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# Antimicrobial Activity of Microencapsulation Liquid Smoke on Tilapia [*Oreochromis niloticus* (Linnaeus, 1758)] Meat for Preservatives in Cold Storage (± 5 C°)

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**Abstract**

Tilapia [*Oreochromis niloticus* (Linnaeus, 1758)] is the fresh fish, it generally classified as perishable food.One way to avoid meat quality degradation are cold storage and the addition of bioactive compound in liquid smoke microcapsules. The purpose of this study was to find the effectiveness of adding liquid smoke microcapsulation ratio and to determine the ability of microencapsulated bioactive coconut shell compounds to maintain the tilapia meat quality during cold storage. The preliminary research, adding dextrin 3 % in smoke liquid coconut shell get total phenol 0,98% and pH content 4,83. The main research, it applies microencapsulated liquid smoke coconut shell on meat tilapia 0 % , 1 % , and 1.5 % during cold storage and phase 0 d, 3 d, 6 d, 9 d of observation. The test parameters were Total Volatile Base Nitogen (TVBN), Total Plate Count (TPC), pH and Sensory evaluation. The results of the first study were adding dextrin 3 % can assist in maintaining phenol content values on 0.98% and pH 4.83. In the second study, the parameters 9 d of observation showed TVBN concentration 0 % (37.787 mg · N · $g^{-1}$**)**, 1 % (33.410 mg. N· $g^{-1}$**)** and 1.5 % (31.070 mg. N· $g^{-1}$**)** , TPC parameter 0 % (7.717 log · CFU · $g^{-1}$), 1 % (6.390 log· CFU· $g^{-1}$), and 1.5 % (6.263 log · CFU · $g^{-1}$), pH concentration parameter 0 % (8.873), 1 % (8.383), and 1.5 % (8.140). Coconut shell smoke liquid microcapsulated is proven to reduce quality deterioration on fresh fish meat and can be developed as a preservative in food.


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*Keywords:* Antibacteria; dextrin; liquid smoke; microencapsulated; tilapia meat.

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## 1. Introduction

Tilapia [*Oreochromis niloticus* (Linnaeus, 1758)] is a commodity exports potential in Indonesia. Agency of Maritime and Fisheries Affairs East Java (2015) said that total national production tilapia in Indonesia is a 912 613 $t \cdot yr^{-1}$. Tilapia is a favorite fish among people because it has low economic value , a savory and having the chemical content of protein 43.76 % , fat 7.01 %, levels of ash 6.80 %, and water 4.28 % on 100 g meat (Leksono, 2001). One way to avoid quality deterioration of meat tilapia is saved in cold storage or gave a preservative meat fish.

The fish quality deterioration can be prevented by a natural preservative with bioactive which prevent the activity of perishable bacteria called psikrofil bacteria. A preservative natural has any bioactive which is coconut shell liquid smoke. Liquid smoke has any bioactive compound such as phenol, carbonyl and organic acid that serves as antibacterial which prevent the quality of fish (Saloko et al., 2014). The coconut shell liquid smoke bioactive apply to fresh produce which previously keep the bioactive compound with microencapsulation processing.

Microencapsulation is a process to change a liquid product to powder sized micro product. According to Supriyadi and Sakha (2013), microcapsules is a technique for protecting the core material (core) which was originally a liquid into a solid so it's easy handling and can protect the core material from losing flavor.. Deladino et al. (2008) said that encapsules is a process a thin layer, usually polymer applied to fluids particles. This method used to protect the active and control the condition of the compound missing.

## 2. Material and methods

### *2.1. Materials*

Coconut Liquid Smoke was produced by condensation machine in the laboratory of processing Faculty of Fisheries and Marine Science and white dextrin was distributed at industrial store in Semarang city. Tilapia used was obtain from fish market Kobong, Semarang city. Spray dryer for microencapsulated process at Bioproses laboratory, Chemical Enginering Gadjah Mada University, Yogyakarta, Indonesia

### *2.2. Preparation of microencapsulation process*

The microencpsulated making processing does some modification method from Saloko et al. (2014) microencapsules are started by mixing coconut shell liquid smoke with dextrin concentration 1 %, 2 %, and 3 % on 1 000 mL. To homogenized dextrin in liquid smoke, use the magnetic stirer at 200 rpm for 30 min (1 rpm = 1/60 Hz). Next to get solution supernatant pure centrifuge process at 3 000 rpm for 3 min (1 rpm = 1/60 Hz). To get solution pure using paper strain then use screening process. After getting supernatant are followed by heating supernatant with waterbath temperatures 50 °C for 15 min. The microencapsulation process with a spray dryer temperatures inlet 90 °C (± 4 °C), with the temperature outlet about 70 °C. Process of using spray dryer more or less took 45 $min \cdot L^{-1}$ to 50 $min \cdot L^{-1}$ sample. Then spray dryer would process micro powder size and stored in toples airtight and kept temperatures the freezer under 0 °C so as to maintain the quality of the microencapsulation.

### *2.3. Chemical analyses of microencapsules*

Some tests carried out to see the effectiveness of the ratio encapsulan added to maintain bioactive content on coconut shell liquid smoke microencapsulated is by testing total phenol and pH. Testing total phenol done by using the method Ali et al. (2014) as 1 mL liquid smoke weighed or 1 g liquid smoke nanocapsules or microcapsules diluted be 25 mL , taken 1 mL diluted longer be 10 mL ( factors dilution = 250×). Taken 2.5 mL diluted longer be 10 mL (factors dilution = 1 000×). The dilution 1mL into tube reaction then added $Na_2Co_3$ saturated and leave on 10 min at room temperature. Homogenized reagen folinciocalteau 1 mL and 7.5 mL aquadest, with vortex then incubation for 30 min at room temperature. These sample measured at wavelengths 770 nm. Phenol levels samples counted based on a curve standard obtained.