



SS 科学基礎 ～ 科学英語講座 (液体の密度の実験)・国際理解講座 ～

平成27年6月1日(月)・2日(火)に、トップ英進部・英進部の1学年全クラスを対象に「科学英語実験講座」が、英進部理科棟1階の化学実験室で行われました。

サイエンスの世界では共通語として英語が使われ、多くの研究者は研究の成果を英語で発信しています。そのため、英語力が身につけていると、最新の科学情報を論文や雑誌等で豊富に得ることができます。また、研究活動では、多国籍の人と共同で進められ、そこでの会話もほとんどが英語になります。研究者として国際的に通用する人を目指すには、英語の能力が必要となります。このような背景から、本講座では、科学分野に関する英語の読解力や表現力を高め、さらに、科学的な分野への興味・関心を喚起することを目的としています。

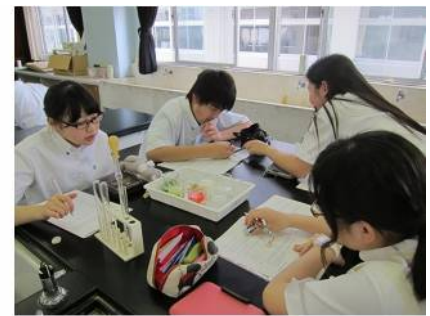
実験では、宇都宮大学で研究をされているスリランカ出身の Sasanka 先生と Thanujya 先生を講師としてお招きし、異なる種類の溶液を用いて、密度の大小に関する実験を行いました。なお、実験中は、Sasanka 先生の説明はもちろんのこと、生徒間のコミュニケーションも全て英語で行うことを条件として行われました。



【Photo1. 実験の様子】



【Photo2. 実験の様子】



【Photo3. 実験の様子】



【Photo4. 実験の様子】



【Photo5. 実験の様子】



【Photo6. ランチの様子】

- ◇ Photo1、2：実験が始まり、Sasanka 先生と Thanujya 先生の丁寧な説明を熱心に聞く生徒たち。
- ◇ Photo3、4：「予想(仮説)を立てて検証する」という実験の意義についても確認することができました。
- ◇ Photo5：実験終了後、Sasanka 先生に質問する意欲的な生徒の姿も多く見られました。
- ◇ Photo6：この2日間の講座で、お昼休みに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。お互いの国の情報交換や研究活動のお話を聞くことができました。また、Sasanka 先生手作りのスリランカカレーをご馳走になり、その美味しさに生徒たちはとても喜んでいました。

実験中には英語の専門的な用語に慣れていないためか、戸惑っている生徒も見られましたが、英語での実験は新鮮で、どのクラスも協力しながら意欲的に取り組んでいる姿が見られました。また、本講座を通して、英語“を”学ぶのではなく、英語“で”学ぶ楽しさも感じられたのではないかと思います。各クラス1コマという限られた時間の中で、科学英語と科学を同時に深めることができた大変有意義な時間となりました。

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
- Salt
- Water 100 ml
- Sugar syrup 100 ml
- Vegetable oil 100 ml
- Dish wash 100ml
- Milk 100ml
- Food coloring (red, blue, green)
- Several small objects – (Paper clip, Piece of crayon, Macaroni piece, Small ball)



Experiment 1: Sink or Swim

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

Write down your predictions.

	Paper clip	Macaroni	Crayon	Small ball
Water				
Milk				
Vegetable oil				
Sugar syrup				
Dish Wash				

What You Do:

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

Write down the results

	Paper clip	Macaroni	Crayon	Small ball
Water				
Milk				
Vegetable oil				
Sugar syrup				
Dish Wash				

Conclusions : Were your predictions right? Did the 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, milk 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 and Red coloring is already put into sugar syrup and dish wash.)
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 five 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 beaker by drawing.

What happened in the beaker?

Make a sentence.

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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 five 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 three beakers with 100 ml of water. Add food coloring to water. Add 3 teaspoons of salt to the red beaker and stir until the salt is dissolved.
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