Students Note

Key questions

1. How is water important?

2. What happens to hand-made water strider when put it on the surface of water?

3. What happens to hand-made water strider after giving one drop of detergent into water?

4. What is the surface tension of water?

5. What happens to the weight of water drops if detergent consists in water? Select one of follows:
   ☐ Weight of water drops increases
   ☐ Weight of water drops decreases
   ☐ Weight of water drops doesn't change

6. What did you find from experiment?

Experimental Worksheet

Determination of Water Surface Tension

Objective

- To determine surface tension of water by dropping method.
- To investigate the effect of detergent on water surface tension.

Material

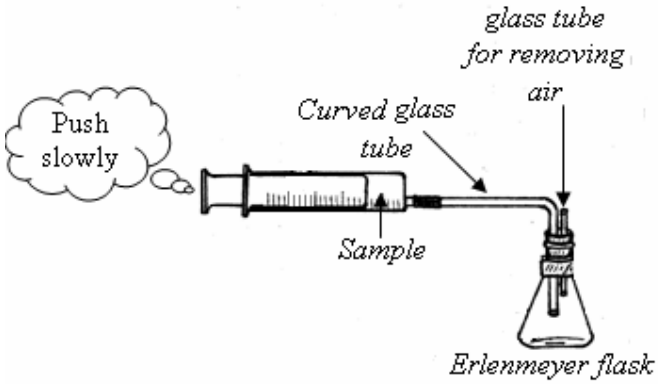
50 mL Erlenmeyer flask (1), rubber cock which fit to Erlenmeyer flask's mouth (1), 90 ^{o}-curved glass tube (3 mm-inner diameter) attached with a rubber cock and rubber tube which fit to glass tube size (1 set), 1 mL syringe (1), scale which can weigh at least 0.001 g (1).

Samples

5 different samples of detergent are prepared 6 ppm, 12 ppm, 24 ppm, 48 ppm and 96 ppm respectively.

Procedure

1. Weigh an empty 50 mL Erlenmeyer flask plus rubber cock and record the weight.
2. Pump pure water into syringe without air. And set up the equipment as in Figure.
3. Carefully and very slowly push syringe plug in order to let sample inside the syringe come out into Erlenmeyer flask drop by drop, by gravity not by force to get 10 drops of sample.



4. Weigh Erlenmeyer flask plus rubber cock plus 10 drops and record the weight.
5. Repeat procedures 1 to 4 for detergent samples.
   Note: Measure three times for each sample, and calculate the average for 10 drops.
   Record the results of other 4 samples from other groups into your worksheet.

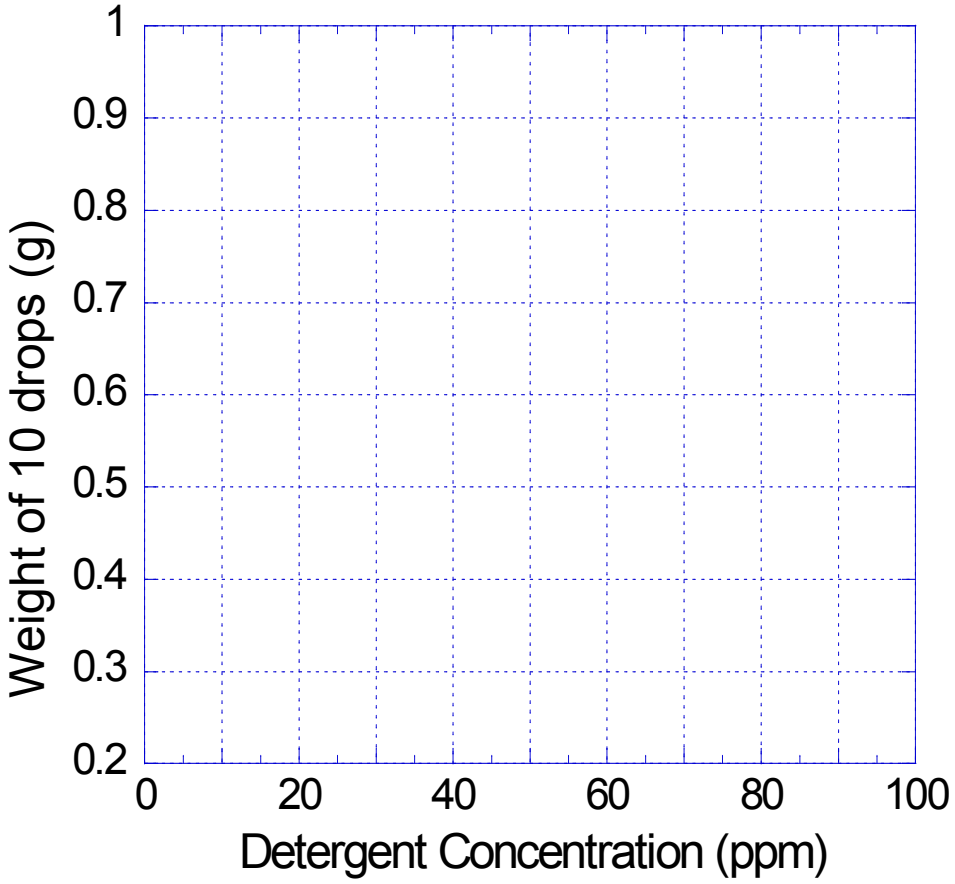
Result

Sample /ppm	Number of Experiment	Weight of Erlenmeyer flask before dropping sample (g)	Weight of Erlenmeyer flask after 10 drops of sample (g)	Net weight of 10 drops of sample (g)	Average weight of 10 drops of sample (g)
Pure water 0	1st				
	2nd				
	3rd				
6	1st				
	2nd				
	3rd				
12	1st				
	2nd				
	3rd				
24	1st				
	2nd				
	3rd				
48	1st				
	2nd				
	3rd				
96	1st				
	2nd				
	3rd				

Discussion

1. Let summery the results from experiment into the following table and then try to plot its graph.

Detergent conc. /ppm	(Water) 0	6	12	24	48	96
Average of 10-drop weight/g						



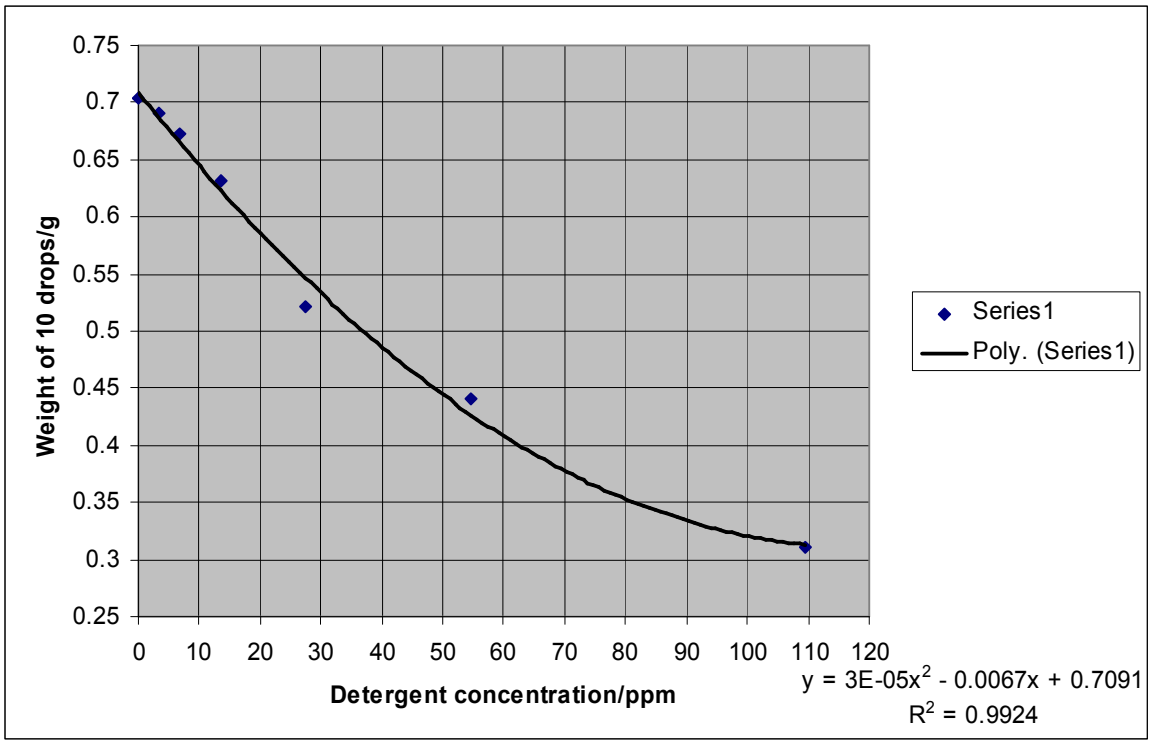
2. According to the trend of obtained graph, choose the appropriated word in the statements follows:

   -When the concentration of detergent becomes (*increased/decreased*) the weight of sample drops becomes (*increased/decreased*).

   -By assuming density of each sample equals to water density (1 g/cm^3), so the weight of a drop sample in *gram* equals to its size (volume) in *centimeter*. From this view point, the size of a drop becomes (*bigger/smaller*) when concentration of detergent becomes (*increased/decreased*). This means the surface tension of water becomes (*increased/decreased*) in the present of detergent.

Assessment

1. You have learnt how to measure surface tension of water and investigate the effect of detergent on surface tension of water. By using this method, try to measure the surface tension of water sample and then determine the concentration of detergent presents in that sample within Amaki area by using following standard graph.



Method

① Different groups should carry out this research with the samples from different places.

② One group must to research at least 3 places.

Result

Sample: Place name	_____	_____	_____
Weight of 10 drops			
Detergent amount			

Discussion

Discuss and give opinions about your results according to the fact of places that you take sampling

2. Combine the results from other groups and do the comparison.

3. Give your opinions about this research activity.