

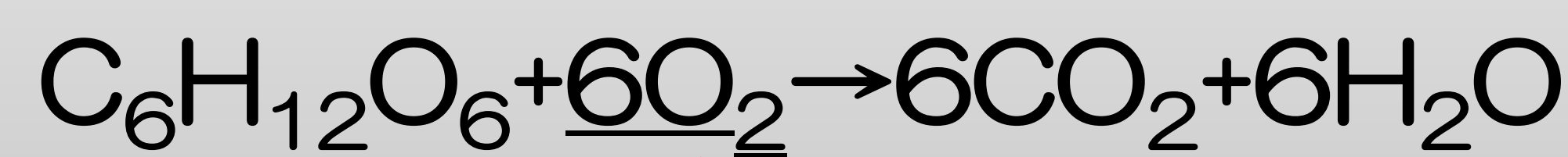
# Producing Alcohol from Grape Juice by Using Yeast

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## INTRODUCTION

Yeast cells are useful in people's lives.

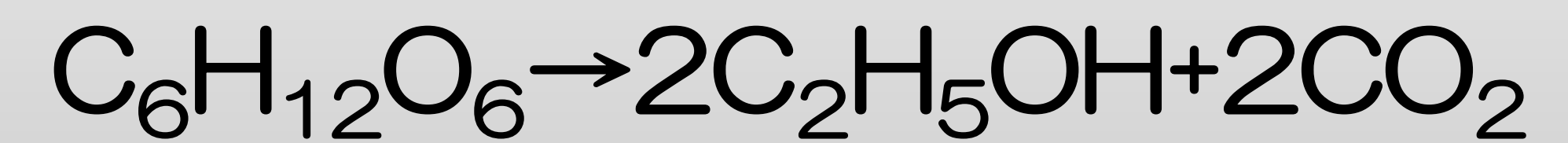
- Respiratory reaction  
The reaction when breads are made by using yeast.



**Aerobic condition**



- Alcohol fermentation  
The reaction when wine is made.



**Anaerobic condition**



## Tasks

- **Can we make alcohol by using yeast?**
- Separating yeast cells from wine.
- Checking the production of carbon dioxide.
- Confirmation of production of alcohol.

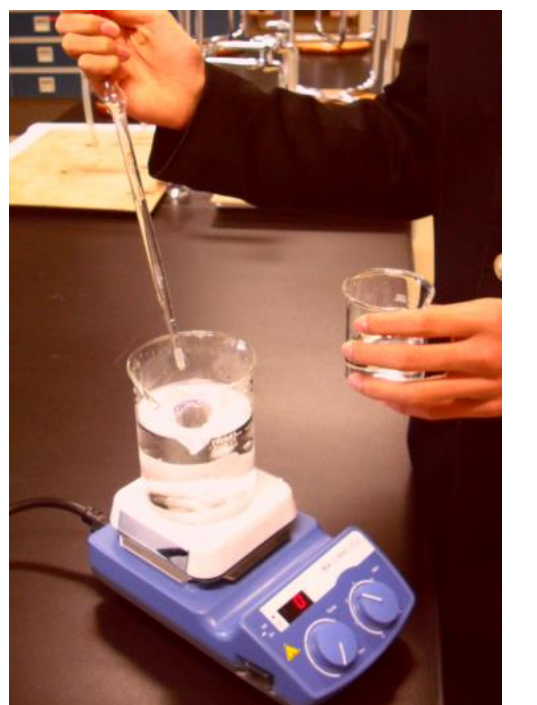
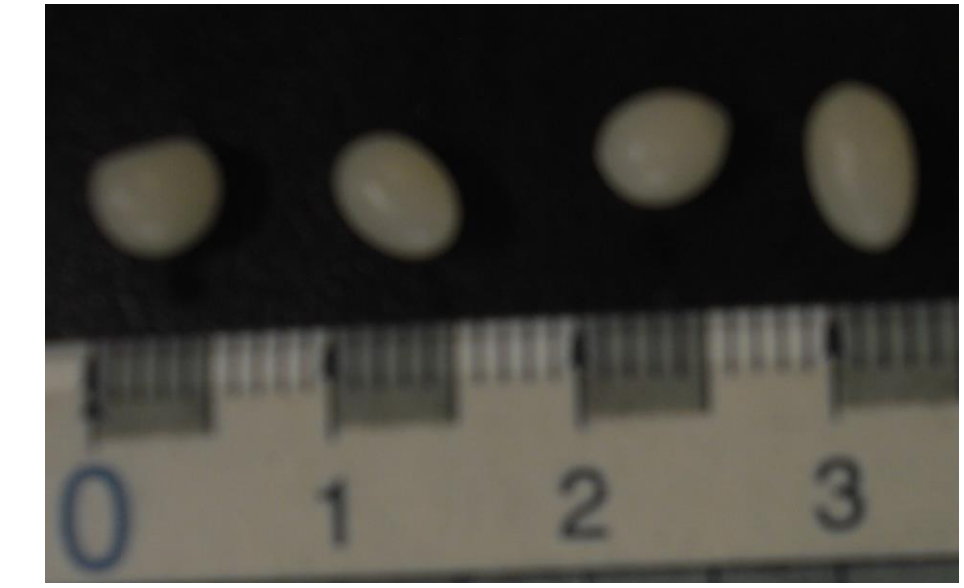
- using "bioreactors" (like artificial salmon roe)
- judging from the color of lime water.
- confirmation by distillation.

## Method 1 Making "bioreactors"

- 1) Put dried yeast into sodium alginate solution (solution A).
- 2) Pour solution A into calcium chloride solution one drop at a time.
- 3) Solid "bioreactors" form (~5mm in diameter)

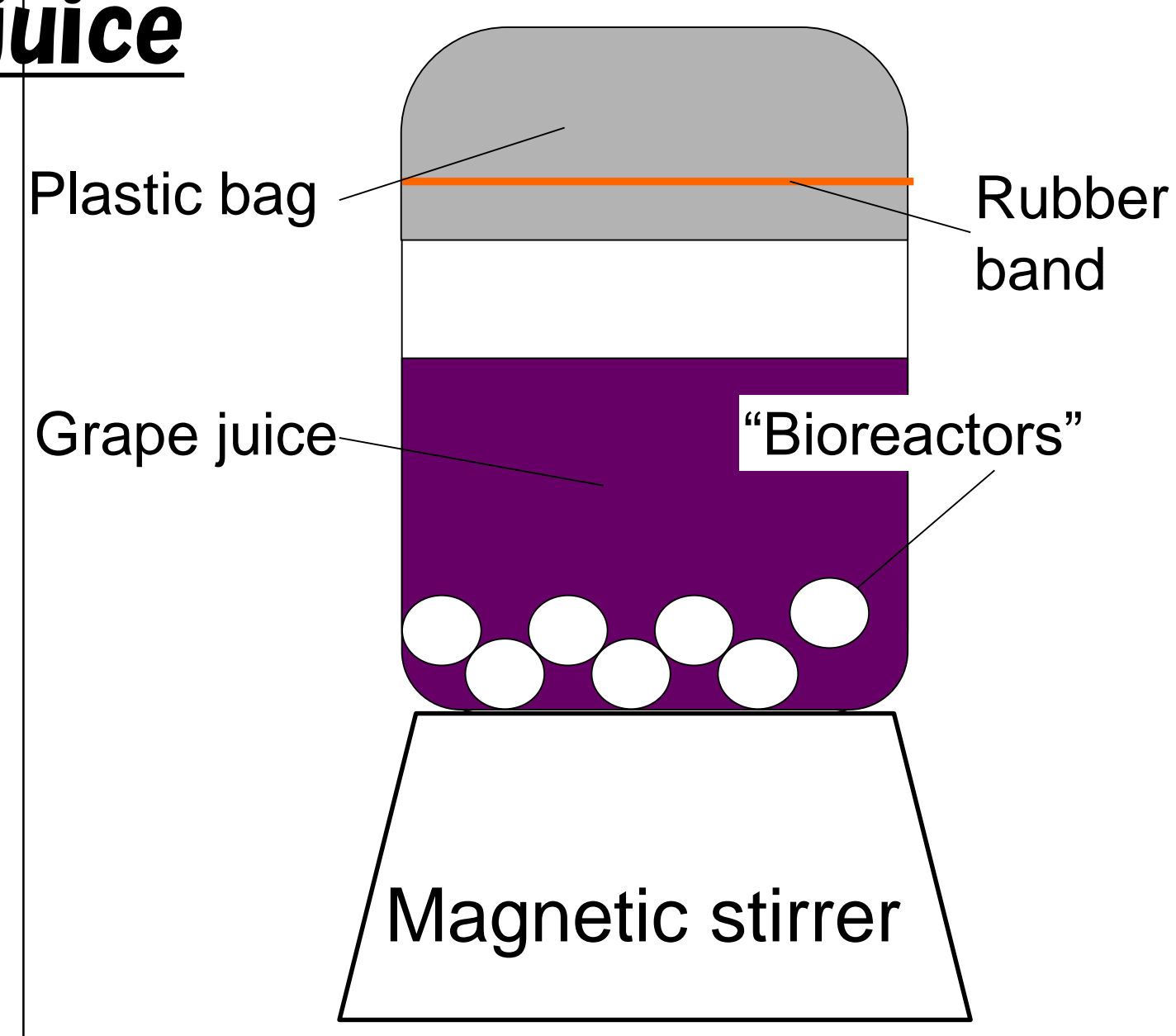
## Result of Method 1 Making "bioreactors"

- "bioreactors" that have a diameter of around five millimeters.



## Method 2 Fermenting grape juice

- 1) Put the "bioreactors" into grape juice.
- 2) Cover beaker with plastic bag.
- 3) Put the beaker with grape juice stirred by magnetic stirrer.



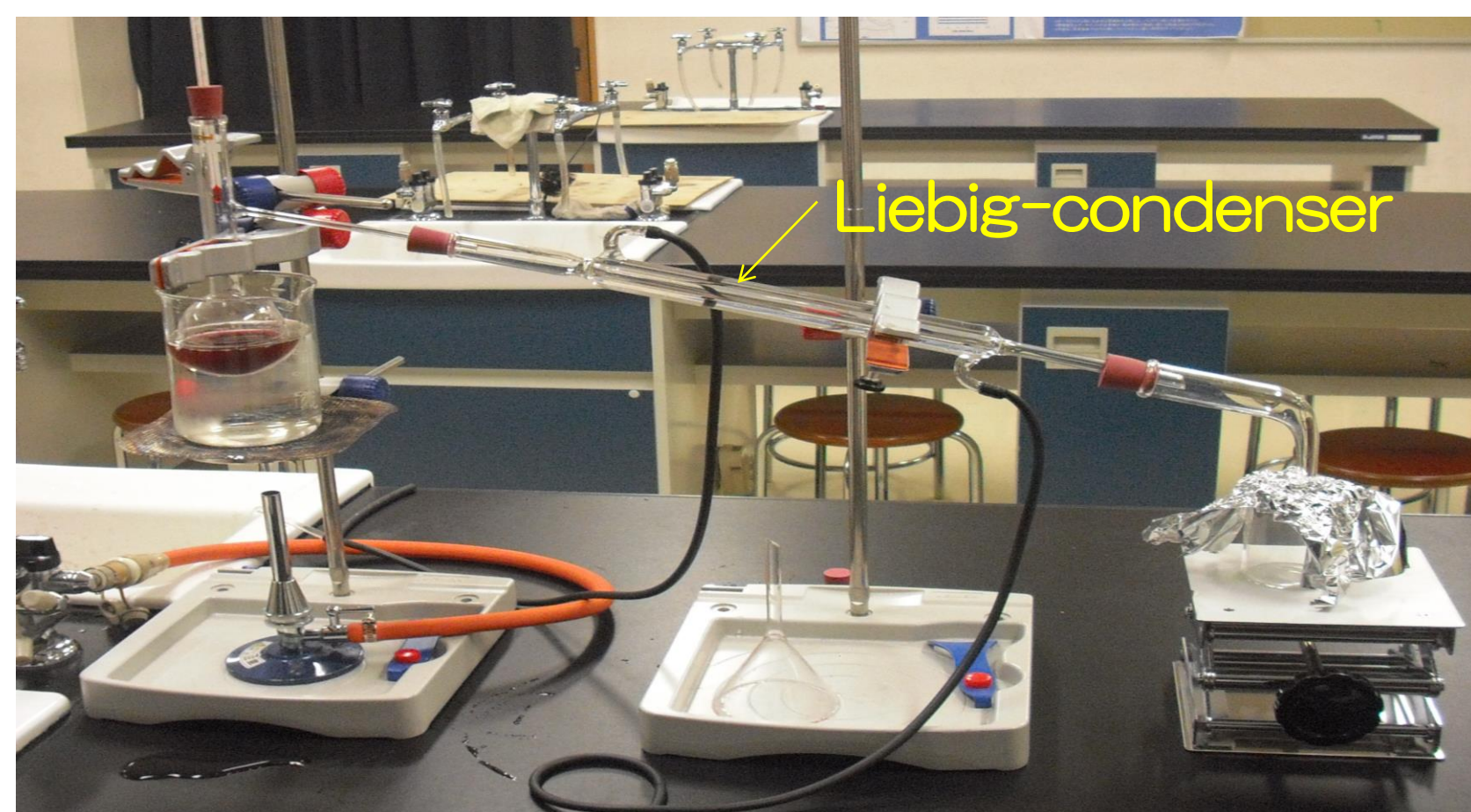
## Result of Method 2 Fermenting grape juice

- The plastic bag swelled.
- The gas in the plastic bag changed the color of lime water to opaque white.



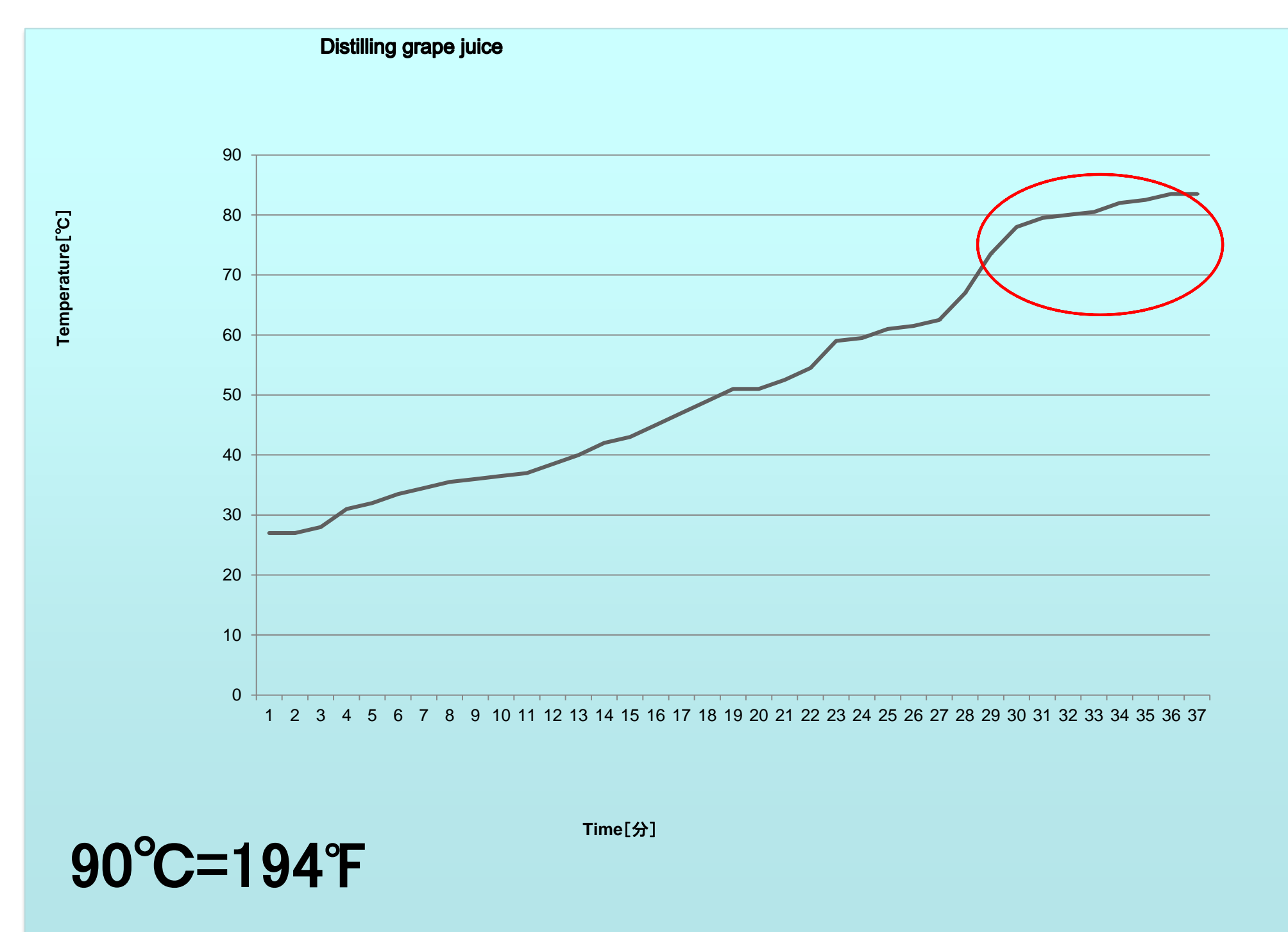
## Method 3 Distilling grape juice

- 1) Pour the fermented grape juice into a side-arm flask and make an experiment apparatus.
- 2) Heat the side-arm flask immersing it in a beaker with very hot water for 45 minutes and collect the distillate.



## Result of Method 3 Distilling grape juice

- The distillate had a smell peculiar to alcohol that stung the nose.
- The distillate burned with a blue flame.



90°C=194°F



## CONCLUSION

- Yeast cells can be separated from wine by using artificial salmon roe.
- I was able to confirm the production of carbon dioxide by using lime water.
- Confirming the production of alcohol by distillation was possible.

Alcohol fermentation was possible.

**→It was possible producing alcohol by using yeast.**

## PROBLEM

- I was able to collect only a small amount of alcohol in this way.
- To produce much more alcohol, more sugar is needed in grape juice.

## REFERENCES

- Yoshizato, K. スクエア最新図解生物, Daichigakusyusya, [published 2008; cited 2010 Sep]
- Interesting Experiments [internet] .Kenis Co., Ltd .<http://www.kenis.co.jp>

This project won the valuable award in "集まれ! 化学好き発表会" in 2011.