

## Considerations

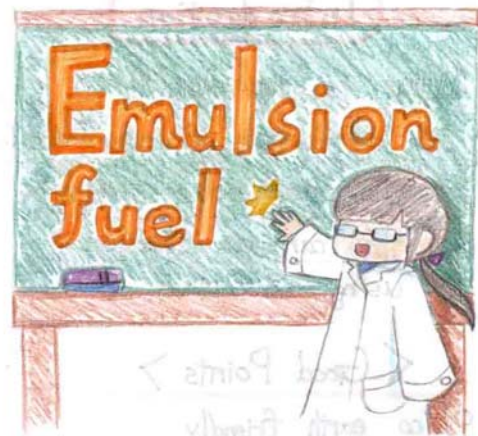
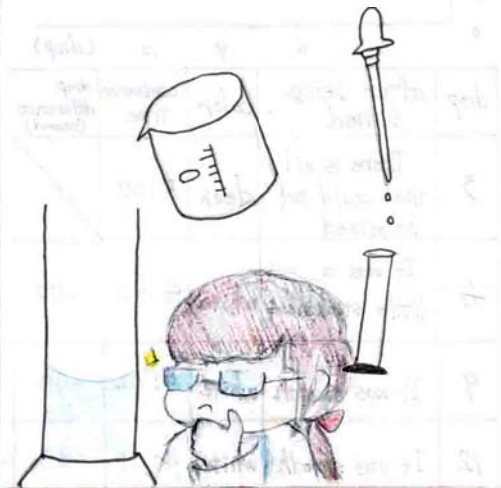
- ① Combustion time changes depending on the amount of surfactant.
- ② Flash points change depending on how well the water and oil mix.
- ③ Combustion time changes depending on the components of detergent.

## Further problems to be solved

- We did our experiment changing the amount of surfactant, but we couldn't measure the amount of surfactant accurately.
- We examined the combustion time to measure combustion efficiency but we should try other ways to measure it.

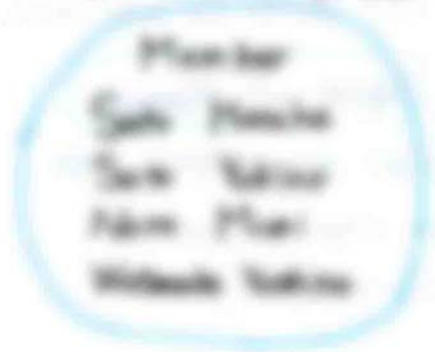
## TIPS

You can see emulsion.  
For example, milk.  
Protein connects fat with water.  
Protein works as surfactant.  
We will look for another!



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## Introduction

What is "emulsion"?

It's a mixture of water and oil.

Essentially water and oil can't mix.

But they can mix together by using a surfactant.

### < Good Points >

- Eco earth friendly
- Less fuel costs

### < Bad Points >

- Easily separates into water and oil.

## Purpose of Research

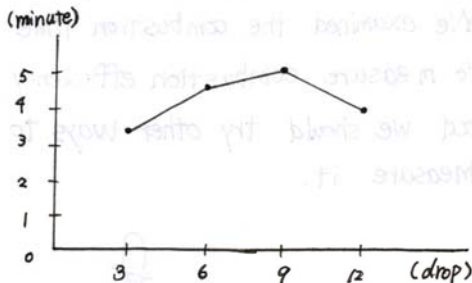
What change happens when

we change the amount of surfactant?

## Procedure of the Experiments

Where we changed the amount of surfactant

- ① Mix water, oil and surfactant
- ② Stir the mixture
- ③ Burn the mixture



drop	after being stirred	color	combustion time	drop difference (second)
3	There is oil that could not be mixed	clear	3:28	
6	It was a little sticky	white	4:40	+72
9	It was smooth	white	5:02	+94
12	It was smooth	white	4:01	+33

Where we used different detergents

- ① Mix water, oil and 9 drops of surfactant
- ② Stir the mixture
- ③ Burn the mixture

### < Example >

43% : Alkylhydroxysulfobetaine

30% : Sodium lauryl sulfate

Polyoxyethylene alkyl ether

