

Light Activated Reaction

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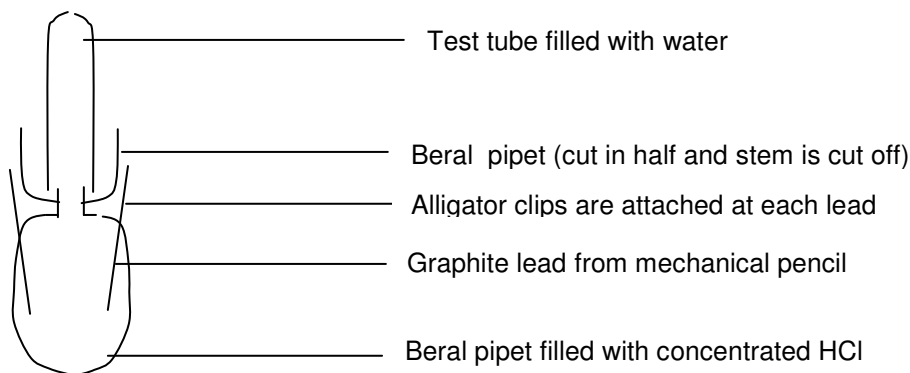
I first saw this activity demonstrated by John Little at a Chem 5 TORCH Workshop in 1995. It can be used to demonstrate a light activated reaction, activation energy, reaction mechanisms, and electrolysis.

Safety: Use a thick walled Pyrex #9860 test tube. Wrap the outside of the test tube with Scotch Tape and perform the demonstration behind a safety shield. Use chemical resistant gloves and chemical splash goggles when working with hydrochloric acid. Follow Flinn method #24b for disposal of the hydrochloric acid.

Materials:

1 test tube (Pyrex #9860)	2 graphite leads used in mechanical pencils
1 cork to fit test tube	2 wires with alligator clips
1 ping pong ball (hot glued to cork)	1 9-volt battery
1 bulb from a Samco #234 pipet	110 camera with flash
1 Beral pipet with tip cut off	Concentrated HCl
1 ring stand with test tube clamp	

Step 1: Collection of H₂ and Cl₂ gases.



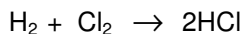
Use hot glue to attach the ping pong ball to the cork.

The above diagram shows the setup for collection of gases. The tip is cut off of a Beral pipet and the pipet is filled with concentrated HCl. Two holes are made in the pipet so that the graphite leads can make contact with the HCl. The stem is cut off of the bulb of a larger pipet and the bulb is cut in half. The half with the hole is placed on top of the Beral pipet. Fill with water. Place the apparatus in a test tube holder. A test tube filled with water is inverted into the the pipet. Using alligator clips, the leads are connected to a 9 volt battery. This generates the two gases. The gases are collected into the test tube by water displacement. Since chlorine gas is soluble in water, refill the test tube with the displaced water and fill the test tube again. This should insure the test tube has enough chlorine gas for the reaction to occur.

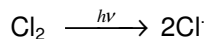
Step 2. The reaction.

When the test tube is filled with the gases remove it from the holder and gently stopper it with the cork. Use a test tube holder to clamp the test tube to a ring stand. Place the flash directly next to the tube and “take a picture” of the test tube. The UV light from the flash activates the reaction between the two gases and the cork flies out of the test tube. The ping pong ball makes it easier to see the cork.

The reaction that takes place is:



This is a multi-step reaction in which the first step requires light.



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