

Realizing "Frizz"

Kobe high school Kisaku Daichi Ito Hiroki Asada Ryousuke Ozaki Yuta Furuta Ryoto

In this experiment, our goal is to make a machine which launches "Frizz" however we didn't have enough time. So we set the goal of launching fire balls like "Frizz". We thought that this could be used in movies or shows to amuse people. We wanted to realize a machine that can shoot fire balls. However we didn't have enough time. So we set our goal to make fire balls (not the machine).



Frizz(Smash Bros)

Method

First, make bubbles with high viscosity using thickeners and surfactants. Second, put burnable gases into the bubbles. At last shoot the bubbles in the air and light a fire on them.

Experiment 3 The optimization of thickener

By increasing the viscosity of the foams, we can make the foams durable. Foams for this experiment must have both heat resistance and viscosity in order to burn. So we tried to mix two thickeners "Guar gum" and "Xanthan gum".

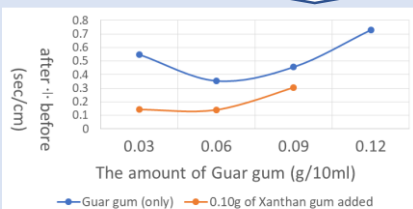
Thickener ... red
glass... blue

method1 method2 method3

the time it takes for the liquid to fall at a certain distance

the time it takes for the marble to fall at a certain distance

the formula to calculate the error (value ÷ average -1)		
0.144	0.207	0.083



We were unable to measure amount of 0.12g of Xanthan gum

We use method3
Vertical axis:
fall velocity after heating
fall velocity before heating

The higher the value is, the less likely it'll be for the viscosity to become low and the higher the heat resistance becomes.

Conclusion

We found out that mixing the Xanthan gum will make the heat resistance lower
Since we know that both the Xanthan gum and the Guar gum have synergistic effects in the viscosity, we could say that some kind of reaction is the cause of this to happen.
Therefore, the best thickener for this experiment is the Guar gum.

Additional experiment

When we mixed the detergent and the thickener, durability of the bubbles became higher. But we couldn't find any other ways except for using balloons.

Experiment 2 the optimization of the surfactants

Surfactants are necessary in making durable foams. Therefore, we searched the best surfactant for making durable foams by mixing the detergent A that has a lot of amphoteric surfactants with the detergent B that has many anionic surfactants.

Method

We make mixtures that consist of detergent A and detergent B. We put them in a couple of tubes. Each mixture in the tubes have different mixture ratio. After that we used the vortexer to mix them properly. Then we saw if there were any differences between them.

The next experiment after making closer mixture ratio of near 1:3.

The next one is research on the most suitable concentration of the original detergent and water.

1 : 4 1 : 3 2 : 1 7 7 % 6 8 % 4 0 % 1 0 0 %
detergent A:detergent B The concentration of detergent A

The mixture with the ratio of 1:2 and the concentration of 40% has the highest foam ability and the stability.

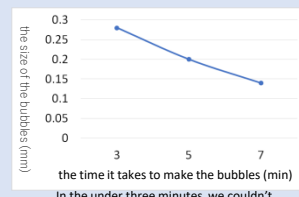
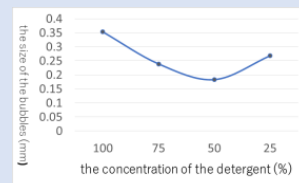
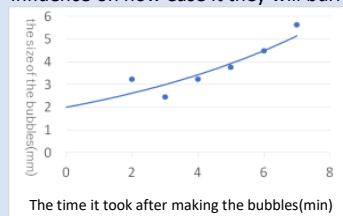
Experiment 3 the influence of the bubbles' size

We made bubbles like the right picture. And we tried to burn them, they didn't burn. We thought that the cause was small bubble drops. So we looked into the influence of the bubbles' size.



Method

We searched how, the concentration of the detergent, the time it takes to make the foams and the standing time after making them affect the sizes of the bubbles' influence on how easy it they will burn.



We could only see lighters flame

Didn't neglect Two minutes neglected Four minutes neglected

They hardly burned when we didn't neglect them, but the longer the standing time was, the bigger the foams got

Right after whipping The foams will become like clusters

Four minutes neglected spattered

Conclusion

We found out the relation between the size of the bubbles and the time by doing experiments about the stability and the heat resistance of the bubbles. The bigger the bubbles are, the easier it is for them to burn. But at the same time the durability of the bubbles will be lower. Therefore, we concluded that even if we use the surfactants, it'll be hard to make the fire ball.

References

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