

## LOWERING THE SOLIDIFICATION POINT OF COCONUT OIL

by

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### ABSTRACT

The suitability of coconut oil as packing medium in fish canning depends upon its solidification point. As coconut oil has already a considerable amount of mono and diglycerides, the lowering of its solidification point can only be done by mixing with other kinds of vegetable oils.

These experiments were made to ascertain which oils are suitable. According to our data, rice bran oil will be the best, because a mixture of 10% can already drop the solidification point of coconut oil to 10°C, which is sufficient for Indonesia. Moreover this has high  $\alpha$ -tocopherol content.

### INTRODUCTION

Canning of fish in Indonesia needs oil, inexpensive oil with a good taste. Coconut oil is very suitable, but its solidification point is very high (22°C). In parts of the country, where the temperature may decrease by several degrees below 22°C, especially in the morning and evening hours, fish packed with coconut oil, will become solid and not attractive anymore when the cans are opened.

Though this difficulty can be eliminated by heating the whole can, this will disturb consumers sentiments. The popularity of the canned product will decrease considerably.

Since the solidification point of oils is not at a specific temperature, but is over a range of temperature, as a result of mixed fatty acids in different amounts and behavior, the solidification point may be considered as the temperature at which is reached an equilibrium between produced and lost heat. This point depends upon the crystallization and temperature in the solution.

In binary systems, the solidification will take place several degrees below the melting point, especially when these oils are mixed with other kinds of oils.

### MATERIALS AND METHODS

The equipment used for measuring the solidification point, consists of a glass container with cover, thermometer and electric stirrer.

This container is filled with oil to be measured, and placed in a metal box. Between box and container is a thick layer of heat insulating material.

As refrigeration agent dry ice is used. During the observations the oil is mixed continuously.

The beginning of cloudiness is taken as endpoint. Though this point is not exactly the solidification point, we may assume that oil in this condition is no more suitable for canning purposes. Cloudiness occurs when crystals begin to form, and separate from the solvent.

Coconut oil is mixed with glycerin, rice bran oil, soyabean oil, arachis oil, cottonseed oil and corn oil, which have a very much lower solidification point than coconut oil. All these oils are purified and freed from free fatty acids, but they are not winterized.

Glycerin shows a positive lowering and also cottonseed oil, though the latter cannot reach the zero point.

Soyabean oil, rice bran oil and corn oil have shown about the same effect, they are able to drop down the solidification point to 15°C, with an amount varying from 10% - 50%.

Peanut oil cannot make the solidification point lower than 5°C. Both glycerin and peanut oil make the mixture viscous. This viscosity will not be popular. Moreover, glycerin gives to the coconut oil a strange sweet taste.

Cottonseed oil and peanut oil do not affect the taste of coconut oil.

Rice bran oil gives a bran taste and odor, but has  $\alpha$ -tocopherol as antioxidant. With soyabean oil, rice bran oil has the advantage of lowering the solidification point of coconut oil

down to 10°C even with 10% mixture. This situation maintains till a mixture of 50:50.

We may conclude that rice bran oil will give the best result not only according to its content of tocopherols, but also seen from an economical standpoint.

Data of this experiment are shown below :

%	The beginning of cloudiness in coconut oil when mixed with :					
	glycerin	cotton seed oil	peanut oil	soybean oil	rice bran oil	corn oil
100	22°C	22°C	22°C	22°C	22°C	22°C
90	20°C	20°C	19°C	15°C	10°C	16°C
80	17°C	19°C	16°C	15°C	10°C	15°C
70	15°C	18°C	13°C	15°C	10°C	15°C
60	12°C	17°C	11°C	15°C	10°C	15°C
50	10°C	15°C	9°C	15°C	9°C	15°C
40	7°C	13°C	7°C	10°C	7°C	13°C
30	3°C	10°C	6°C	5°C	5°C	8°C
20	- 3°C	7°C	5°C	1°C	0°C	1°C
10	- 10°C	4°C	5°C	- 7°C	- 4°C	- 8°C
0	- 20°C	0°C	5°C	- 9°C	- 6°C	- 12°C

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