

Baking Soda Diffusion Lab

Background Information:

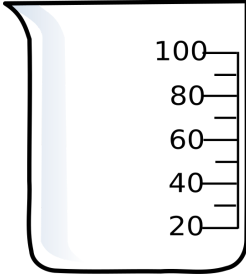
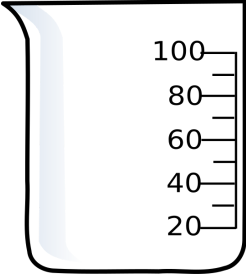
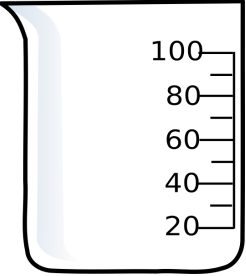
Baking soda (NaHCO_3) can easily dissolve in water. When it does, it forms what is known as a basic (or alkali) solution with a pH of around 8.3. A basic solution is one with a pH of more than 7. pH is a chemical property that can be easily measured using several different methods, one of which is a pH indicator.

For this experiment, we will be using the pH indicator Phenolphthalein. When a liquid has a pH of less than 7 (neutral), the indicator will be clear. When the pH reaches around 8, it will become a light pink (lilac purple) and at pHs of greater than around 8.5 it will turn bright fuschia. When there is no baking soda present, this means that the indicator will be clear. The more baking soda that is present, the darker pink the solution will turn. Use the included pH scale for this indicator to help you understand the color differences.

In this lab, you will use this information to observe color changes as particles of baking soda diffuse through a beaker of water.

Hypothesis:

** Use colored pencils or markers to indicate what you believe the beaker will look like at these 3 points in the experiment.**

<p>Prior to the addition of the baking soda, the beaker will look like this</p>  <p>because _____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>Shortly after the baking soda is added, the beaker will look like this</p>  <p>because _____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>After time is up, the beaker will look like this</p>  <p>because _____</p> <p>_____</p> <p>_____</p> <p>_____</p>
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Materials

- Safety goggles and gloves
- Colored pencils
- pH indicator scale
- Baking soda
- beaker
- Dissolvable paper
- Timer
- Phenolphthalein
 - Toxic if swallowed and a skin irritant.
- Camera (you may use your phone or the school cameras)
- Blank piece of white paper

Procedure

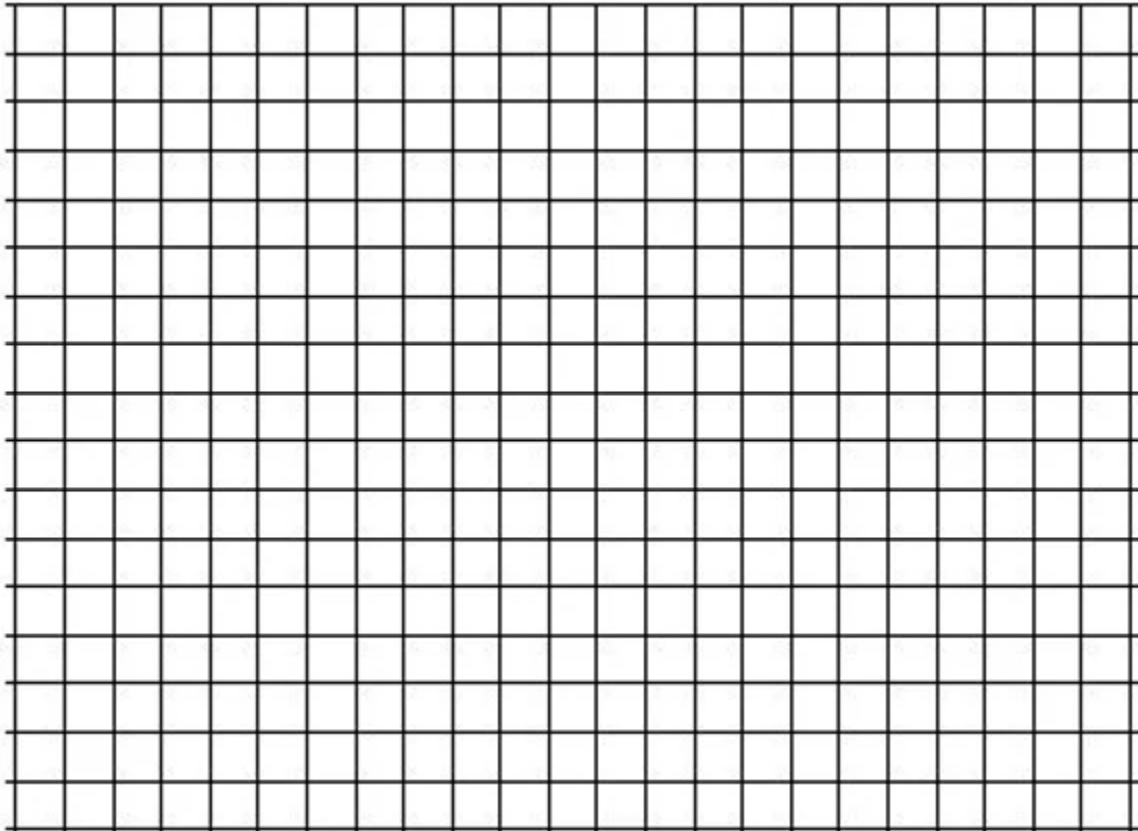
1. Put on safety goggles and gloves. Tie up long hair.
2. Put some baking soda into the middle of 1 square of dissolvable paper.
3. Fill your beaker with hot tap water.
4. Ask your teacher to add some indicator to your beaker.
5. Put a piece of paper behind the beaker so you can more clearly see the color. Take a picture of the control beaker. Note the color in the “Data” section
6. Prepare your station by...
 - a. Setting up your timer so it is right next to the beaker and can be viewed in any pictures you take.
 - b. Having someone hold the piece of paper behind the beaker so you can easily see any color changes.
 - c. Zooming in on the beaker and timer so they take up the entire screen.
7. Carefully place the dissolvable paper with the baking soda into the beaker. DO NOT DUMP THE BAKING SODA IN -- place it into the beaker inside of the dissolvable paper.
8. Swirl it around for less than 5 seconds. Start your timer.
9. Take a picture of the beaker every 2 seconds for 1.5 - 2 minutes, or until the color stops changing.
10. Clean up by...
 - a. Dumping your water and indicator solution down the drain and rinsing with lots of water.
 - b. Using dish soap and a brush to scrub out the inside of the beaker.
 - c. Throwing away your gloves.
 - d. Putting away your goggles.
11. Use the pictures that you have taken to fill out the rest of the “Data” section.
12. Use the information from the “Data” section to fill out the analysis section.

Data

Time	Description (include pH)	Time	Description (include pH)	Time	Description (include pH)
00:00	Control -	00:44		01:28	
00:02		00:46		01:30	
00:04		00:48		01:32	
00:06		00:50		01:34	
00:08		00:52		01:36	
00:10		00:54		01:38	
00:12		00:56		01:40	
00:14		00:58		01:42	
00:16		01:00		01:44	
00:18		01:02		01:46	
00:20		01:04		01:48	
00:22		01:06		01:50	
00:24		01:08		01:52	
00:26		01:10		01:54	
00:28		01:12		01:56	
00:30		01:14		01:58	
00:32		01:16		02:00	
00:34		01:18			
00:36		01:20			
00:38		01:22			
00:40		01:24			
00:42		01:26			

Use the information you generated in your table to prepare a graph showing how the pH of the solution changed over time.

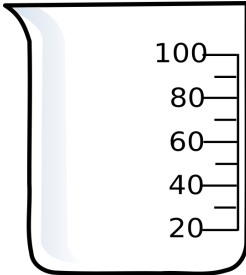
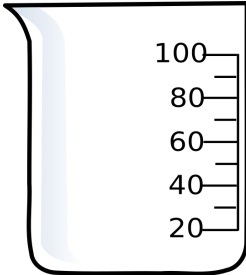
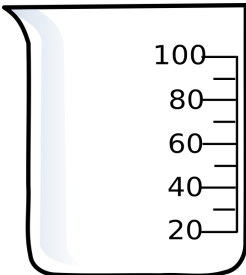
Title _____



Time

Analysis

1. Summarize your results by filling out the table below.

<p>Prior to the addition of the baking soda, the beaker looked like this.</p>  <p>The pH was _____.</p> <p>Check the box that corresponds:</p> <p><input type="checkbox"/> This is what I hypothesized.</p> <p><input type="checkbox"/> This is not what I hypothesized.</p>	<p>Shortly after the baking soda was added, the beaker looked like this.</p>  <p>The pH was _____.</p> <p>Check the box that corresponds:</p> <p><input type="checkbox"/> This is what I hypothesized.</p> <p><input type="checkbox"/> This is not what I hypothesized.</p>	<p>After time was up, the beaker looked like this.</p>  <p>The pH was _____.</p> <p>Check the box that corresponds:</p> <p><input type="checkbox"/> This is what I hypothesized.</p> <p><input type="checkbox"/> This is not what I hypothesized.</p>
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2. Explain what is happening at a molecular level during the beginning, middle, and end of this experiment.

First, the baking soda is _____, so the indicator is _____.

Then, the baking soda _____

because of _____.

This causes the indicator to _____.

By the end of the experiment, the baking soda has _____

_____, so the indicator is _____.

3. What does this lab show about passive transport via diffusion?

