

Pink Lemons?



Annotation:

This lab demonstration is useful for discussing neutralization of acids and bases. It can be done after lecture to illustrate the concept or prior to lecture to stimulate thought.

Georgia Performance Standards:

SCSh4. Students will use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

SCSh6. Students will communicate scientific investigations and information clearly.

SCSh8. Students will understand important features of the process of scientific inquiry.

SPS2. Students will explore the nature of matter, its classifications, and the system for naming types of matter.

SPS6. Students will investigate the properties of solutions.

Materials:

Three lemons of comparable size
phenolphthalein, 0.1 M NaOH

Syringe
sharp knife.

Safety:

Demonstrator should use caution with the syringe and wear safety goggles.

Procedure:

One beaker should contain 10 mL of 0.1 M (or weaker) NaOH. Add one drop of the phenolphthalein indicator. The solution should turn from colorless to pink. Draw up a sufficient amount of the pink solution in the syringe and inject it into one of the lemons. Ask students to keep an eye on the lemon that receives the injection.

Next, juggle or shuffle the lemons, reminding the students to keep track of the injected one. Ask the class to point out which lemon has the pink solution in the middle. Be sure to spend a minute or so shuffling or whatever, so the base has plenty of time to be neutralized. Then cut open all three lemons to reveal the color of the inside. Of course, none will be pink because of the neutralization which has occurred.

Key Questions:

1. What do you know about sodium hydroxide?
2. What is phenolphthalein?
3. Why did the phenolphthalein turn pink in the sodium hydroxide?
4. Which lemon is pink inside?
5. Why are none of the lemons pink inside?
6. What is another way we could show this same concept?
7. What is produced when a base reacts with an acid?
8. In this case, which was the base and which was the acid?

Explanation:

The explanation is simple. An acid plus a base always equals salt and water. The salt water is neither an acid nor a base, but a neutral compound.