reserving rate of iodine in soy sauce is still quite high. After the sample preparation step, the reserving rate of iodine reaches 60.42%. The preservation process is stably carried out. After three-month preservation, the reserving rate of iodine is 58.04%. The soy sauce bottles are well sealed, which helped a lot to the preservation of iodine. Something has to be clarified, that is, the reserving rate of iodine in soy sauce is measured by the content of salt inside soy sauce without the consideration of the total amount of salt used in the production process. If measured by the total amount of salt used, the reserving rate of iodine will be lower.

After this test, we can draw conclusion as following: the applicability of iodized salt inside soy sauce is good and the reserving rate of iodine inside soy sauce is high. Therefore, iodized salt should be widely used in soy sauce production.

# **A Study of Iodized Salt Used in Bottled Potherb Mustard**

## **I. Foreword:**

Bottled potherb mustard is the product of fresh potherb mustard by drying, salting and bottling. Potherb mustard is planted and used in North and East China, which is quite popular among customers. The traditional bottled potherb mustard is produced with non-iodized salt. To study and make certain the influence of iodized salt towards potherb mustard quality and the corrosion of empty bottle, this study has been carried out.

## **II. Material and Methods Used:**

A. All material (iodized solar salt and non-iodized solar salt) used in this study is provided by Ningbo Salt Company. By measuring, the content of iodine in the iodized salt is 40.86 mg/kg, while the content of iodine in the non-iodized salt is 0 mg/kg. Potherb mustard used in this study is procured by the factory.

### **B. Samples Preparation**

Fresh potherb mustard is salted by iodized solar salt and then bottled. Meanwhile, two groups of comparative samples are prepared with non-iodized salt. The salting process is carried out in Zhejiang Ningbo Yunyu Vegetable Factory and the bottling and sterilizing processes are taken in Ningbo Canning Factory. All fresh potherb mustard is procured by Ningbo Yunyu Vegetable Factory locally.

### **C. Preservation Test**

Preserve the samples with non-iodized salt and iodized salt at the common temperature for 3 months. During preservation, test those samples periodically in different ways, such as quality estimation by sense organs, iodine content estimation and empty bottle corrosion check.

### **D. Iodine Content Estimation**

Method—catalytic colorimetric analysis (GB107860) and confirm the preserving rate of iodine in potherb mustard according to content of salt and iodine inside potherb mustard.

### **E. Estimation by Sense Organs**

Estimation by sense organs includes 2 parts. The first part is to compare the iodized salt sample and non-iodized salt sample by expanding triangle testing method and 12 people will be involved in this part. Then the mathematical and physical statistics will be done according to the estimated result. The second part is to test the color and luster of the bottled potherb mustard by range estimation. Experienced experts will be involved in this part.

### **F. Empty Bottle Corrosion Test**

The inside substance contains iodine, which may speed up the corrosive rate of the empty bottle. Therefore, every time when the bottle is opened for sense organs estimation, empty bottle corrosion test needs to be taken for determining if there is any difference among different samples.

### III. Conclusion and Discussion

This study is carried out by the single factor comparative test between iodized salt potherb mustard and non-iodized salt potherb mustard. Then, mathematical and physical statistics analysis will be taken. The result is as below:

A. The result of the triangle test shows there is no prominent difference between the iodized salt potherb mustard and the non-iodized salt potherb mustard in fragrance, texture and taste.

B. The range estimation of the bottled potherb mustard with iodized salt inside shows that not only the color of the whole bottle but also the color of stem and leaves is darker than the one with non-iodized salt inside. The liquid is darker and more turbid. The longer the preservation period, the darker the bottled potherb mustard. However, this is still within the limits accepted by customers.

C. Concerning the aspect of empty bottle corrosion, during the three-month preservation, there is no prominent difference between the pickled potherb mustard with iodized salt inside and that with non-iodized salt inside.

D. The iodine preservation rate of the bottled potherb mustard is about 50% after washing during the bottling process. Even after three-month preservation, the rate is still quite stable. Something needs to be mentioned here, the high preserving rate is due to the salting process that is taken after the drying process. In the salting process, salt is efficiently used.

In general, iodized salt can be used in potherb mustard production. However, the problem of the influence of iodized salt on the color and luster of bottled potherb mustard needs to be settled. Potherb mustard belongs to green-leaf vegetable. Iodized salt's influence towards bottled potherb mustard may reflect the problem of green-leaf vegetable. For expanding the usage of iodized salt in pickled food industry, improvement need to be made in the picking technology of bottled potherb mustard so that the quality of bottled potherb mustard will be improved.