

Developing biodegradable plastics with gelatin

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Motive and objective

- Current situation
- plastic pollution in the ocean
 - biodegradability in the ocean Δ



Developing plastics which are biodegradable in the ocean

Δ : most biodegradable plastics are not biodegradable in the ocean.

Motive and objective

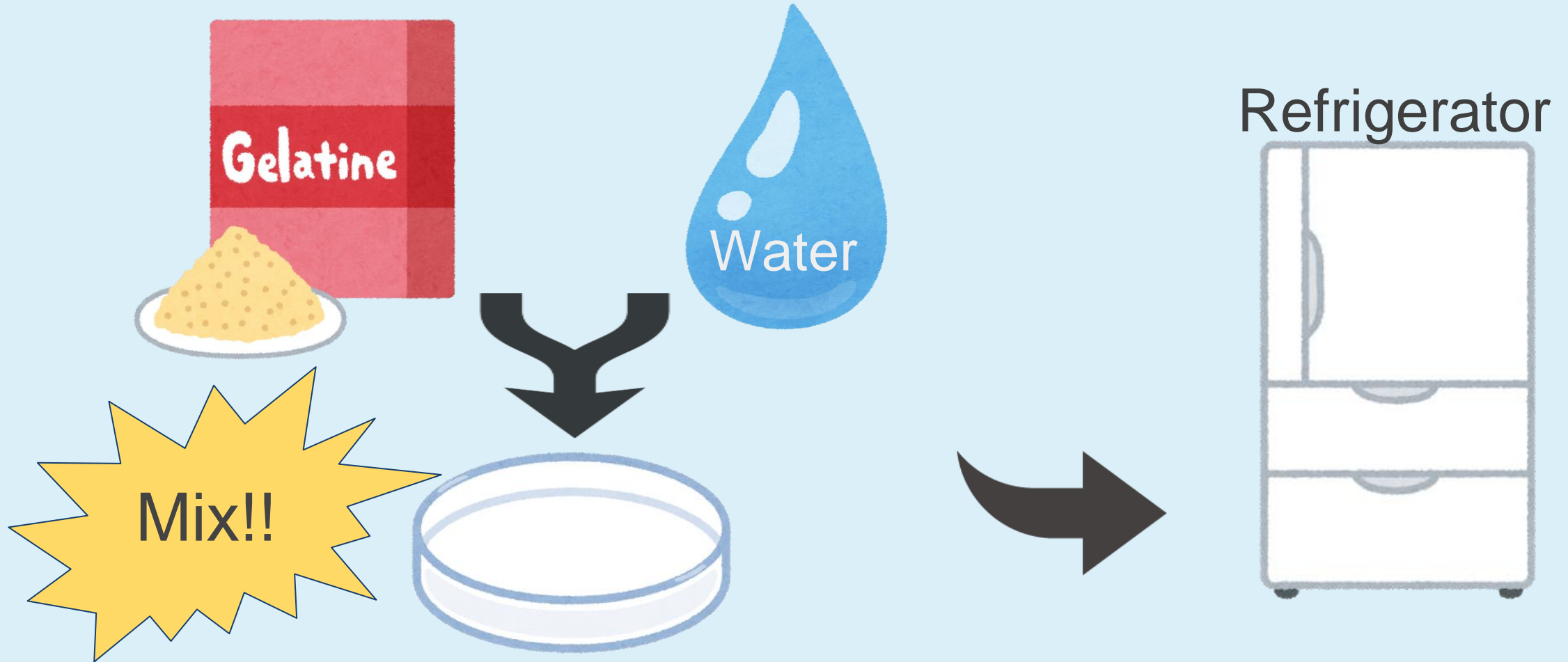
gelatin



- edible
- familiar
- made from plants and animals



How to make gelatin plastics



Pretest

Objective

To make plastics with added substances

Method

Add substances to beakers named A, B, C, and D.

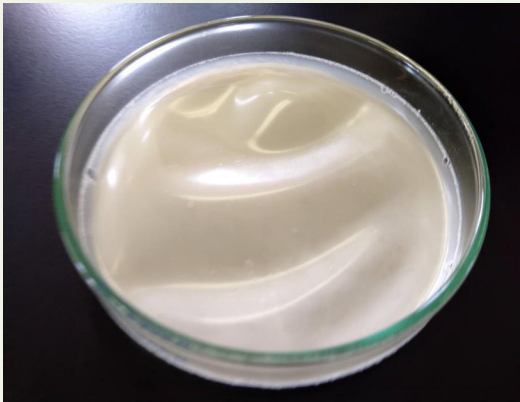
Pretest

- A: 5.0 g gelatin + 50 g distilled water
+ 1.2 g calcium carbonate
- B: 5.0 g gelatin + 50 g distilled water
+ 1.2 g calcium acetate
- C: 5.0 g gelatin + 50 g distilled water
+ 1.2 g calcium chloride
- D: 5.0 g gelatin + 50 g distilled water
+ 1.2 g glycerin

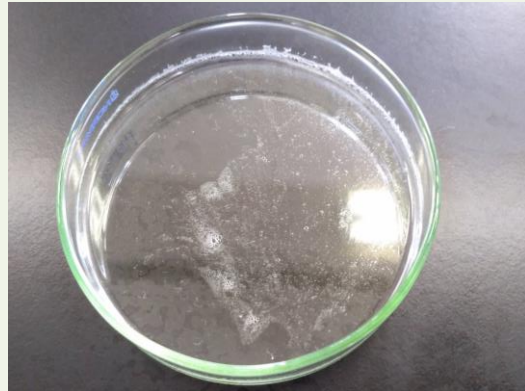
Pretest

Results

A:
(calcium carbonate)



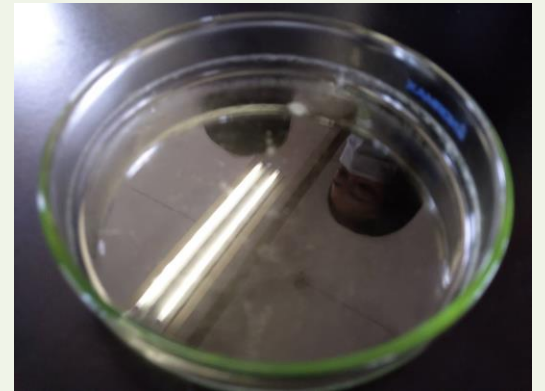
B:
(calcium acetate)



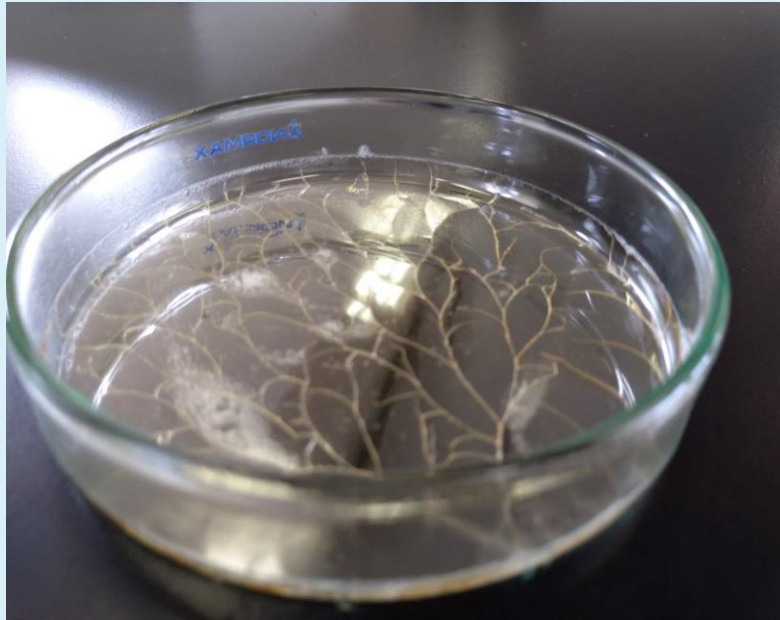
C:
(calcium chloride)



D:
(glycerin)



Pretest



Only gelatin

Difficult to
remove

Easy to remove



Gelatin
+ calcium carbonate

Hypotheses

The durability of gelatin plastics can be improved by adding calcium carbonate.

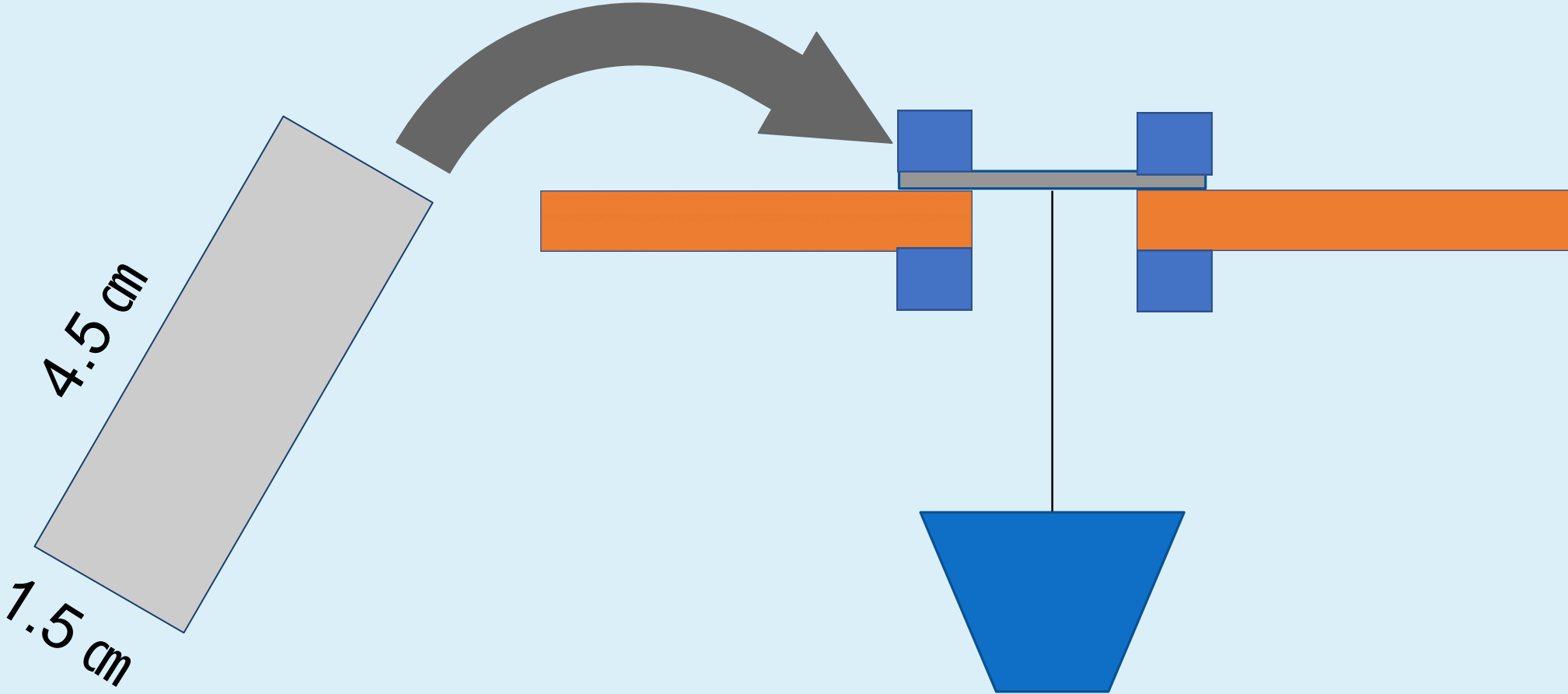
Gelatin plastics are biodegradable.

Durability

Objective

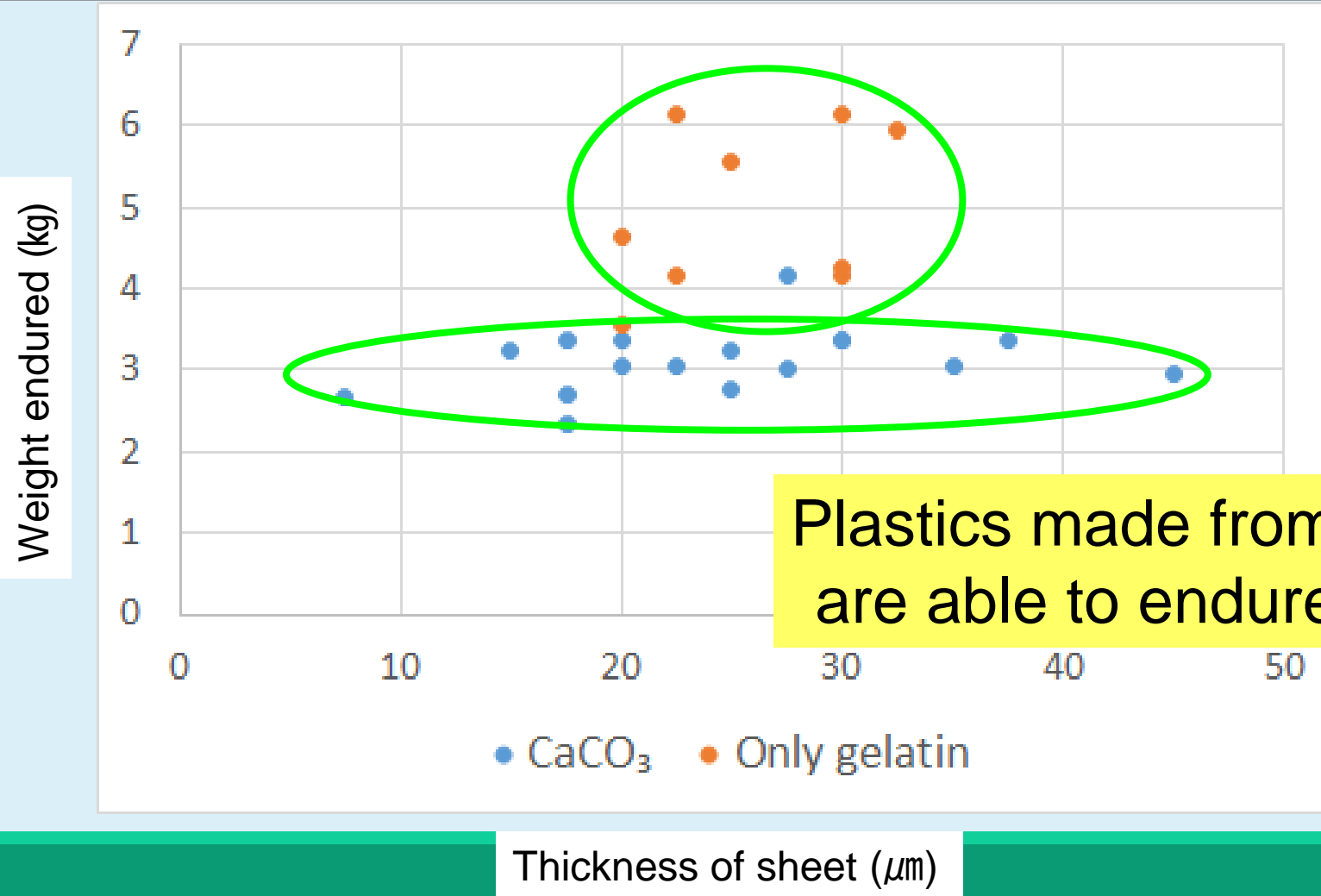
To investigate the durability of calcium carbonate gelatin plastic

Durability



Durability

Result



Durability

**Calcium carbonate gelatin plastic
⇒ Durability is reduced.**

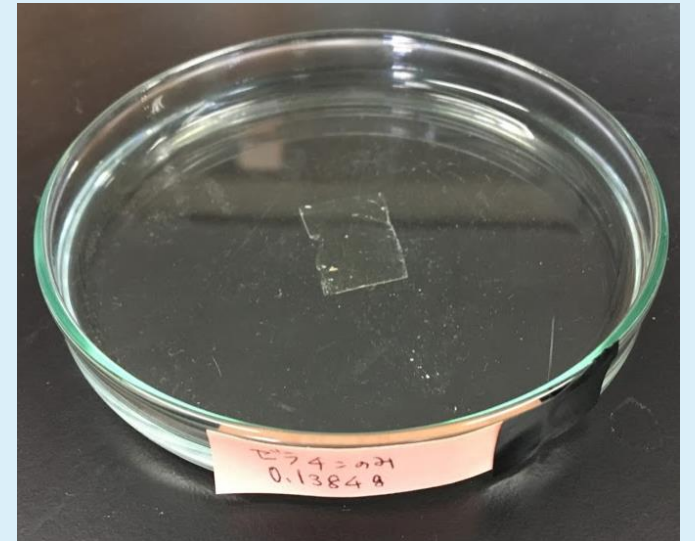
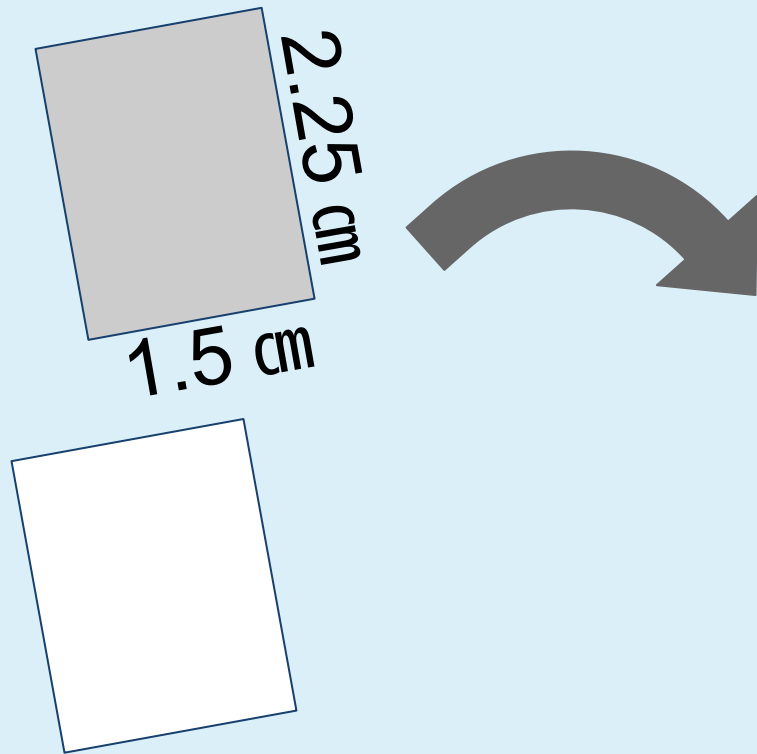
Biodegradability

Objective

**To investigate
whether the plastics are
biodegradable**

Biodegradability

How

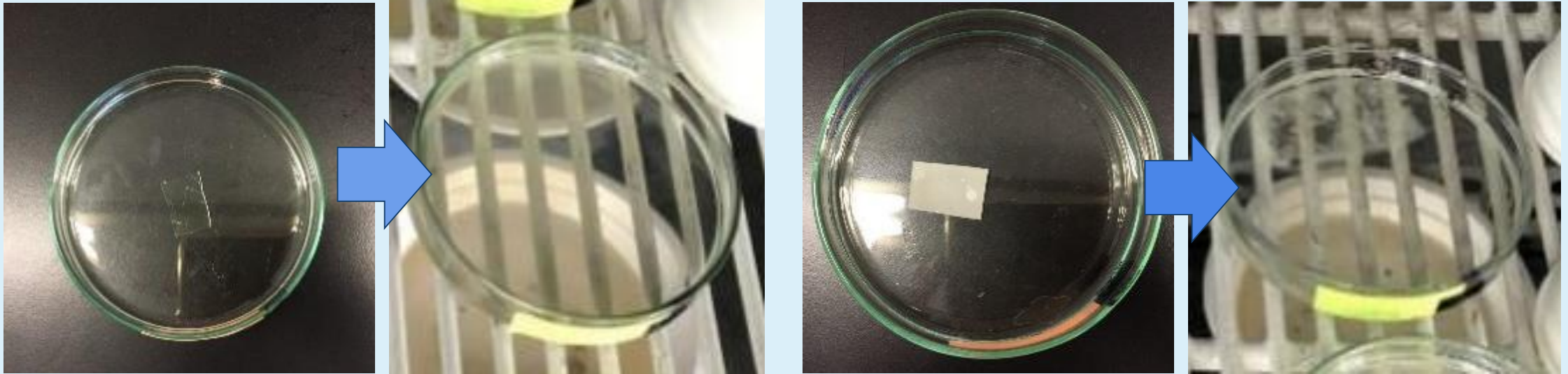


Biodegradability



Biodegradability

Results in sea water

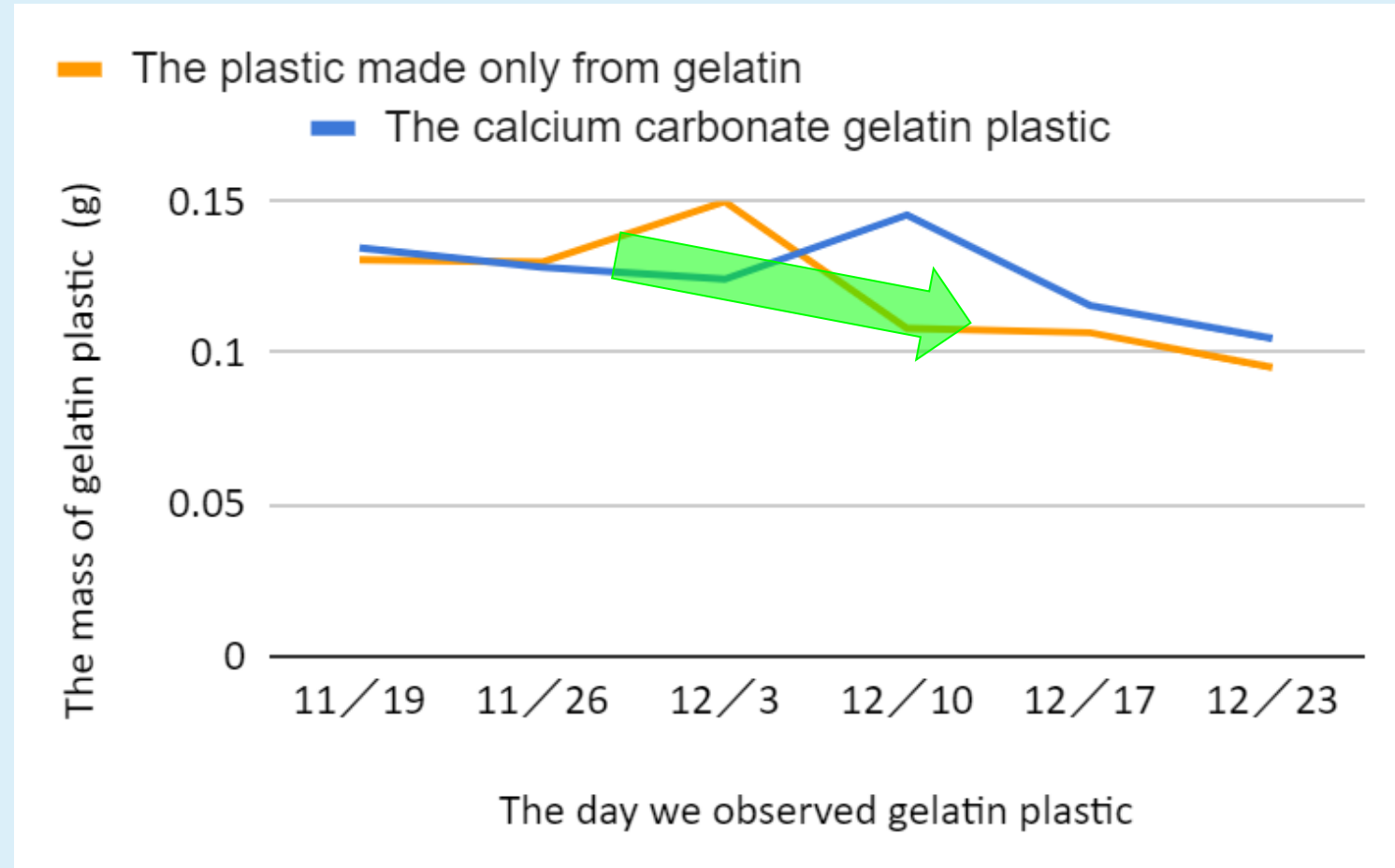


Only gelatin

Gelatin + calcium carbonate

Biodegradability

Results in soil



Biodegradability

In sea water
⇒ **Not sure yet...**

In soil
⇒ **Biodegradable!!**

Summary

We succeeded in making gelatin plastics.

When we mix calcium carbonate...

It can be made easily.

 **Durability is reduced.**

Future ideas

To think about the practicality of plastics we made

To study whether plastics have the ability to biodegrade or dissolve

Future ideas

To experiment using gelatin extracted from fish bones



References

- 1) Tomoaki Nakatsuka, Hotaka Hara, Yuji Harada, Miki Bito: Development of materials made from agar, Kakogawa Higashi High School, 2018 (in Japanese)
- 2) Tomohiro Aramoto, Ryusei Korai, Yuichi Takeuchi, Nagisa Mifune, Kenta Morinaga: Development of new materials using agar, Kakogawa Higashi High School, 2019 (in Japanese)
- 3) Nagano Prefectural Food Industry Research Institute Research Report: Characteristics of edible film consisting of agar and gelatin, 28 p61-64, 2000 (in Japanese)

Thank you for listening!

