

The Effect of Adding Liquid Smoke Powder to Shelf Life of Sauce

Desniorita[#] and Maryam^{*}

[#] Department of Chemical Engineering, Polytechnic of ATI Padang, Padang, West Sumatra, Indonesia
E-mail: desnioritarusli@gmail.com

^{*} Department of Agro-Industrial Engineering, Polytechnic of ATI Padang, Padang, West Sumatra, Indonesia
E-mail: iyam_cb@yahoo.co.id

Abstract— Development of food preservation with the use of liquid smoke technology continues to be done in order to produce a product that has the taste of smoke, durable and safe for consumption. To make easy handling and application redistilat liquid smoke, an innovative technology in making smoke powder has developed using maltodextrin as the medium carrier. The method in the process of drying the product was drying with spray dryer with the end result in the form of powder and the most widely used in industry, especially the food industry. The purpose of this study was to determine the process of making liquid smoke powder by spray drying method and see its effect on the flavor and shelf life of sauce. The main tool used is a spray dryer and mixer. The main material used is liquid smoke and dextrin. Optimal conditions of liquid smoke powder processing is at concentration 5% and temperature inlet 160°C. Concentration and inlet temperature very significant effect on the moisture content, bulk density and yield. Concentration did not significantly affect the solubility. Giving liquid smoke powder increase the shelf life of sauce is 7 days. Providing optimum flavor can still be received by respondents is at the level 2%.

Keywords— liquid smoke powder; flavour; shelf life; sauce

I. INTRODUCTION

In general, fresh perishable foodstuffs, due to the activities of microorganisms and oxidation reaction, because it is necessary preservation measures. Currently the community is often disturbing the number of compounds using formaldehyde as a preservative in food that can be harmful to health. Basically a lot of ways that can be done to preserve food, one through evaporation, which has long been used some communities in Indonesia to preserve food. Fumigation process can be done through contact with aerosols in space fumigation (the traditional way), fumigation electrostatic and through the condensate liquid smoke.

Pickling with liquid smoke is more friendly to the environment, because it does not cause air pollution. Liquid smoke is very adaptable and can be produced commercially. But we can not deny that the use of liquid smoke as a preservative is not popular yet and not so well known by the public, the sense are now beginning to be developed as a replacement for formaldehyde compounds. Development of products and processes for food preservation with the use of liquid smoke technology continue to be done in order to produce a product that has taste of smoke, durable and safe for consumption. Liquid smoke is the result of condensation

from the pyrolysis of wood containing a large number of compounds formed. By the process of pyrolysis of wood constituents such as cellulose, hemicellulose and lignin by using high temperature combustion process in a closed room or vacuum using a device of liquid smoke. Device of liquid smoke is a tool used to produce liquid smoke comprising pyrolysis tube, conduit smoke, tar catcher, condenser, and a container of liquid smoke.

Several studies have been shown that liquid smoke can extend product shelf life by preventing damage caused by the activity of spoilage bacteria and pathogens. Supporting antibacterial compounds in distillate liquid smoke are phenolic compounds and acids[1]. Compounds smoke gives the flavor of smoke (smoky) characteristic that cannot be replaced by any other means. Phenol is a compound that is most responsible for the formation of specific desired flavor smoke products, especially phenols with a boiling point medium such as guaicol, eugenol and siringol [2]. Phenol in conjunction with sensory properties have kresolik pungent smell, a sweet, smoky and burning [3].

For ease of handling and application redistilat liquid smoke, has developed innovative technology in making smoke powder using maltodextrin as the carrier medium. Liquid smoke powder can be generated with a ratio of 3 parts redistilat ratio of liquid smoke and 1 part maltodextrin [4]. Drying spray drying method of choice in the process of

drying the products most widely used in industry, especially the food industry.

II. MATERIALS AND METHOD

The research was conducted from August to September 2014 at teaching factory, Polytechnic of ATI Padang. The tools used in this study is a spray dryer and blender. Materials used are food grade liquid smoke, dextrin, and sauces. The method of making liquid smoke powder using a spray dryer with liquid smoke treatment solution concentration with dextrin (10%, 15%, 20%) and spray dryer inlet temperature (120°C, 140°C, 160°C). Flour liquid smoke will be applied as a flavor enhancer in the manufacture of sauces to test the smoke flavor and shelf life. The addition of liquid smoke flour in food products will be tested at several levels of 0%, 2%, 4% and 6%.

III. RESULTS AND DISCUSSION

A. Purification of Liquid Smoke

Liquid smoke purification process to obtain the liquid smoke does not contain harmful ingredients that are safe for a food preservative. The test results using GCMS liquid smoke can be seen in Table 1.

Smoke liquid obtained from condensation of fumes on pyrolysis process deposited for one week, after separate, liquid upper part we take and put into the distillation apparatus. The distillation process is different from pyrolysis, distillation temperature of about 120-150°C, the distillation temperature is adjusted automatically to the distillation evaporator. Results accommodated distillate, distillate is then used for the filtration process. Distillate filtration process with active zeolite is intended to obtain active substances are completely safe from harmful substances. The trick substance of our liquid smoke distillate stream into the column and the active zeolite obtained filtrate liquid smoke that is safe from hazardous materials and can be used as a food preservative non carcinogenic. Filtration process the filtrate with activated carbon for the purpose of getting the filtrate liquid smoke with the smell of smoke that is lightweight and does not sting, do filtrate from the filtration of zeolites active flowed into the column containing activated carbon so that the filtrate obtained in the form of liquid smoke with the smell of smoke that is lightweight and does not sting, then completed the liquid smoke as a food preservative that is safe and natural.

B. Flour-making liquid smoke

One way that can be used to manufacture flour smoke is the spray dryer. Spray drying technology is an economical method to protect the active compounds by means of trapping in a carrier. [5] stated that the use of a spray dryer capable of producing good quality flour with low water activity, ease of handling and storage, as well as to protect the active compounds from reactions are undesirable.

The best treatment was obtained from the results that have best parameters, especially parameters yield and moisture content. Such treatment at a concentration of 10% and an inlet temperature of 160° C result with 6.95% moisture content, bulk density of 1,21 g/cm³, the solubility of 98.58% and a yield of 69.49%.

TABLE I
COMPONENTS OF COCONUT SHELL LIQUID SMOKE COMPOUND

No	Componen compound	Peak area (%)
1	2-Furanol, tetrahydro-	0,37
2	Furfural	2,97
3	2-Pentanone, 4-hydroxy-4-methyl-	0,52
4	Phenol	16,04
5	Phenol, 2-methyl-	0,74
6	Phenol, 2-methoxy-	2,41
7	Octanoic Acid	0,64
8	Phenol, 2-methoxy-4-methyl-	0,17
9	n-Decanoic acid	0,20
10	1,2-Cyclopentanediol, 3-methyl-	0,49
11	Dodecanoic acid	1,52
12	Hexadecanoic acid	0,36
13	Xylitol, 1-O-octanoyl-	0,56
14	Tetradecanoic acid	2,49
15	Stearic anhydride	5,39
16	Oleic Acid	1,32
17	1-(+)-Ascorbic acid	27,72
18	8-Octadecanone	0,35
19	Stearic anhydride	2,27
20	Dodecanoic acid	3,28
21	Oleic Acid	21,05
22	Octadecanoic acid	3,19
23	9-Octadecenoic acid	4,80
24	Hexadecanoic acid	1,14

C. Shelf Life

In the liquid smoke contains phenolic compounds that act as antioxidants, preventing the breakdown of food by way of donating hydrogen. In a very small amount, effective to inhibit liquid smoke autooxidation fat, thus reducing damage to food as fat oxidation by oxygen. Acid content in liquid smoke is also effective in shutting down and inhibit microbial growth in food products in a way that acidic compounds penetrate the cell wall of the microorganism that causes lysis of cells of microorganisms into later died. By decreasing the number of bacteria in food products, food damage by microorganisms can be inhibited thereby increasing the shelf life of food products.

The test results liquid smoke powder to the sauce can give effect to the flavor and shelf life as in Table 2. The addition of liquid smoke powder to give effect to the increase in shelf life as shown in Figure 1.

TABLE III
THE TEST RESULTS ON THE LIQUID SMOKE FLOUR SAUCE

No	Threatmen	Flavor	Shelf life
1	0 %	3,43	3 days
2	2 %	3,41	5 days
3	4 %	3,16	10 days
4	6 %	2,37	13 ays

The advantages of using liquid smoke according [6], among others, more intensive in the provision of flavors, flavor loss control more easily, can be applied to various types of foodstuffs, more efficient in the use of wood as a material smoke, environmental pollution can be minimized, and can be applied to the material in various ways such as spraying, dipping, or blended directly into the food. Besides other advantages obtained from liquid smoke, are as described below :

Product Safety Smoke. The use of liquid smoke are processed properly can eliminate harmful smoke components that form Polycyclic aromatic hydrocarbons (PAH). These components are not expected because some of them proved to be carcinogenic in high doses. Through controlled burning and processing techniques are getting better, tar and heavy oil fractions can be separated so that the resulting product smoke free approach PAH [7].

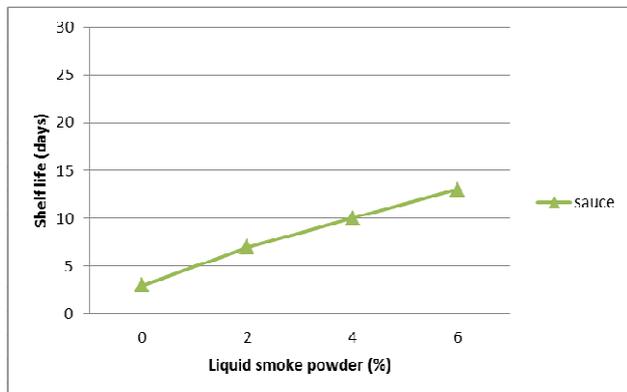


Fig. 1. Chart the effect of adding the liquid smoke powder to shelf life of sauces

Antioxidant activity. The presence of phenolic compounds in the liquid smoke gives the antioxidant properties of the oil fraction in the product smoke. Where the phenolic compounds can act as hydrogen donors and effective in very small quantities to inhibit fat auto oxidation [8]. Antibacterial activity. Bacteriostatic role of liquid smoke originally only due to the formaldehyde alone but the activity of these compounds alone is not enough as the cause of all the observed effects. The combination of functional components phenols and organic acids that work synergistically to prevent and control the growth of microbes [7]. The presence of phenol with high boiling point in the smoke is also a high antibacterial substances [8].

The potential for the formation of brown color. According [9] carbonyl having the greatest effect on the formation of brown color on the product being smoke. Carbonyl component types that were most responsible are aldehydes glyoxal and glyoxal metal while formaldehyde and hidroksiasetol provide a low role. Phenol also contribute to

the formation of brown color on the product being smoked although the intensity is not as big as carbonyl.

Ease of use and Variations. Liquid smoke can be used in liquid form, in a solvent phase of the oil, and the form of powder so as to allow the use of liquid smoke broader and easier for various products [7].

IV. CONCLUSIONS

Giving of liquid smoke powder which is acceptable respondent is at the level of 2%. The sauce shelf life testing conducted under open air and without special packaging. The sauce can last up to 5 days with a sense that they accepted without mushrooms grown. The adding liquid smoke powder give higher resulting flavor is too strong so that the respondent hasn't favored.

The advantages of using liquid smoke like more intensive in the provision of flavors, flavor loss control more easily, can be applied to various types of foodstuffs, more efficient in the use of wood as a material smoke, minimized environmental pollution and can be applied to the material in various ways such as spraying, dipping, or blended directly into the food.

REFERENCES

- [1] Girard, J.P. Smoking In Technology of Meat Products. Clermont Ferrand, Ellis Horwood, New York. 1992.
- [2] Guillen, Md dan M.I. Ibargoita. Relationship between the maximum temperature reached in the smoke generation process from Vitis vinifera L Shoot sawdust and composition of the aqueous smoke flavoring preparation obtained. *J. Agric. Food. Chem.* 44:1302-1307. 1996.
- [3] Daun, H. Interaction of Wood Smoke Components and Foods, *Food Technology.* (32): 66-71. 1979.
- [4] Darmadji, P. Optimization Process of Making Smoke Powder. *Agritech* 22 (4) : 172-177. 2002.
- [5] Helena, C.F., Carneiro, Renata V., Tonon, Carlos R.F., Grosso, Miriam, D., and Hubinger. Encapsulation Efficiency and Oxidative Stability of Flaxseed Oil microencapsulated by Spray Drying using Different Combinations of Wall materials. *J. of Food Eng.* 115 : 443-451. 2012.
- [6] Maga. Y.A. Smoke in Food Processing. CSRC Press. Inc. Boca Raton. Florida. : 1-3;113-138. 1987.
- [7] Pszczola, D.E. Tour Highlights Production and Users of Smoke Based Flavours. *Food Technology* (1)70-74. 1995.
- [8] Astuti. Utilization of Liquid Smoke. 2000. Retrieved from <http://alcoconut.multiply.com/journal>. Accessed Date 24 Agustus 2015.
- [9] Ruitter, A. Colour of Smoked Foods. *Food Technology*, 33:(5) 54-63. 1979.