Making Limestone

Overview: Limestone is a sedimentary rock that is mostly calcium carbonate ($CaCO_3$). In our experiment today, we are doing a simple chemistry experiment that produces calcium carbonate as the product.

What to Learn: Out of all the kinds of sedimentary rocks, limestone makes up 10% by volume. People have used limestone in architecture like the Great Pyramids, castles in Europe, and in early 20th century buildings like banks and train stations. Today we use it as white filler in toothpaste, to build roads, make tiles, in cosmetics, and added to breads and cereal as a cheap source of calcium.

Materials

- Goggles
- Distilled white vinegar (you only need a drop, so use a medicine dropper)
- Funnel
- Straw
- 2 water bottles
- 2 paper napkins
- Calcium hydroxide (also known as "lime") This chemical is irritating to skin and eyes, so use your goggles and gloves when handling since it's a dust. This chemical is toxic and should only be handled by an adult. Find safety information under MSDS Calcium Hydroxide.

DO NOT ALLOW CHILDREN TO DO THIS EXPERIMENT. Limewater is TOXIC. This experiment is for demonstration purposes only by an adult.

STUDENTS: You can watch the video and complete the data table and exercises if you're not able to have an adult do this for you.

Experiment

1. Put on your goggles and gloves.
2. Fill one of your water bottles partway with water.
3. Add a spoonful of calcium hydroxide.
4. Cap the calcium hydroxide and store safely away.
5. Place the cap on the water bottle and shake up the solution. Set aside and do not disturb for several minutes.
6. Fold your napkin into a shape that will fit into your funnel. This is a liner for your funnel that will catch the solids as they are poured into the funnel.
7. Put a little water into your funnel to dampen the paper napkin liner.
8. Place the second (empty) water bottle under the funnel.
9. Pour the limewater solution through the funnel. Don't pour the sludge at the bottom into the funnel.
10. Insert a straw into the water bottle with the strained limewater.
11. Write down the color of the solution. Is it cloudy? Clear?
12. Blow *gently* into the straw for several minutes until you see a color change. **DO NOT INHALE. Limewater is very toxic!**
13. What color did the color change to? Record your observations in the data table.

14. Test the calcite by pouring the solution through a new paper funnel.
15. Place a drop of acetic acid (distilled white vinegar) on the calcite crystals and watch for a slight reaction.

Limestone Data Table

Sample	Observations for Solution	Observation for Calcite Crystals

Reading

Limestone is a sedimentary rock that is mostly calcium carbonate, and some amazing fossils have been found in limestone. In our experiment today, we are doing a simple chemistry experiment that produces calcium carbonate as the product. The calcium carbonate is created from a chemical reaction of the carbon dioxide from your breath mixed with calcium hydroxide. Only 4-5% of your breath is converted into carbon dioxide, so it takes awhile to get enough carbon dioxide through the solution to form the calcite crystals and see the color change happen.

Exercises

1. What element is present in both calcium carbonate and your breath when you exhale?
2. Why aren't kids allowed to do this experiment? What's the danger?
3. Where can you find safety information for chemicals?

Answers to Exercises: Making Limestone

1. What element is present in both calcium carbonate and your breath when you exhale? (carbon)
2. Why aren't kids allowed to do this experiment? What's the danger? (The danger is if they inhale the solution, which is very caustic and toxic.)
3. Where can you find safety information for chemicals? (Look for MSDS sheets under the chemical name.)