



SS 科学基礎<第2回 国際理解・科学英語講座>

12月8日と9日の2日間にわたり、理科棟化学室において今年度第2回目の科学英語講座が行われました。本講座は1学年の全生徒を対象とし、英語を用いて世界各国の人々と科学実験を行い、良好なコミュニケーションを築くことを目的としているもので、説明から実験に至るまで全て英語で実施されます。

今回は、スリランカから Sasanka 先生と Thanuja 先生をお招きし、異なる種類の液体(溶液)の密度の大小を各生徒が予想した(仮説をたてた)後に、実際にそれぞれの液体の密度を比較することで(実験)、密度の概念及びその大小の意味を英語で理解することを目指しました。

また、両日ともお昼休みには先生方を囲んで昼食をとりながら国際理解講座が行われました。講座では、スリランカと日本の文化や習慣などはもちろん、大学での研究活動についてもお話を聞くことができ、生徒たちも有意義な時間を過ごすことができました。



まず、Sasanka 先生と Thanuja 先生の自己紹介を英語で行い、その後スリランカの産業や経済などの基本情報について紹介して頂きました(写真左)。

「スリランカはどこにあるか知っていますか?」という質問に対して一生懸命英語で答えようと頑張っています!(写真右)

さあ、実験スタートです。実験の説明ももちろん全て英語!写真は、Sasanka 先生と Thanuja 先生の丁寧な説明に耳を傾けている生徒たちの様子です。



「それぞれの液体にクリップや一円玉、ビーズを入れるとどうなるだろうか?」そして、「そのような結果になるのはなぜ?」という予想や結果の説明は、日本語ではできても英語でとなると難しいものです。それぞれが持つ密度の大小によって、液体同士は互いに混ざらず、試験管の中に層が形成されることを実験で実際に確かめることができ、「仮説を立てて検証する」という実験の意義についても併せて確認することができました。写真はその実験の様子です。

写真は、昼食時に行われた国際理解講座の様子です。スリランカと日本の文化や日々の暮らしについて話し合い、お互いの国の情報を交換しました。生徒たちにとっても良い刺激になりました。

Liquid Density Experiments

Outline

Why do objects that are the same size sometimes have different weights? The answer has to do with their density. An object's density is determined by comparing its mass to its volume. If you compare a stone and a bread that are the same size (they have equal volume), which is heavier? The stone is, because it has more mass. The stone is denser than the bread, then, because it has more mass in the same volume - this is due to the atomic structure of the elements, molecules, and compounds that make it up.

Liquids have density, too. You can perform several experiments with different types of liquids to determine which is denser. These experiments can make a good science fair project; use them as a foundation and then come up with your own ideas of what to test.



Materials for Experiments

- Small beaker
- Test tube
- Pipette
- Ice
- Salt or sugar
- Water 100 ml
- Sugar syrup 100 ml
- Vegetable oil 100 ml
- Dish wash 100ml
- Food coloring (red, blue green)
- Several small objects – (1¥ coin, Paper clip).



Experiment 1: Sink or Swim

Question & hypothesis: Will paperclip or coin sink or float if they are placed in water, sugar syrup, vegetable oil and dish wash? Write down what you think about what will happen when you place each object into the four different liquids.

Write down your predictions.

	Coin	Paperclip
Water		
Vegetable oil		
Sugar syrup		
Dish Wash		

What You Do:

1. Check 100 ml of water of beaker #1, 100 ml of sugar syrup of beaker #2, 100 ml of vegetable oil of beaker #3, and 100 ml of dish wash of beaker #4.
2. Gently set a paperclip or coin in each beaker. Does it sink or float? Write down what happens to the paperclip or coin in each beaker.
3. Try a different small objects such as raisins.

Write down the results.

	Coin	Paperclip
Water		
Vegetable oil		
Sugar syrup		
Dish Wash		

Conclusions : Were your predictions right? Did the raisins and other objects sink or float? Did they float in one liquid and sink in another? Can you explain why they acted the way they did?

The denser liquid is, the easier it is for an object to float on it. If one of your objects floated in the sugar syrup but sank in water, what does that tell you about the densities of water and sugar syrup?

Experiment 2: Mix it up

Question & hypothesis: Which of water, sugar syrup, vegetable oil or dish wash is densest? And which is sparsest? Based on your results from Experiment 1, predict which liquid is densest and sparsest.

Which liquid is densest? Write down your prediction.

Which liquid is sparsest? Write down your prediction.

What You Do:

1. Add food colorings into each beaker of liquid so that you are able to tell it apart from the other liquids. Blue is for water, Red is for dish wash, and Green is for sugar syrup (Green coloring already put into sugar syrup as “green sugar syrup”.)
2. Carefully pour 5 ml of each of the liquids into a test tube by using a pipette. Decant only sugar syrup into the test tube. Then, let them settle.
3. What happened? Did the four liquids mix together or separate into layers? Which liquid is at the bottom of the test tube? Which is at the top?

Describe what happened in the test tube by drawing.

What happened in the test tube?

Make a sentence.



Conclusions : Were your predictions right? If so, the liquid which you thought densest should be at the bottom of the test tube. The next dense will float on top of the bottom layer, and the sparsest will float at the very top. Now you know how the densities of the four liquids are compared to each other. If you want to find out the approximate density of each, you can calculate it using this formula:

Density = Mass/Volume.

On Earth, we measure mass (how much of a substance there is) by calculating weight (how heavy it is). Weigh each liquid in grams (make sure you subtract the weight of the beaker!) and then divide that number by the volume (number of milliliters) of the liquid. The answer is density in grams per milliliter. (Your answer will be more exact if you use a graduated cylinder instead of a beaker to measure the volume and weigh the liquid.)

Experiment 3: Adding salt to water

Question & hypothesis: Will adding salt make water denser? Which of salt water or water is denser? Write down what you think about what will happen to the density of water if you add salt.

Write down your prediction.

What You Do:

1. Fill two beakers with 100 ml of water. Add “red” food coloring to water. Add 3 teaspoons of salt to the red beaker and stir until the salt is dissolved. Try putting a coin in each of the beakers. Does it float?
2. Pour some of the salty water into the test tube. Using the pipette, slowly add the water one or two drops at a time. Record which sinks to the bottom and which floats on top.



Describe what happened in the test tube by drawing.

What happened in the test tube?

Make a sentence.



Conclusions: Were your predictions correct? Did adding salt make the water denser? Which of the salt water or the water was denser?

Reference: —Densities of various kinds of substances—

Substance	Density (gm/cu.cm)
Water	1.00
Cooking oil	0.92
Sea Water	1.025
Carbon tetrachloride	1.58
Benzene	0.87
Glycerin	1.26
Methanol	0.79