

Smallbrook Acidic Water Problem

Scenario

You and your team are independent environmental consultants who have been hired by the town of Smallbrook to help them with their acidic wetland problem. They believe that the community wetland is becoming more acidic because of a factory 15 miles away. The factory produces visible air pollution. The smoke stacks emit SO_2 . You figure out that this chemical must be entering the wetland and combining with H_2O to form H_2SO_4 , sulfuric acid, or combining with water vapor in the air and producing acid rain. First, the Town Advisory Council would like your team to figure out how to make the wetland safe for children to swim in again.

Task

The town council would like you to present a comprehensive report to the people of Smallbrook in the Town Hall meeting on: _____. You will need to clearly explain what is happening and how your team plans on solving it. For your efforts you will be paid up to _____.

The town can provide a sample of water for you.

Materials

Quantity	Item	Quantity	Item
1	balance	2 pellets	sodium hydroxide (NaOH)
2	250 ml beakers		Purified Water
3	disposable pipets		pH paper or a pH meter
100 mL	sample of the wetland water	10mL	graduated cylinder

Procedure

Do the following and fill in your answers in the Data Section below.

1. Find the mass of one of the 250mL beakers.
2. Add a small amount of NaOH.
3. Find the mass of the beaker and the NaOH.
4. From the periodic table determine the molar mass of NaOH.
5. Use the factor label method to determine the number of moles of NaOH.
6. Add 100 mL of distilled water to the beaker.
7. Convert this to Liters.
8. Determine the molarity of the NaOH solution.
9. Find the pH of the Sodium Hydroxide solution with pH paper.
10. Get your 100mL sample of wetland water.
11. Convert to Liters.
12. Use pH paper or meter to determine the pH of the wetland water.

13. Find the desired pH for a body of water.

Data

Mass of beaker	
Mass of beaker and small amount of NaOH	
Mass of NaOH	
Molar mass of NaOH	
Moles of NaOH	
mL of distilled water	
Convert mL to Liters	
Molarity (moles/liter)	
pH of sodium hydroxide solution	
mL of sample wetland water	
Convert to Liters	
pH of wetland water sample	
Desired pH	

Add drops of NaOH solution to wetland water sample. Count the number of drops you add. Test with pH paper or read the meter on a regular basis. When the desired pH is reached you must calculate the total milliliters of base that you added to the sample.

Using the graduated cylinder put in the same number of drops of NaOH solution in the graduated cylinder that you put in the sample. How many milliliters is it?

1	Number of drops of NaOH added to sample	
2	Number of mL of NaOH (calculated in graduated cylinders)	
3	Convert to number of Liters of NaOH	
4	Number of mL of wetland water sample	
5	Convert to number of Liters of sample	
6	Number of L of base/L of wetland water	
7	Number of L of wetland water in community wetland	160,000L
8	Multiply #6 by #7	

The answer to #8 is the number of liters of your molarity NaOH solution that must be added to the wetland to neutralize it. Now begin preparing for your presentation at the Town Hall meeting. You will be able to hand out pamphlets, do an oral presentation, do a power point presentation or a video presentation of your findings. Please be ready to defend your findings and answer any questions. You should have a bill prepared with your payment request.

Questions

1. What are some sources of error when using this method?
2. Does this seem like a reasonable quantity to add to the wetland? Explain how you know.
3. What might you do to decrease the volume of base that you need to add?
4. Student teams around you may not have used the same number of drops as you did. List some possible causes for this difference

Name _____

Period ____

5. How would the increase of acidic water affect any animals in a body of salt water?
