

Chemical Reaction Lab – Zinc and Hydrochloric Acid

(100 pts.)



Team Names: _____ Date: _____

INTRODUCTION: Mr. Hanson will give you some instruction on the elements used in this Single Displacement Reaction Experiment.

Problem: When zinc (Zn) and hydrochloric acid (HCl) are combined, liquid zinc chloride (ZnCl_2) is produced. In addition, a gas is produced.

Hypothesis: What is the gas that is produced in this reaction?

Materials:

- 125 ml flask
- Bic Lighter
- Hydrochloric Acid
- Meter stick
- 8 grams of Zinc
- Paper cupcake holder for Zinc
- Rubber Stopper
- Balloon
- Apron, gloves & Goggles
- Digital scale
- Vernier LabQuest 2
- Temperature Probe
- Beaker of water to wash the probe.

Procedure:

Mr. Hanson will demonstrate how to use the materials and equipment.

CAUTION: HYDROCHLORIC ACID CAN BURN THE SKIN. HANDLE WITH CARE.

*****Take out a piece of paper you can record temperatures, and the mass in grams of your zinc. Also, you will need to write down your observations of the reaction.

1. Take the balloon and blow it up to stretch it out. Stretch out the mouth of the balloon also so it will be easier to get over the mouth of the flask.
2. All materials are in your brown bin. Put on safety equipment. All students wear goggles. The student who works with the Hydrochloric Acid will use gloves and an apron also.

3. Go to the lab station where the flasks of HCl are located – they are labeled. Pour 50 mL of HCl in your flask and place a rubber stopper on the flask. If any spills immediately let Mr. Hanson know and he will immediately clean it up.
4. Take the flask back to your lab table and secure it in the plastic basin.
5. Measure out 8 grams of zinc in your paper cupcake holder, using the Triple Beam Balance scales on the lab table, and bring the zinc back to your lab area. Write down the amount of zinc you have in grams.
6. Turn on the Vernier LabQuest 2 and measure the temperature of the HCl and record it in the Results section below by writing "Start Temperature". Then place the probe in the beaker of water and stir to clean it off – wipe off with a tissue. Turn off the LabQuest 2.
7. Carefully drop 8 grams of zinc into the flask with the HCl (tilt the flask to allow the zinc to slide down.)
8. Immediately place the balloon over the mouth of the flask. The lab partner with the gloves will hold the balloon in place so it does not come off the mouth of the flask.
9. Allow the balloon to fill up with the gas for about 5-7 minutes. Time it.
10. Turn on the LabQuest 2.
11. When the balloon is full of gas, you will need to carefully take it off the flask so that no gas escapes from the balloon, and tie the balloon. Someone in your group must know how to tie a balloon – but be careful you do not let any gas escape.
12. Place the temperature probe in the flask in with the zinc reaction and measure the temperature after 1 minute. Record the temperature in the Results section below writing "Final Temperature". Then place the probe in the beaker of water and stir to clean it off – wipe off with a tissue. Turn off the LabQuest 2.
13. Clean up and dispose of your products in the proper container labeled by Mr. Hanson (Used Hydrochloric Acid, and used Zinc). Rinse out the flask at least 5 times and place it upside down on the drying rack at the sink. Insure everything is placed back in your brown bin and that your LabQuest 2 is turned off. Do not throw away the gloves. Mr. Hanson will show you how to take them off.

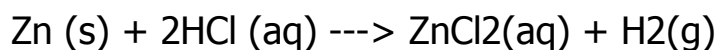
14. Insure that you do not play with the balloon. Have someone hold it until Mr. Hanson is ready to show you the next part of the experiment. Remember to write down all observations of what happened to the HCL and the Zinc during the chemical reaction.

Results:

1. What happened when you combined the HCl with the Zinc? Describe in detail what you saw.
2. What happened when you put the balloon on the lit candle? Describe in detail what you saw.
3. What was the beginning temperature of the Hydrochloric Acid, and what was the ending temperature after the zinc was added and you took the balloon off the flask?
4. Was this reaction exothermic or endothermic, and why?

Conclusion:

1. Write out the chemical equation for the reaction that took place. (Balance it too!)
2. What were the reactants in this lab?
3. What were the products in this lab?
4. Is Zinc (Zn) an element or compound? How do you know?
5. Is Hydrochloric Acid (HCl) an element or a compound? How do you know?
6. What type of gas was produced in this lab? How do you know?
7. Was the gas produced a reactant or a product? Explain?
8. This lab showed a chemical change occurring. What do we mean by a chemical change?
9. If this reaction were allowed to continue, eventually all of the zinc would disappear. But the Zinc atoms didn't really go away. Where did they go?
10. In your own words, explain the following chemical reaction equation:



11. This reaction is called a Single Displacement Reaction. Why?