

Analysis of milk crown phenomenon



Hyogo prefectural Kobe high school sougourigaku course

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◆ The purpose

To find the relation between the velocity of the droplet and the height of the crown by taking pictures and movies of the crown and measuring it.

◆ The picture of each crown



0.1m



0.225m



0.4m



0.625m



0.9m



1.225m

◆ Hypothesis

We guessed that as we increase the height, the height of the crown will increase too.

◆ What to prepare

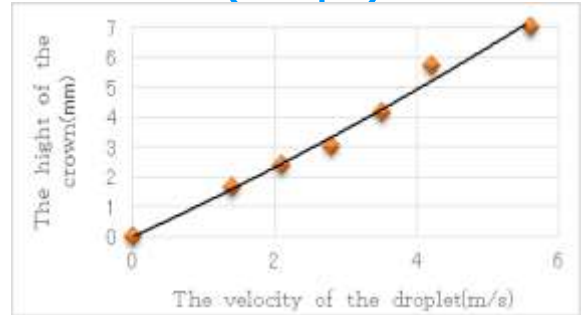
electrical balance, beaker×3, a laboratory dish, stand, burette, measure, medicine spoon, high speed camera, 20% salt solution, paper for wrapping individual doses of powdered medicine

◆ Method

- ① Make an experimental device like a right picture.
- ② Pour 20% salt solution into the burette and fill the laboratory dish with it till 3mm.
- ③ Drop the droplet with the initial velocity as small as possible.
- ④ Take a picture of the crown.



◆ Result (Graph)



◆ Discussion

According to the previous graph, instantaneous velocity when the droplet splashes down becomes bigger, the height of crown becomes bigger too. We concluded the graph of the relation of those two things will be a quadratic-function. The reason is because the kinetic energy of the droplet increases in proportion to the velocity squared.

◆ Reasons for the margin of error

- ① Standard area to measure the height of the crown became ambiguous whether the crown has the projection or not.
- ② The volume of each droplet was not perfectly equal.
- ③ The initial velocity was not perfectly zero.
- ④ The air resistance was bigger than we thought.
- ⑤ The burette vibrated a little.

◆ References

- Research about the property and occurrence of the milk crown Okada Yosuke, Takeuchi Rihito, Kono Ryo www.takasaki-hs.gsn.ed.jp/ssh/research/report/h22-report-research-6.pdf
- *Chemical text of liquid about surface tension* kuchem.kyotou.ac.jp/ubung/yyosuke/lclec_text/chemliq04_c08.htm