Lab Report: Separating Salt and Pepper

6 November 2014

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TECM 3000.001

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Memo

Date: 6 November 2013
To: Ms. Bunsenburner, Chemistry Department
From: Michelle McAllister, Kiara Rodriguez, Jessica Simmons, Molly Gunn
Subject: Request to Collaborate in Teaching Students How to Write Lab Reports

In the chemistry department, our students have the opportunity to run experiments and gain extensive knowledge on the subject. The students then write lab reports over several of their experiments. Learning how to write effective lab reports can be difficult, especially when the time spent on practicing writing is taken away from valuable experimenting time. We have a solution for this timing issue.

We are four English teachers with experience in technical communication and writing in the sciences. We would like to collaborate with you in teaching students how to write lab reports. This collaboration would ensure that students grasp a clear understanding of writing lab reports without sacrificing time from their chemistry classes. We would work with you to enhance students' writing skills so that in your classes, they have time to enhance their experimenting skills. Students will also produce clearer, more concise lab reports for you to read.

Moreover, the connection between two of their classes would show students how they can apply their varying skills and talents in the same subject but in different ways. By seeing the widespread application of their skills and the link between subjects, students will appreciate their classes more.

We ask you to consider this beneficial collaboration. If we implement it, we will be able to dedicate more time to teaching students the skills they should be improving in our classes.

Enclosed is an example of a lab report written according to principles set forth in technical communication. We would teach students to write lab reports based on these principles.

We look forward to hearing from you. Please email us at oxford.comma@english.com.

Introduction

It can be difficult to separate salt and pepper once they are mixed together. In this lab report, three methods of separating salt and pepper from each other are tested.

- Static Electricity
- Evaporation
- Dissolving

The three methods will be compared at the end of this lab report.

Static Electricity Experiment

Introduction

The purpose of this experiment is to separate salt and pepper by using static electricity. Static electricity affects different materials such as salt and pepper in different ways. Because of pepper's higher density, pepper tends to cling to other materials more easily than salt. Salt and pepper are hard to separate when mixed together, but static electricity might provide a solution.

Hypothesis: If pepper reacts to static electricity more than salt does, then pepper can be separated from salt by using static electricity.

Methods

Materials

- Salt
- Pepper
- Measuring scale
- Stopwatch
- 2 paper plates or sheets of paper
- Plastic comb or ruler

Instructions

1. Weigh .1 ounce of salt and .1 ounce of pepper on the measuring scale.
2. Mix the salt and pepper together on one of the paper plates or sheets of paper.
3. Rub a plastic comb or ruler against your clothing or an inflated balloon.
4. Start the timer.
5. Hold the comb or ruler 1 cm above the salt and pepper mixture until the pepper begins to cling to it.
   Don't lower the comb or ruler too much or the salt will also cling to the comb or ruler.
6. Brush the pepper off the comb or ruler and onto the second separate paper plate or sheet of paper.
7. Repeat steps 5 and 6 as necessary to remove the rest of the pepper from the mixture.
8. Stop the timer and record the time that it took for the pepper to be separated from the salt.

9. Use the measuring scale to determine how much pepper was able to be separated from the salt.
10. Record the amount of pepper that was separated from the salt.

Results

Substance	Amount Before Separation	Amount After Separation
Pepper	.1 ounce	.05 ounce
Salt	.1 ounce	0 ounces

It took 8 minutes and 33 seconds to gather as many pepper particles as possible. The static electricity seemed to attract more pepper the longer the ruler or comb is rubbed against the material. Also, when holding the ruler or comb above the mixture, even though it did not grab all of the pepper, gradually all of the pepper rose to the top of the mixture.

Discussion

The results of the experiment yielded very little results. It took a long time to separate the pepper from the salt, and only half of the pepper was able to be taken out of the mixture. Static electricity is an ineffective way of separating pepper from salt. Though this method is possible, there are other less time consuming ways of separating salt and pepper.

Numerous changes had to be made to the experiment in order to produce viable results. The amount of salt and pepper needed to be reduced (1 teaspoon instead of 1 tablespoon), and a dog's fur had to be used to produce any usable amount of static electricity.

The amounts of salt and pepper should be weighed (.1 ounce of salt and .1 ounce of pepper) to obtain a more accurate and scientifically sound amount. A large amount of error can result from the ruler or comb's picking up salt particles along with pepper since salt is also attracted to the ruler or comb because of static electricity.

In conclusion, using static electricity to separate salt and pepper is not a good method because of the time it takes and the large amount of error possible in the experiment. This experiment will need to be changed in the future by possibly using higher quality materials to produce a larger amount of static electricity to make this experiment work.

Evaporation Experiment

Introduction

**********HEEEEYYYYYYHEYHEYHEYHEY**********

The purpose of the experiment is to separate a salt and pepper water mixture using evaporation.

Hypothesis: If the amount of salt and pepper before evaporation is 1 tablespoon, then the amount will be the same after evaporation.

Methods

Materials

- 1 tablespoon of salt
- 1 tablespoon of pepper
- 1 pint of clean tap water (2 cups)
- 2 quart-sized glasses or jars
- 1 spoon
- 1 Funnel
- 1 Coffee Filter
- A stopwatch
- 2 ¼ cups of water
- 1 sauce pan
- Stove burner
- Pen
- Paper
- Mixing bowl

Instructions

How to mix the salt and pepper in water:

1. Pour 2 cups of clean tap water into the first jar.
2. Pour 1 tablespoon of salt into the mixing bowl
3. Pour 1 tablespoon of pepper into the mixing bowl.
4. Mix the salt and pepper together with a spoon.
5. Pour the salt and pepper mixture into the jar of water.
   Notice how the pepper floats to the top of the water while the salt sinks to the bottom and dissolves.
6. Stir the water until the salt dissolves completely.
7. Notice how the pepper does not dissolve.

How to separate the pepper from the salt water:

1. Set the funnel in the mouth of the second jar.
2. Place the coffee filter in the funnel.
3. Make sure your stopwatch is ready to start timing.

4. Start the timer as you pour the water mixture through the coffee filter and funnel into the second jar.
5. Add ¼ cup of water into the first jar.
6. Swirl the water around the first jar to collect any lingering traces of salt and pepper.
7. Pour this mixture through the coffee filter and funnel into the second jar.
8. Remove the funnel with filer from the second jar.
   Notice that pepper remains in the coffee filter, while the second jar contains only salt water.

Use the following instructions to separate the salt from the water.

1. Pour the remaining salt water into a saucepan.
2. Set the sauce pan on a burner on the stove.
3. Turn the burner heat on high.
4. Bring the contents of the saucepan to a boil.
5. Let most of the water boil off until there is about a tablespoon left.
6. Turn the stove off.
7. Leave the saucepan on the burner.
8. Allow the rest of the water to evaporate as the pan slowly cools.
   Notice the white solids remaining in the sauce pan.

Use the following instructions to record your results.

1. Measure the amount of salt you have separated.
2. Record the amount of salt separated.
3. Measure the amount of pepper separated.
4. Record the amount of pepper separated.
5. Record the time you finish separating the salt and pepper.

Results

Substance	**Amount Before Separation**	**Amount After Separation**
Salt	1 tablespoon	2/3 tablespoon
Pepper	1 tablespoon	1 tablespoon

The water mixture initially had one tablespoon of salt and one tablespoon of pepper. The pepper separated easily, and there was almost exactly one tablespoon of pepper after separation. The salt did not have the same results. There was a decrease in the amount of salt after separation. Table X below shows these results.

Discussion

Using evaporation to separate salt and pepper had mixed results. This method worked well for separating pepper, but did not work well for separating salt. It was predicted that the method would work the same for both salt and pepper. Both the salt and pepper were expected to separate with the same amount that it started with. The pepper measure out at 1 tablespoon before and after separation, while the salt measured out at 1 tablespoon before the separation and 2/3 tablespoon after the separation.

The salt separation failed because 1/3 of the salt evaporated with the steam and left a salty residue around the burner rather than in the pan. Although the salt separated, it was difficult to measure the residue because it was stuck to the glass top stove. This might have been avoided if the water had been boiled with a lid that lets off steam but catches the residue. If this experiment were to be repeated, this step would be included.

The salt in the pan had the consistency and color of mud because the coffee filters used were made out of recycled material. The brown-tinted filters turned the salt water brown and failed to catch all of the pepper. The amount of pepper that escaped from the filter was not enough to affect the results.

The timing portion of the experiment was omitted. The directions were unclear on what was supposed to be timed and why it was supposed to be timed. The length separation process did not seem like it would help evaluate which method works the best. Skipping over the timing steps did not affect the results.

Dissolving Experiment

Introduction

The purpose of this experiment is to dissolve salt and pepper in water to separate them. Salt is formed out of the ionically bonded elements of sodium and chlorine; because water molecules are polar, with a slightly positive charge on one end and a slightly negative charge on the other, this means that water has the power to break some of these ionic bonds.

Hypothesis: In water, salt sinks while pepper floats. Pepper will be able to be skimmed from the water.

Methods

Materials:

- Salt
- Pepper
- Tablespoon
- Clean quart-sized jar or glass
- Warm water
- Clean spoon

Instructions:

1. Measure out 1 tablespoon each of salt and pepper.
2. Pour the tablespoons of salt and pepper into the bottom of a clean jar or glass.
3. Pour warm water over the salt and pepper mixture, filling the glass about ¾ of the way.
4. Stir the mixture for about 30 seconds.
5. Rinse off the spoon used for stirring.
6. Use the clean spoon to skim as many pepper particles as possible that are floating on top of the water.
7. Drop the pepper particles back into the tablespoon measuring cup.
8. Record the approximated amount of pepper that was scooped back into the tablespoon measuring cup.

Results

Substance	Amount Before Separation	Amount After Separation
Pepper	1 tablespoon	½ tablespoon
Salt	1 tablespoon	0 tablespoons

Approximately ½ tablespoon of pepper was skimmed off the top of the water in the jar. For the most part, the salt was dissolved in the warm water. The remaining salt attached to pepper particles and sunk to the bottom of the jar.

Discussion

The results of this experiment do not completely support the original hypothesis. The experiment suggests that a majority of salt dissolves in water, a majority of pepper floats in water, but if the two particles happen to attach to one another, they both sink to the bottom of the glass.

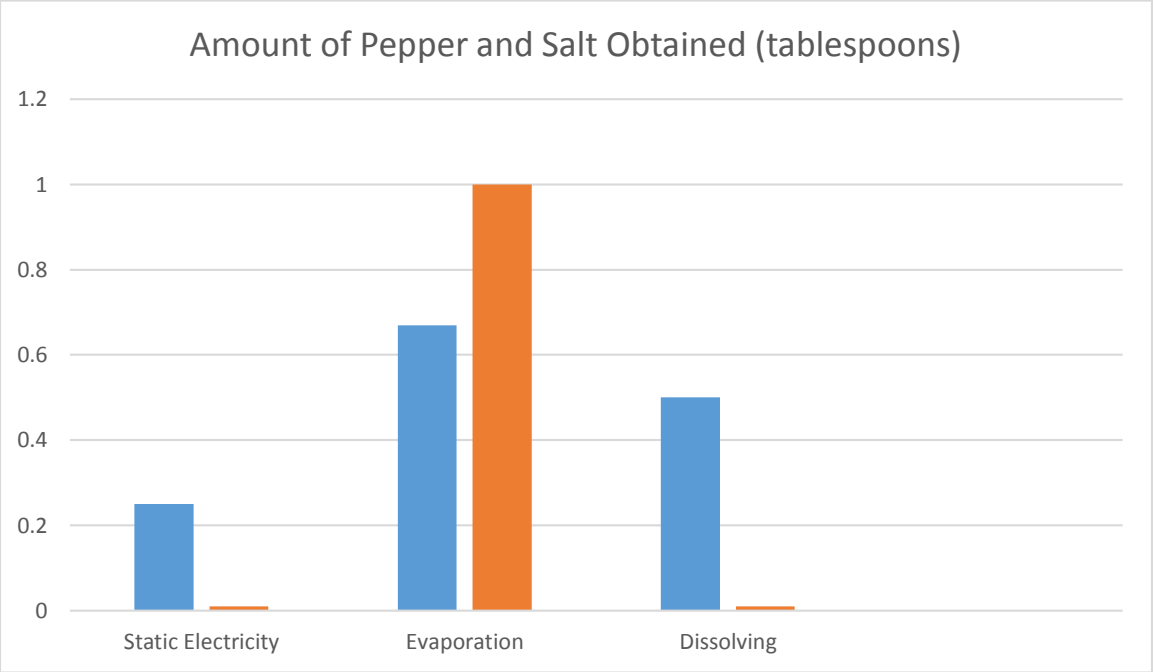
The most significant factor in the experiment is the temperature of the water. The salt dissolved because it was stirred into warm water. Salt, as well as any other soluble substance, dissolves quicker in hot water because heat makes the water molecules move faster, creating more space between them. This extra space means the salt molecules more readily make contact with the water molecules, binding to them and creating a solution. If the water was at room temperature, the salt particles would dissolve in the water slower, sinking to the bottom of the jar first.

Pepper is less dense than water. Its buoyancy allows it to float on top of the water, proving that particular part of the hypothesis correct. However, when some of the pepper particles attached to some of the salt particles, they sunk to the bottom. Those specific salt particles were not able to dissolve because of their attachment to the pepper particles. The pepper particles were not able to float to the top because of the weight of the salt particles.

In order to achieve closer results to the original hypothesis, the experiment should be conducted with room temperature water.

Conclusion

The data for the amounts of pepper and salt that were able to be separated in each experiment is shown in the following graph.



The evaporation method yielded the highest amounts of pepper and salt. This is the most effective method for separating salt and pepper even though it is also the most time consuming.

Style Sheet

Team Members

Michelle McAllister, Kiara Rodriguez, Jessica Simmons, Molly Gunn

Page Elements

Page size	Letter
Margins	Gutter .5” Inside .5” Outside 1.5” Top 1.25” Bottom 1.25”
Layout	Double-sided, bound
Spacing	Single-space
Visual aids	Salt and pepper on cover Tables in some results sections
Headings	Modified hanging

Type Elements

Typeface	Garamond for text Calibri for headings
Size	12 point for text 14 point for subheadings 16 points for headings 30 point for title
Style	Bold for headings
Color	Blue for headings

Text Elements

Capitalization	Sentence case
Numbers	Use numerals
Lists	Numbered lists place period after number Bulleted lists use black circle bullet
Punctuation	Oxford comma
Style Handbook	*A Writer’s Reference* by Diana Hacker

Statement of Work

Date: November 6, 2014
To: Dr. Jackson
From: Michelle McAllister, Kiara Rodriguez, Jessica Simmons, Molly Gunn
Re: Statement of Work for Lab Report

We hereby agree to the following division of work for the team Lab Report Project:

Name	Job	E-mail	Phone
Michelle McAllister	Do experiment 2 and write introduction, methods, results, and discussion for it	michellemcallister@my.unt.edu	682.203.9178
Kiara Rodriguez	Do experiment 1 and write introduction, methods, results, and discussion for it	kiararod12@gmail.com	817.705.6573
Jessica Simmons	Do experiment 3 and write introduction, methods, results, and discussion for it	jessicasimmons46@yahoo.com	817.807.7227
Molly Gunn	Compile and edit all writing, write general introduction and conclusion, and format and design document	m.g.gunn@outlook.com	817.458.1319

We agree that the members of the team who are completing the experiments will have the experiment completed and the writing over the experiment submitted to Molly by **Thursday, October 30, 2014**.

We agree to reply to emails and texts to each other within 24 hours of the time they are sent.

Any of member of the team who does not perform her duties will receive one letter grade lower than the rest of the team.

Agreed to upon this date:

Michelle McAllister Date

Kiara Rodriguez Date

Jessica Simmons Date

Molly Gunn Date