

Emulsion fuel is a new fuel getting a lot of attention. But, its use is not popular. There are some reasons.

Over a long period time. Water and oil separate so fuel doesn't work.

For that reason, when it's sold, it's separate or we can't use it if it's sold.

For this reason, we can't preserve it and when it's made into fuel, it costs a lot of money. So it isn't used.

If we make sure it doesn't separate, the fuel can be easy to use.

Also it doesn't cost much to make this fuel originally.

So there are not many weak points.

[Surfactant]

construction

Lipophilic group  
Familiar to oil.

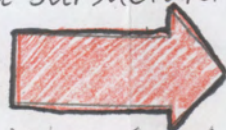


A hydrophilic group  
Familiar to water.

[Role]



When a surfactant is added.



Originally, water and oil which can't be mixed... To be mixed !!

# Emulsion fuel



Emulsion fuel is paid attention to new fuel.

But it isn't used. We think that there is some reason so we want to know the details.

We know about emulsion fuel's good points and bad points.

After that, we will think about effectiveness of use.

## <Research content>

### Emulsion fuel

A mixture of fuel and water by means of a mechanical agitation in the presence of surface active agents or surfactants.

### Surface active agent

It can help mix water and oil. There are two types: one is natural and the other is synthetic.

### Good points

When this fuel is burned water boils very quickly, and increases combustion efficiency.

So it decreases the amount of air which helps to burn.

### Weak points

Since it is mixed with water, its flash point is higher than other fuels. Also it is easy to freeze because water freezes at  $0^{\circ}\text{C}$ . Other time it easily separates and it costs a lot to mix again.

### <Experiment>

Tools: beaker, meltingpot, oil, spoon, detergent, lighter water.

(1) 3:7 (water: oil), 7:3 (water: oil) and 5:5 (water: oil) stir to use a detergent (5ml) in each beaker.

(2) Burn fuels made in step (1) with a lighter in the melting pot.

### Result

#### Fuel 25 ml

	5:5 (oil: water)	7:3 (oil: water)	3:7 (oil: water)
Does the fuel burn?	Burn	Burn	Burn
Burning time	5 minutes 4 seconds	13 minutes 25 seconds	7 minutes 57 seconds

When setting fire to them, they made a crackling sound and liquid spattered. (Liquid is possibly  $\text{H}_2\text{O}$ )

When we experimented outside, it was windy.

### Consideration

We may be able to use the fuel more efficiently by investigating the proportion of water to oil.

**Conclusion** All fuels were burning. However, burning time was different. In future, we will want to think the way to make use of good points and improve weak points under this experiment.