Hydrogen Generator Assembly Instructions

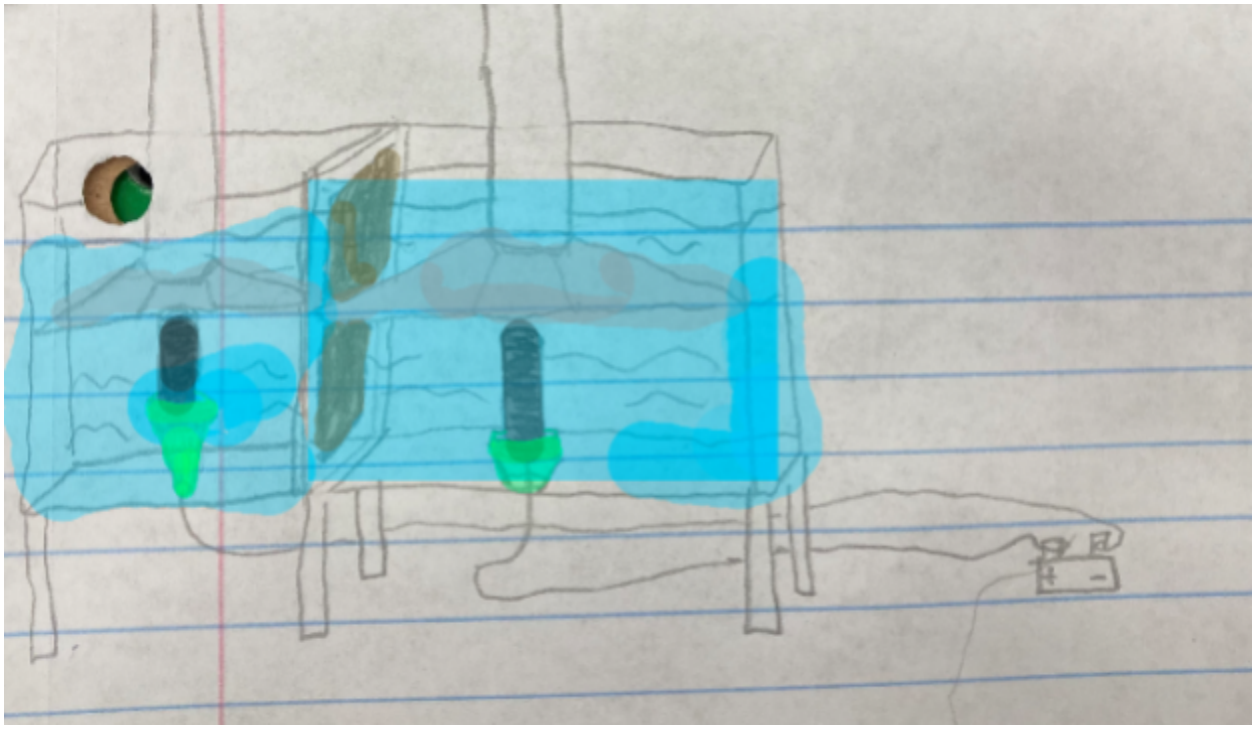

Table of Contents:

Overview and Purpose

This product is an interactive experiment that demonstrates water electrolysis and its uses in a simple, clear to understand way. There are three major components of this system.

Generator

The generator is made up of 5 outer walls and 2 inner walls meant to secure a membrane that promotes movement of ions. It includes two chemically inert graphite rods secured with a holder that is held in place with a clear sealant. Wrapped around the rods is copper wire that delivers electricity to them. Solid sodium hydroxide is also included as an electrolyte for the system.

Collection System

The collections system is a loose collection of parts meant to capture the hydrogen. It includes tubing, two funnels with wires to attach them to the box, a syringe to pull air out of the system and water in, a box, and a beaker.

Hydrogen Usage

Meant to demonstrate the energy potential of hydrogen, a rocket system is utilized that includes a rocket body, a fuse, a stand for the rocket, a battery, wires, and a button switch.

When all of these components are put together, a system is formed that uses water to generate, collect, and combust hydrogen.

Assembly Instructions

Generator/Collector

Place the clear box containing black rods on a table with the open end facing up. Attach the negative wire from the double a battery setup to the wire coming out of the cathode side of the box. Wait to attach the other wire to the other side. In a separate container pour in 100g of the sodium hydroxide provided in the kit to 700ml of water. Stir until the solution becomes clear (may take a while). Attach one end of a tube to the funnel provided. Attach the other end to the syringe. Place each of the wires attached to the funnel in their respective slots in the box. Repeat this process for the other funnel on the other side of the box. Pour the sodium hydroxide solution into the box that was prepared earlier. Fill the large clear box labeled “WATER” with water. Turn the beaker provided in the kit sideways and dunk it under the water so that all the air that was in it has been replaced by water. Leaving it under water, turn it so that it is completely upside down. Take the tube attached to the cathode side funnel, and attach the syringe from the kit to the side that is not already attached to the funnel. Pull the syringe as far as it will go, and leave it there. Use the clamp from the kit to clamp the tube below the waterline so that the sodium hydroxide solution in the tube doesn’t fall back into the generator. Detach the syringe and empty it into a sink. After emptying, reattach the syringe to the same tube it was on before. Release the clamp, and pull the syringe again until the sodium hydroxide solution is in the syringe. Secure the clamp on the tube as close to the end as possible, and remove the syringe again. Holding the end of the tube with the clamp on it, dunk it under the same water the beaker is in. Turn the tube so that the clamped end is facing directly upwards to ensure there is absolutely no air in the end of the tube. Release the clamp making sure the end of the tube stays under water. Move the end of the tube so that it is fully inside the beaker facing upwards. Connect the other wire of the battery pack to the remaining wire on the generator. At this point the process should be started and you should be able to see bubbles appearing on the rods. Look at the beaker and disconnect the wires when the hydrogen being collected nears the bottom of it.

Rocket

Keeping the beaker upside down, remove it from the water and slide the metal circle in the kit under the opening. Take the rocket from the kit and hold it in the air with the open end facing the ground. Have a partner flip the beaker over so that the end with the seal on it is slightly inside the rocket. Remove the seal and the hydrogen will rush into the rocket, displacing the air in it due to it being 14x lighter. Screw on the seal to the can. Making sure you’re outside and on a flat surface, place both feet of the fuse from the kit into the holes on the wooden platform also in the kit (make sure the feet of the platform are on the ground). Place a 9V battery in the orange plastic box with long wires coming out of it. Attach each wire to a leg, making sure you are attaching them to the part of the leg that is underneath the wooden platform. Carry the orange box as far away from the

setup as the wires will allow. Take the sealed rocket, and hold it with the sealed end facing the ground. Screw off the seal and place it on top of the platform with the open end touching the platform centered on the fuse. Quickly return to the orange box, and flip the switch to ignite the rocket.

Lessons

Water Electrolysis

This kit is an excellent hands-on experiment that demonstrates the splitting of water into its components. However there is more going on than what you can see. This lesson will show students the importance of variables such as dissociation, ionic conductivity, and molar ratios.