

The_Cavitation_With_Plate_Transducer_And.pdf

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The Cavitation (With Plate Transducer) And Non Cavitation (With Knob Transducer) By Manihot Utilissima Fermentation [The Potential Hydrogen (Ph) Method]

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Abstract: Manihot (*M.*) *utilissima* fermentation is popular foods and drinks for Indonesia people, but it fermented foods 24 hours per day will breed fungi and anaerobic bacteriae, so it will make it into acidic foods and alcoholic beverages. Ultrasonic 48 kHz, 5 Vpp, 1 VDC with functional generator and of the two models of transducers, will have two different phenomena on *M. utilissima* fermentation. Methods: Model-1. Radiation ultrasonic transducer plate or Flat of piezoelectric speakers^[2] were applied with transducers *M. utilissima* dipped in a test tube. Model-2. Knob or small ball ultrasonic transducer (12 balls) were applied with transducers of tin knob which was connected to the copper wire^[2] and piezoelectricspeakers were dipped into the media *M. utilissima* in a test tube. After ultrasonic radiation, fluid (liquid) from two models of transducers measured total acid in *M. utilissima* fermentation liquid by paper indicators of potential Hydrogen (pH). The conclusion of this study can predict different phenomena, namely: the transducer plate of the initial pH value-acid fermentation *M. utilissima* can change increases the pH-value end of the base, which means that the transducer plate has a cavitation phenomenon, and media *M. utilissima* lead to the delicious food, but on transducer knob that the initial pH value-acid fermentation *M. utilissima* will decrease more acid value, so that have no phenomenon of cavitation, and the media will lead *M. utilissima* to be alcoholic foods.

Keyword: Ultrasonic, Cavitation, no Cavitation, Manihot *utilissima* Fermentation.

1. Introduction

M. utilissima (cassava) fermentation in three-day anaerobic (called "Tape" or "es Tape" in Indonesia) is first processing with microbiology: fungi / yeast (*Saccharomyces cerevisiae*, *Aspergillus sp*), whom the *M. utilissima* is good food to eat, but after that bacteria will breed in its colony (*Pediococcus sp*, *Basillus sp*), whom the *M. utilissima (cassava)* is no good food because that is alcoholic water for beverages^[4]. Exposure ultrasonic with metal implant material^[1] is good idea to make two models transducers ultrasonic. Exposure in 48 kHz, 5 Vpp, 1 VDC by the function generator is fix resources^[2] energi radiation in all fluids. The two models of transducers, ie: Model-1 Plate transducer and model-2 Knob transducers (12 balls)^[2] This in vitro research is to observe pH value in *M. utilissima* fermentation fluid, ultrasonic exposure with

two models transducers, no exposure and that had the criteria: *M. utilissima* fermented foods has 1. Different pH value 24 hours per day, 2. Breed fungi and anaerobic bacteria, 3. Ultrasonic transducer (by plate) to be inside *M. utilissima* fermentation fluid. 4. immersed Ultrasonic transducer (by knobs) for *M. utilissima* fermentation fluid. 5. Using tube reaction, functional generator, and pH indicator papers. 6. Biosafety and biosecurity in laboratory with a modified aquarium.

2. Material s and methods

M. utilissima

M. utilissima (cassava) yeast and bacteria are material of *M. utilissima* fermentation in natural anaerobic container, that interaction between yeast (%) and fermentation time are 0,5 % : 36 hours^[4] and more, this is good fermentation, good food to eat and pH value = 5 – 5,5. After hours *M. utilissima (cassava)* have interaction between fermentation time and bacteria anaerobic to produces alcoholic and total acid.

Natural Anaerobic Container

Natural anaerobic container was wrapped in banana leaf or bamboo traditional weaving.

Model of Transducer

Plate transducer was modified with speaker of piezoelectric that newly purchased and was destroyed shell so stay condenser piezoelectric \emptyset condenser = 1,0 cm, thick condenser = 0,04 cm, \emptyset plastic holder condenser modify till = 1,2 cm^[2]. Knob transducer is small ball, smooth and making from tin, diameter less than 3 mm

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and over 2 mm and no painted. The knob connected to plate condenser piezoelectric with copper wire holding [2].

Phenomena Exposure Ultrasonic

Linier exposure

Phenomena ultrasonic model-1 is linier exposure, and ultrasonic wave theory identical the electromagnetic wave theory or light phenomena celebrated by Huygens about front wave of ultrasonic. In the plate transducer had convex front wave of ultrasonic. Vibrated ultrasonic can produce cavitation and same oxygen (liquid *M. utilisissima* fermentation).

Radiation exposure

Phenomena ultrasonic model-2 is radiation exposure, not like Huygens phenomena theory, but this is a natural wave phenomena. This is new phenomena to develop bacteria colony, and prediction no cavitation.

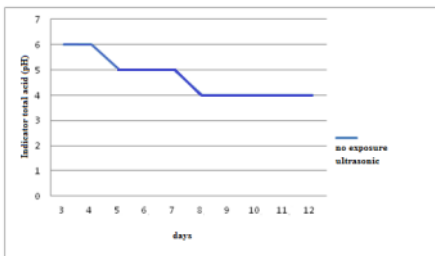
pH indicator

The measure total acid *M. utilisissima* fermentation liquid in test tube by indicators pH is detecting developing bacteria anaerob before and after expose of ultrasonic between model-1 and model-2.

3. Results

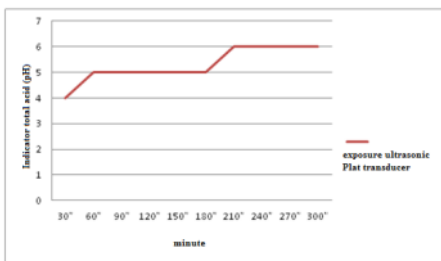
The result of pH *M. utilisissima* (*cassava*) fermentation per experiment is relating between pH value and fermentation time:

- The fermentation *M. utilisissima* (*cassava*) without ultrasonic (per day)



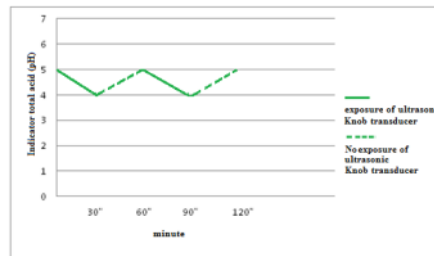
Picture-1: Graphic pH value in *M. utilisissima* fermentation without ultrasonic exposure

- M. utilisissima* fermentation with continue ultrasonic exposure with Plate Transducer (model-1).



Picture-2: Graphic pH value in *M. utilisissima* fermentation with ultrasonic exposure by Plate transducer

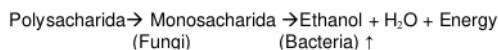
- M. utilisissima* fermentation with periodic ultrasonic exposure with Knob Transducer (model-2).



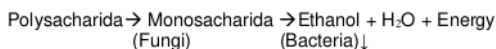
Picture-3: Graphic pH value in *M. utilisissima* fermentation without ultrasonic exposure

4. Discussion

M. utilisissima, yeast and bacteria make new phenomena about cavitation in media of *M. utilisissima* fermentation in natural anaerobic container. The different result of knob transducer and plate transducer, by plate transducer lead to increasing pH value (in continue ultrasonic exposure) and knob transducer lead to decreasing pH value (in periodic ultrasonic exposure). The high rate of pH value is caused by plate transducer (Picture-2); reveals the presence of cavitation (or oxygen bubbles [5]) in *M. utilisissima* fermentation and bacteria anaerobic dying. Knob transducer (Picture-3) periodically exposure *M. utilisissima* in 30 minutes cause pH value decrease (5 to 4), no cavitation, and colony of bacteria broken from large colony to small colony because of particles crash. In the next treatment it doesn't expose for 30 minutes it cause increasing pH (4 back to 5). This phenomenon is adaptation phase to develop bacteria colony before exponential phase [8]. In normal process of *M. utilisissima* fermentation occurs normal bacteria growth:



In *M. utilisissima* fermentation process by Ultrasonic with plate transducer occurs negative bacteria growth:



In *M. utilisissima* fermentation process by Ultrasonic with knob transducer occurs very positive bacteria growth:



5. Conclusion

Conclusion in this research are:

- The effect of plate transducer and knob transducer is different

2. The acid *M. Utilissima* can be consumed for longer period after ultrasonic exposure with plate transducer.
3. The colony bacteria can be multiplication growth by ultrasonic with knob transducer.
4. Knob transducer has no effect cavitation exposure, but in exposure with plate transducer has effect cavitation.

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