

# Activity # 1

Name \_\_\_\_\_

Date \_\_\_\_\_

Date due \_\_\_\_\_

## Activity 8C - Preparing the Element Hydrogen

### Purpose

In this experiment you will prepare some hydrogen gas and examine some of its properties.

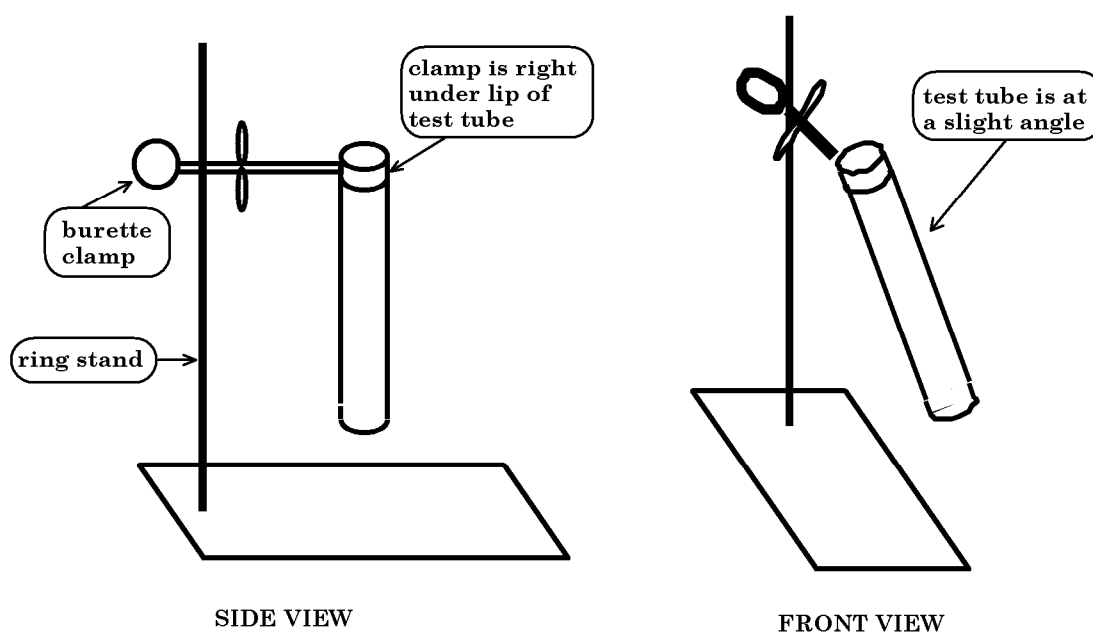
### Materials and Equipment

safety goggles for each person  
1 ring stand and burette clamp  
2 18x150 mm test tubes-with lips (*These can be put into a rack*)  
1 10 mL graduated cylinder  
1 400 mL beaker  
1 stopper & rubber hose apparatus (supplied by teacher)  
a small sample of mossy zinc (supplied by teacher)  
10 mL of 3M (dilute) hydrochloric acid (HCl) (supplied by teacher)  
2 wooden splints  
a source of flame (candle or bunsen burner) to light splints

### Procedure

1. Read through this whole procedure before you start. (Your teacher may go over it with you.)
2. Get a pair of safety goggles for each person. ***You must wear these throughout the lab!*** You may also wear a lab jacket or apron.
3. Clamp one 18x150 mm test tube to a burette clamp. Make sure the clamp is right at the top of the tube, underneath the lip. Clamp the burette clamp to a ring stand so that the test tube is at a slight angle and the bottom is not quite touching the base. (See the diagram on the next page of this lab.)

4. Take your 10 mL graduated cylinder to the teacher. Your teacher will give you some (~5-8 mL) of 3M hydrochloric acid. Be careful with this acid. Make sure it does not spill on your skin or clothes. If it does, immediately wash it off and notify the teacher!
5. Carefully pour the hydrochloric acid from the graduated cylinder into the test tube that is clamped to the ring stand. After you have finished pouring, rinse the graduated cylinder with tap water and pour the rinse water into the sink.
6. Now take the stopper with the rubber hose and insert it into the clamped test tube. Take a 400 mL beaker and fill it about 3/4 full of tap water. Put it beside the ring stand and adjust everything so that the end of the rubber hose will reach into the water to near the bottom of the beaker. Your teacher will demonstrate how to set this up.



7. Fill the other test tube (the one that is **not** clamped to the ring stand) to the top with water. Put your thumb or finger over the top of the test tube and invert it in the beaker with water. Take your thumb or finger off once the test tube is inverted in the water. Make sure the end of the rubber hose will reach the open end of the test tube. You will be using this test tube to collect hydrogen gas by displacement of water.
8. Make sure everything is clamped tightly and securely.
9. Obtain a small amount of mossy zinc from your teacher. Make sure you and everybody around you has goggles on! Remove the stopper from the test tube and carefully add a small amount of zinc to the hydrochloric acid in the test tube. Quickly replace the stopper on the tube. Make sure it is tight but don't press hard enough to break anything!

10. Make sure the end of the rubber hose in the 400 mL beaker is right under the open end of the test tube. Bubbles of hydrogen gas should go into the test tube and force the water out.

12. Observe the colour (if any) of the hydrogen gas. Note it here!

The hydrogen gas is \_\_\_\_\_.

11. After all the water has been forced out of the test tube and it is full of gas, place your thumb or finger over the open end and bring it out of the beaker. Hold the test tube upside down (with the open end down). Keep your finger or thumb on until your partner lights a wooden splint.

12. Now turn the test tube right side up and take your thumb or finger off and hold it for about 10 seconds.

13. Make sure the test tube is **not** pointed at yourself or at anyone else. Put the burning splint a couple of centimeters into the test tube. You should hear a popping sound.

14. After the popping, do you notice any condensation (steam) inside of the test tube. \_\_\_\_\_

What appears to be happening to the temperature of the test tube? \_\_\_\_\_

15. You may collect more hydrogen and repeat the test with the burning splint as time permits. UNDER NO CIRCUMSTANCES are you to use any more zinc or hydrochloric acid than the teacher gives you!

16. Take your equipment apart. Dump the water from the beaker into the sink. Dump the remaining acid in the test tube into the sink being careful not to dump larger pieces of zinc into the sink. Rinse the test tube with water. Discard any zinc remaining in the test tube in the garbage can. Clean this test tube with a test tube brush in warm soapy water to remove any stains.

Put all equipment in the places shown to you by the teacher. Wipe the lab table with damp paper towel. Wash your hands and face with warm soapy water and dry with paper towel. Discard all paper towel in the waste paper basket.

## Questions

You can answer these questions right on this paper and hand the whole lab in when you're finished.

1. Substances which are mixed together to produce a chemical reaction are called **reactants**. What two substances were mixed in order to produce the hydrogen gas?

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These are the **reactants** in this reaction.

2. Why was it important to wear goggles throughout this experiment? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
3. What forced the water out of the test tube that was in the beaker? \_\_\_\_\_  
 \_\_\_\_\_
4. What colour is hydrogen gas? \_\_\_\_\_
5. When the hydrogen was sitting in the test tube for 10 seconds, it was mixing with air. The reactive gas in air is **oxygen**.  
 When the hydrogen gas was lit with the flame it reacted with the \_\_\_\_\_  
 gas in the air.
6. When hydrogen reacts with oxygen it produces a common liquid. What do you think this liquid is? \_\_\_\_\_
7. Why would it not be advisable to produce large amounts of hydrogen in the lab?  
 \_\_\_\_\_

### Summary

Write a short paragraph summarizing what you did in this experiment. This must be done in complete sentences with proper usage and spelling. Your summary should be brief and to the point but should contain the following:

purpose of the experiment

what was mixed (reactants) and what was produced (product(s)) in each reaction

(in this experiment there were two different reactions, one when zinc was put into the test tube and another one when the hydrogen was lit.)

the safety precautions taken

what new information you have learned from this experiment

what questions you might have as a result of doing this experiment

what you personally felt about this experiment (be honest!)

You may use the rest of this page to write your summary. If you need more space, finish it on another sheet of paper and staple it to the back of this hand-out. Hand in this whole hand-out to the teacher when it is complete. Make sure your name is on the top!