

Detonating Bubbles

Student Worksheet

Name _____

Overview: Put on your gloves and safety goggles, kids, because you're in for a wild ride! Let's explode some bubbles!

What to Learn: Today you should learn about the three types of reactions you'll witness: an oxidation reaction, a single replacement reaction, and the highly anticipated exothermic reaction.

Materials

- Goggles
- Gloves
- Test tube rack
- 3 test tubes
- Burner
- Lighter
- Zinc powder (Zn) ([MSDS](#))
- Calcium hydroxide (Ca(OH)₂) ([MSDS](#))
- Rubber tubing
- Measuring spoon
- Solid rubber stopper
- Pan
- Water
- Chemistry stand
- Test tube holder
- 90° glass tubing
- One-hole rubber stopper
- Evaporating dish
- Dish soap
- Wood splint

Lab Time

Be careful of the hot test tubes! It may not look hot, but don't find out the hard way. If a chemist wants to know if something is hot, he places the back of his hand near the surface. If he feels heat, he concludes that it is hot. That's the same way we test a person's forehead for a fever. The back of your hand is more sensitive than the front.

Zinc, zinc oxide, and calcium hydroxide are dangerous chemicals. Use your safety equipment.

1. Place test tube holder into a chemistry stand.
2. Place 3 level spoonfuls of zinc powder (Zn) into a clean, dry test tube. Cap chemical and put it aside. Wash and dry spoon.
3. Add 3 level spoonfuls of calcium hydroxide, Ca (OH)₂. Cap chemical and put it aside. Wash and dry spoon.
Note: this mixture is a fine powder, so do not inhale dust or sneeze nearby.
4. Place stopper on the test tube and shake until mixture is one color (a light gray).

- Remove stopper and insert a 1-hole stopper with 90° glass tube inserted into it. Place rubber tubing on other end of 90° glass tube. Attach test tube to test tube holder on chemistry stand.
- Fill a water bath with water. Place a clean test tube into the water bath and fill it with water. Very carefully place the end of the rubber tube into this test tube. The test tube should stay completely filled with water. Place the mouth of the test tube in the water bath and allow the end to rest on the edge of the water bath so it is at an angle.
- With adult help, light the alcohol burner.
- Evenly heat the mixture of Zn and $\text{Ca}(\text{OH})_2$. Note what happens to the test tube in the water bath.
- Allow the reaction to continue until the test tube in the water bath is filled with gas.
- Turn off the burner.
- Place 1-2 drops dish soap into the ceramic evaporating dish. Fill halfway with water and stir with a rod or measuring spoon until a few bubbles form on top.
- Remove the rubber tube from the water bath and put it in the evaporating dish.
- Re-light the alcohol burner and fill the evaporating dish 1/3 full with hydrogen bubbles.
- Turn off flame.
- Use a straw and your breath to fill the rest of the dish with oxygen bubbles.
- Move stand out of the way and light a long match or splint. Bring it close to the bubbles, observe, and listen!

Cleanup: The product of this reaction was water and dish soap, so it can be rinsed down the drain. Clean everything thoroughly after you are finished with the lab. After cleaning with soap and water, rinse thoroughly. Chemists use the rule of “three” in cleaning glassware and tools. After washing, chemists rinse out all visible soap and then rinse three times more. Dry all equipment.

Storage: Place all chemicals, cleaned tools, and glassware in their respective storage places.

Disposal: Dispose of all solid waste in the outside garbage. Liquids can be washed down the drain.

Detonating Bubbles Data Table

Reaction (Write the three chemical equations from today's lab)	Type of Reaction	Observations

Exercises Answer the questions below:

1. Describe the two reactions that happened when you heated calcium hydroxide and zinc.
2. How do you know a gas was produced in this experiment?
3. Why do embers in a campfire blaze up when you blow on them?
4. What was the equation when hydrogen (H_2) combined with oxygen (O_2) to make water? Make sure to balance the equation so there are the same number of atoms on each side.
5. How do you know the equation in question #4 produced an exothermic reaction?

Exercises

1. Describe the two reactions that happened when you heated calcium hydroxide and zinc. (First, calcium hydroxide produced calcium oxide and water when it was heated: $\text{Ca(OH)}_2 \rightarrow \text{CaO} + \text{H}_2\text{O}$. Then, zinc combined with the water and made zinc oxide and hydrogen gas: $\text{Zn} + \text{H}_2\text{O} \rightarrow \text{ZnO} + \text{H}_2$)
2. How do you know a gas was produced in this experiment? (Bubbles formed in the test tube contained in the water bath. The test tube was completely full of water but the gas displaced the water.)
3. Why do embers in a campfire blaze up when you blow on them? (Your breath actually contains more oxygen than carbon dioxide, and the oxygen causes the flame to burn brighter.)
4. What was the equation when hydrogen (H_2) combined with oxygen (O_2) to make water? Make sure to balance the equation so there are the same number of atoms on each side. ($\text{H}_2 + 2\text{O}_2 \rightarrow 2\text{H}_2\text{O}$)
5. How do you know the equation in question #4 produced an exothermic reaction? (Light, heat, and sound were produced.)

Closure: Before moving on, ask your students if they have any recommendations or unanswered questions that they can work out on their own. Brainstorming extension ideas is a great way to add more science studies to your class time.