

Neutralizing Acids & Bases

NEUTRALIZATION is the process in which one achieves an overall pH value of 7.0 by combining an acid and a base (alkaline).

PHENOLPHTHALEIN is a pH indicator that identifies the presence of a basic or alkaline compound by turning the solution pink. In the presence of an acidic or neutral compound, the indicator will remain colourless. It does not, however, indicate the strength of the base (i.e. a weak base may present the same shade of pink as a strong base).

PRODUCTS of neutralization are often water and a salt. However, some acid-base combinations may produce a gas or vapour, which **can be toxic**.

Today you will be neutralizing two different acids (one strong and one weak) using an alkaline solution. Your task is to use phenolphthalein to determine and compare the amounts of baking soda solution (base, with a pH of approx. 9.0) required to neutralize a sugar solution (acid, pH of approx. 5.0) and white vinegar (acid, pH of approx. 3.0).

The key to neutralization is **patience**. If you add too much of the alkaline solution too quickly, your results will be flawed.

Safety Precautions:

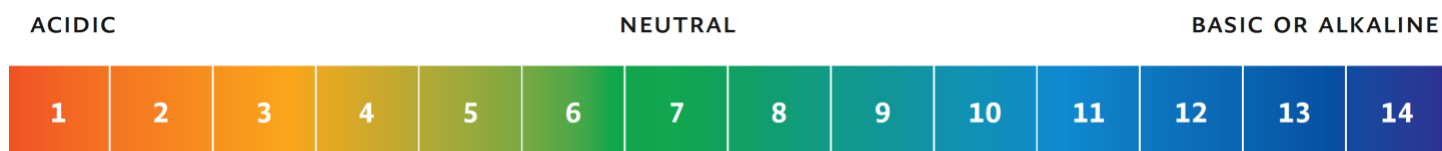
Please wear your safety goggles provided at all times when handling any substance. If any substance should come in contact with your skin, rinse with warm water immediately. Do not mix any substances that you are not directly told to mix, as some mixtures may result in toxic fumes. DO NOT INGEST ANY SUBSTANCES.



Hypothesis:

Before beginning the experiment, please discuss with your group where the following substances are found on the pH value line below:

- baking soda
- white vinegar
- sugar



1. Do you think it will require more baking soda solution to neutralize the sugar solution, or the vinegar?

Why?

Experiment:

Follow your teacher's instructions carefully as you progress through the experiment. Fill out the following information as you go.

Sugar Solution Neutralization

mLs of sugar solution: _____

mLs of baking soda solution required to neutralize: _____

Additional chemical change observations: _____

Vinegar Neutralization

mLs of white vinegar: _____

mLs of baking soda solution required to neutralize: _____

Additional chemical change observations: _____

Questions:

- 2. Does adding water to the sugar or baking soda alter its pH level? Why or why not?

Conclusion

3. Which substance required more alkaline solution for neutralization: the sugar solution, or vinegar? How much more?

4. If it were a constant and linear increase required of alkaline solution for neutralization, how much of the baking soda solution would you expect to need to neutralize stomach acid (pH of 1.0)?

5. More than just a colour change was observed with the baking soda-vinegar mixture. An acid-base neutralization typically produces a **neutral** compound, water, and a salt. However, in this case, it produced a gas rather than a salt.

Please complete the chemical formula below with what you believe was produced by reaction between these two compounds. Please ensure the formula is properly balanced.

(Hint: pure acids generally begin with a “H” and pure bases generally end with “OH”. Neutral compounds typically do not have either attribute).

