

ENZYMATIC HYDROLYSIS OF MACKEREL



✦✦ MACKEREL DREAM TEAM ✦✦

🐟ESTE 🐟SHUMA 🐟YUSA

🐟MOE 🐟SHUNJI

Outline



Background



Materials / methods



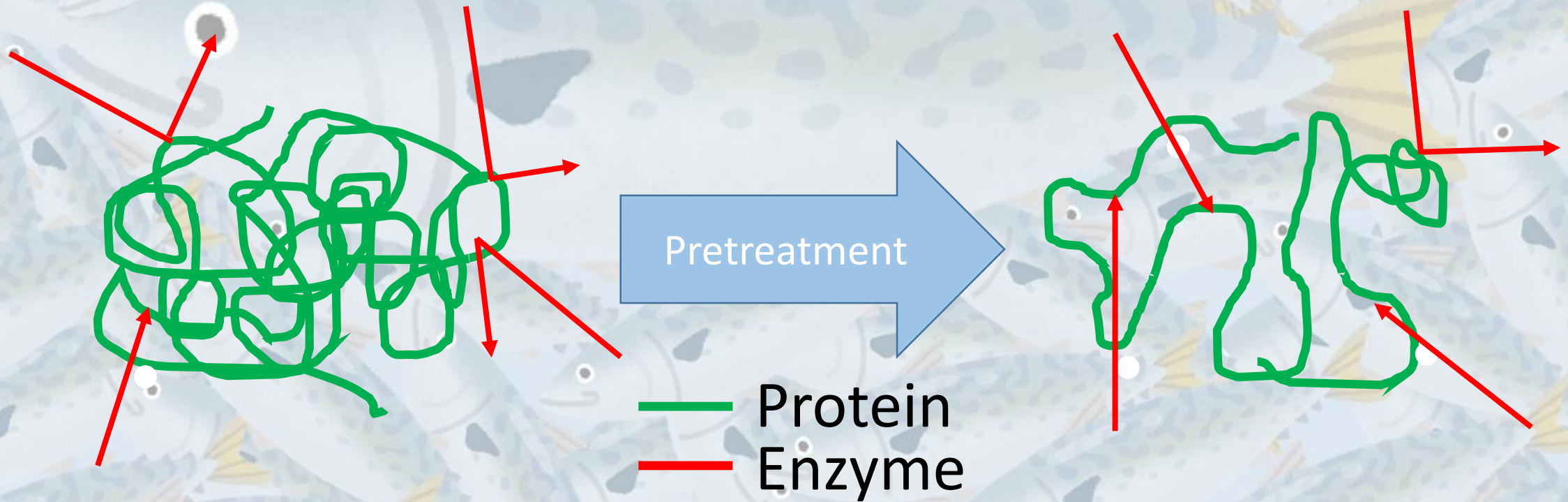
Results / discussion



Conclusions

Background

Why have we investigated the potential of innovative technologies to enhance the enzymatic hydrolysis of mackerel?



Background

Why have we investigated the potential of innovative technologies to enhance the enzymatic hydrolysis of mackerel?

1. Increased cost/efficiency in Food Industry

- Time (More quickly)
- Money (Low cost)
- Added Value (Human nutrition)

Background

Why have we investigated the potential of innovative technologies to enhance the enzymatic hydrolysis of mackerel?

2. Enhanced products

- Physiochemical property
- Nutritional value
- Reduce allergenicity
- Less bitter-taste

Methods

Pretreatment
(HPP & Microwave)

Enzymatic hydrolysis

Enzyme inactivation

Phase separation

High Pressure Pretreatment

- 600 MPa, 15 min

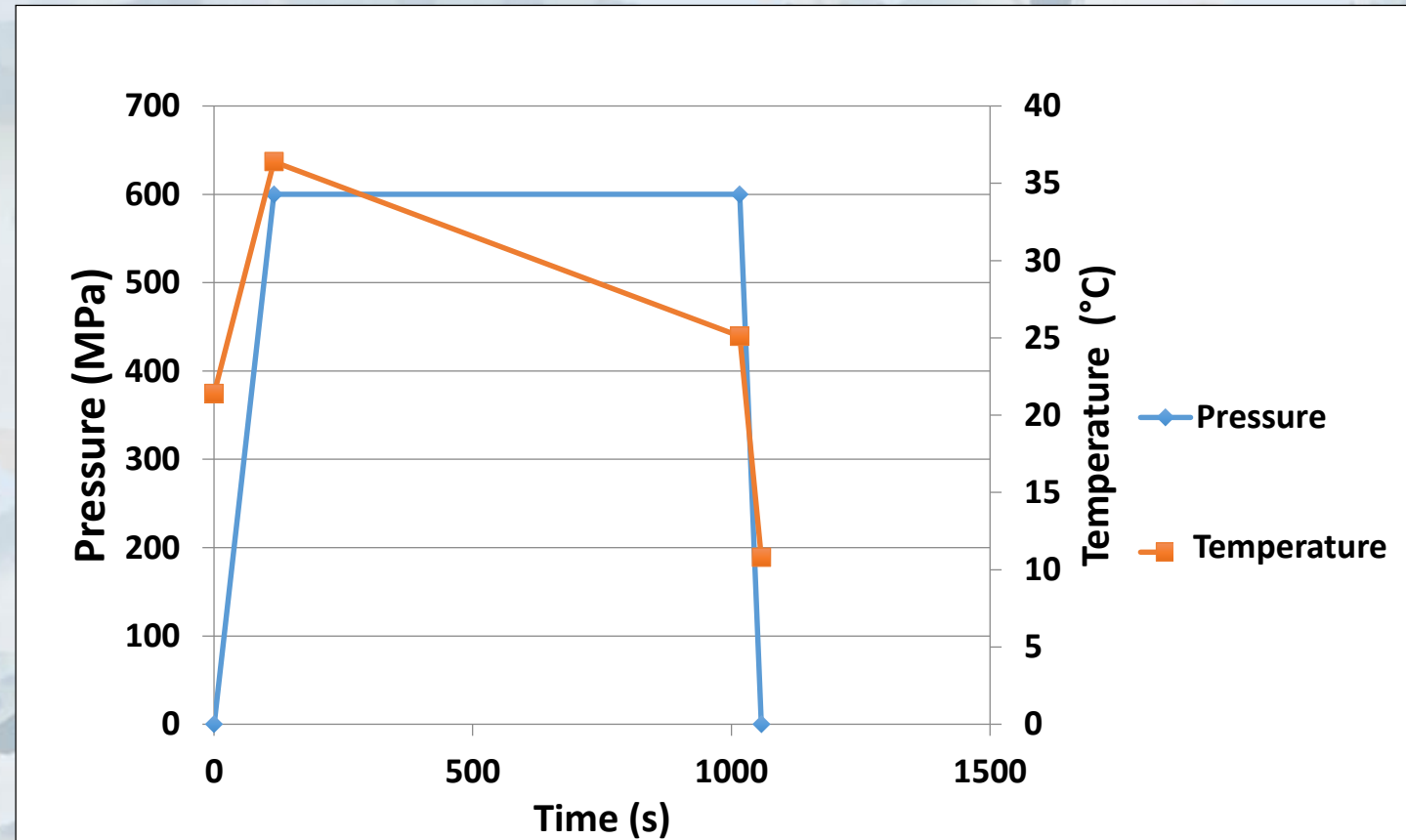


Fig1: Pressure-Temperature profile

Methods

Pretreatment
(HPP & Microwave)

Enzymatic hydrolysis

Enzyme inactivation

Phase separation

Control for HPP

- 13-14 °C, 18 min

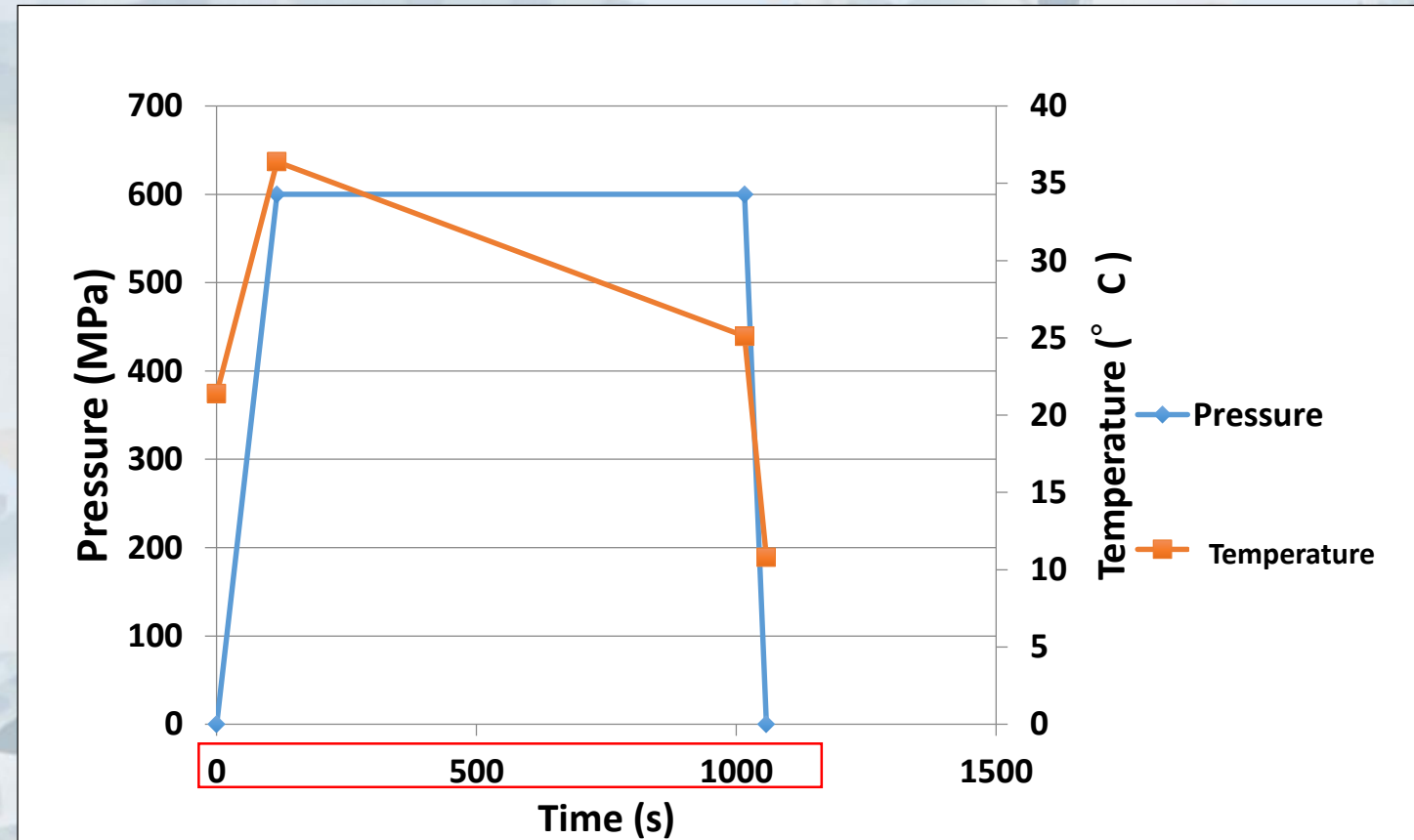


Fig1: Pressure-Temperature profile

Methods

Pretreatment
(HPP & Microwave)

Enzymatic hydrolysis

Enzyme inactivation

Phase separation

Microwave

- 3000 W
- 60 °C, 10 min

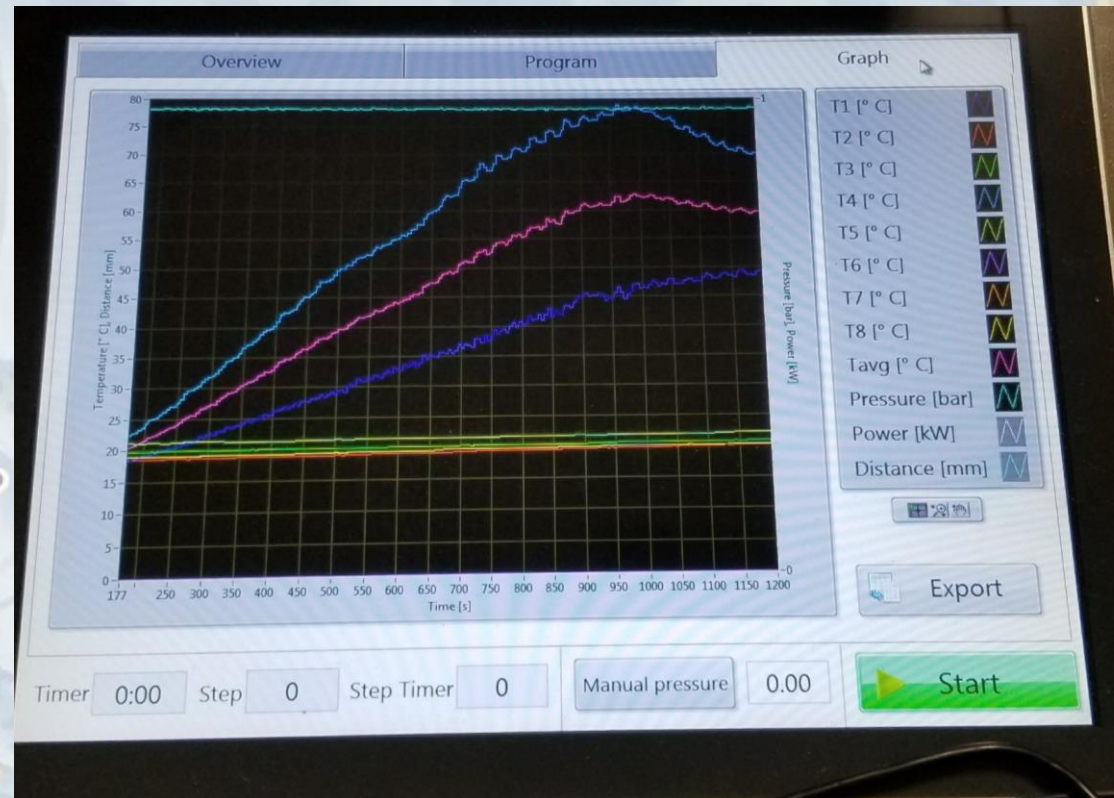
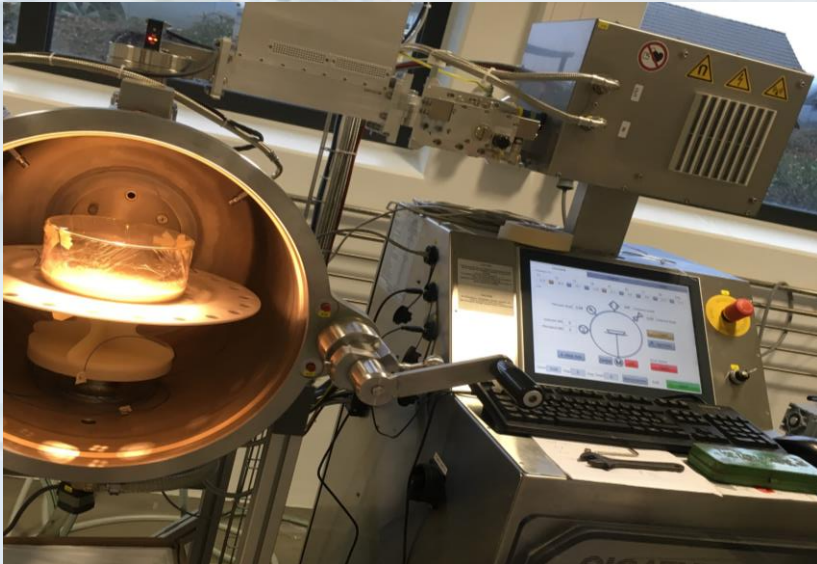


Fig2: Temperature profile

3 min
+
10 min



15 min
+
10 min

Methods

Pretreatment
(HPP & Microwave)

Enzymatic hydrolysis

Enzyme inactivation

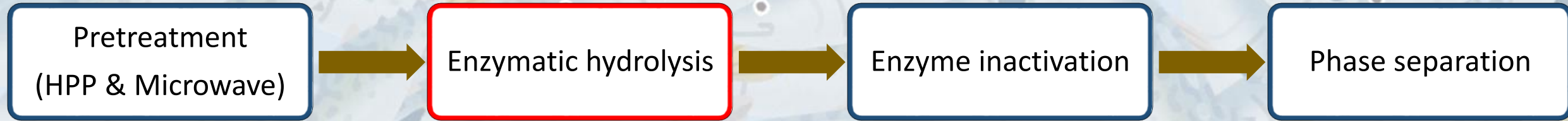
Phase separation

- 200 g pretreated mackerel
- 200 mL tap water



- 2 g of enzyme

Methods



Enzyme “alcalase”

→ multi-enzyme commercial preparation

Slurry

(water + pretreated mackerel)



Orbital Shaker



At 200 rpm, 50 °C for 1 h

Methods

Pretreatment
(HPP & Microwave)

Enzymatic hydrolysis

Enzyme inactivation

Phase separation

Microwave



800 W, 4 min, 95 °C

Water bath



95 °C , 15 min

Methods

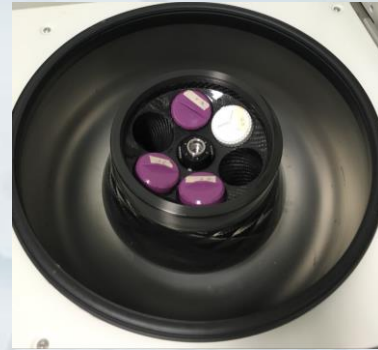
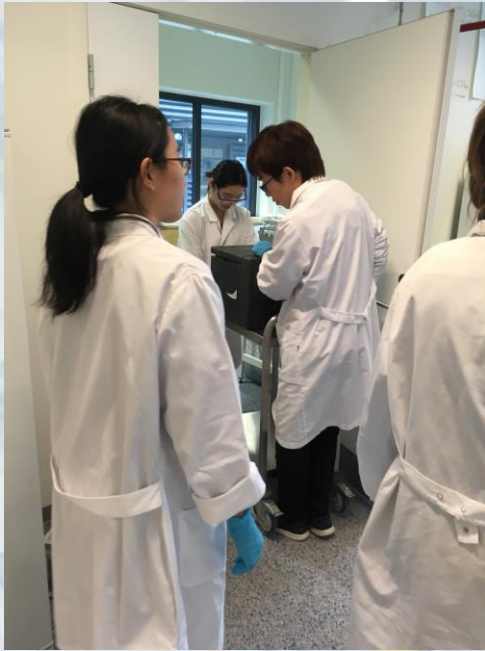
Pretreatment
(HPP & Microwave)

Enzymatic hydrolysis

Enzyme inactivation

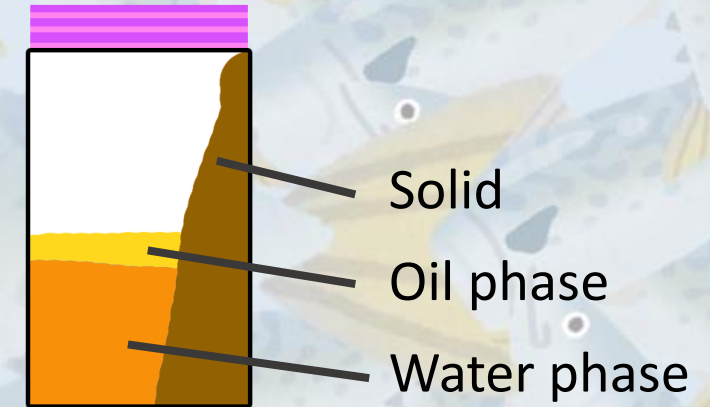
Separation

Centrifugation



- HPP test :
5,000rpm / 10min / 4°C
- MW test :
7,000rpm / 15min / 4°C

Separation



Methods

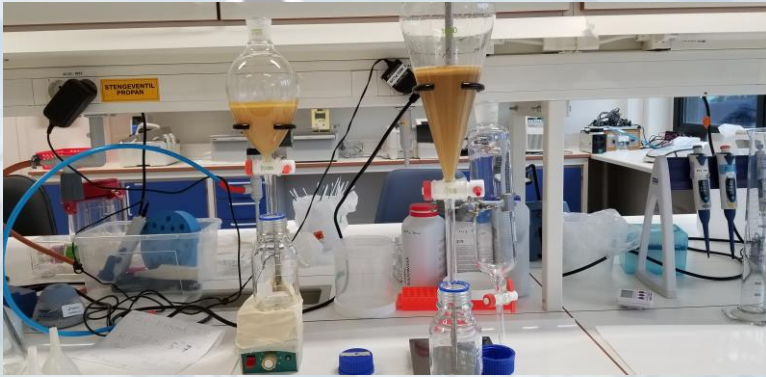
Pretreatment
(HPP & Microwave)

Enzymatic hydrolysis

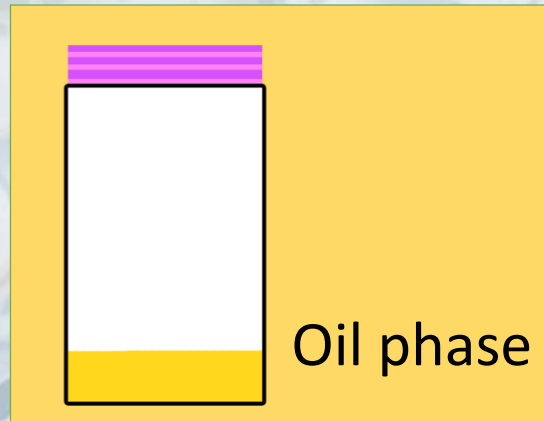
Enzyme inactivation

Separation

Separation funnel

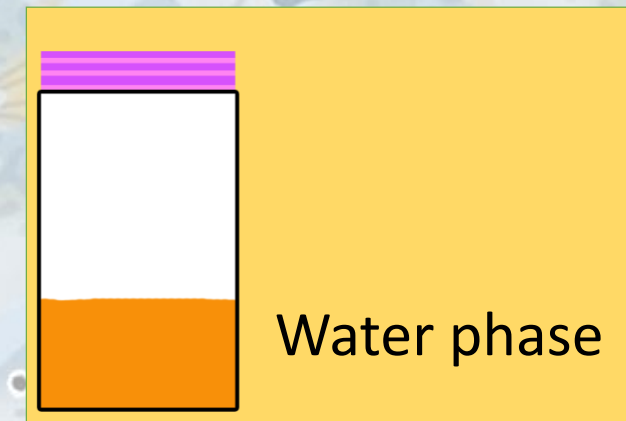
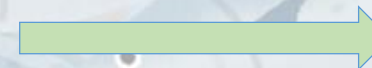


Buchner funnel



Water phase
+ Small particles
+ Oil

filtration



Results / discussion

Table : The weight of each sections (g)

	HPP	HPP cont	MW	MW cont
Solid	159.65	82.11	96.98	99.18
Water Phase	167.96	215.68	200.46	205.73
oil phase	20.26	11.91	12.43	31.15

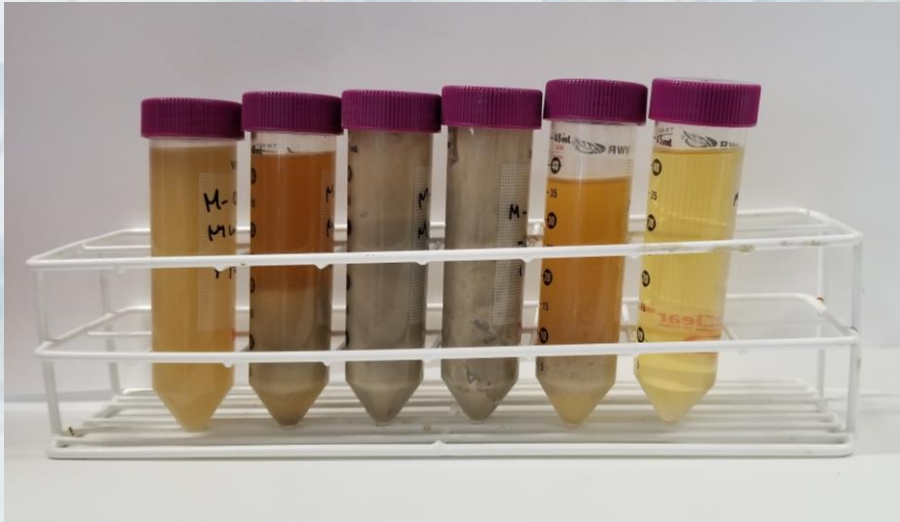


Figure : MW, water phase / oil phase / Solid / Cont Solid /Cont water phase / Cont oil phase

Result を書く

- **What could be improved?**

- 1) Microwave with shaking
- 2) Check the microwave
(regular microwave: 800 W for 4 min to reach 95 °C,
industrial microwave: 3000W for 15 min to reach 60 °C)
- 3) Optimization
- 4) More controlled system for hydrolysis

What did we learn from our team leader Este-San?



- ❖ How to work efficiently
- ❖ To pursue your interest
- ❖ Wider possibilities for future

Conclusions

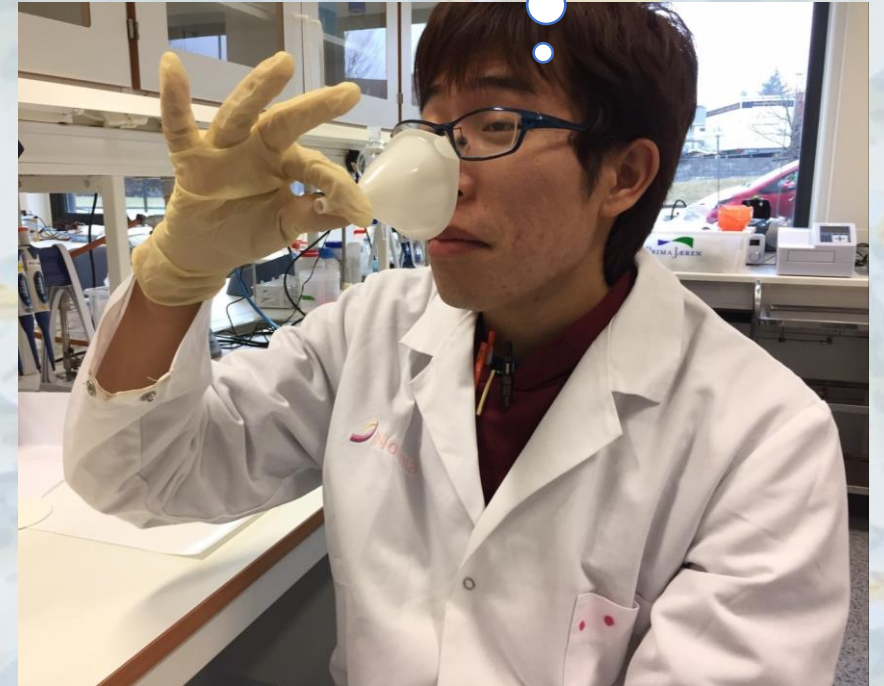
The most important part of working in lab is...



AGHH too
many
mackerels :'(

WASHING!!

Are there less
than 0.3
mackerels??





Gracias por
su atención!!