

GE 15EHG2B1

Caution! Danger! Flammable gasses produced! Ignoring these and other warnings, I frantically dug through annoying foam peanuts to get to what I had won for \$250 on Ebay: a 1971 hydrogen generator that originally retailed for thousands of dollars. It smelled like old metal and warm plastic. It didn't yet work, but was already more promising than the generators I had built from scratch during the two previous summers. Originally, I'd wanted a source of hydrogen gas to operate motors and fill up balloons (there's something magical about making your own hydrogen and using it to float objects miles away from you), but after two failed attempts, my new goal was simply to get a generator running. My first home-built effort resulted in a generator that was slow, leaky, and had tepid and wet hydrogen output due to electrical resistance. The second was a Plexiglas and copper-pipe beast, which I prevented from leaking by using generous amounts of "Mr. Sticky's Underwater Glue." The behemoth transformed our carport into a vivid turquoise mess of oxidized copper, and was hauled to the dump after many near misses and a few direct hits from our family car.

The behemoth also transformed me. Sometimes, whole days revolved around trying, for example, to find a desiccant that was affordable, indicated, and would dry my hydrogen to the requisite low ppm water range. Since buying a replacement part was never an option, I would always resort to my own "solutions." One day, I called at least seven different companies hoping to track down the old user's manual. Luckily, someone led me to Larry Moulthrop, a former GE higher-up who helped design my machine. He gave me the instructions for a similar model, if and only if I promised to give him weekly updates on the generator. (We are still in contact!) Other days went to the never-ending series of new problems to wrangle with, such as cooling the metal hydride storage tank, fixing the relay that controlled current to the cell, and finding a way to get homemade lab-grade water. The "solution" always involved an element of surprise combined with compromise, and resulted in something I inevitably jury-rigged.

I have found that this process of unending challenges and proposed solutions is the spirit of science itself, and I love it. The problem in question doesn't even have to center around a favorite project in order to cause me to lose sleep at night. For instance, there are times when the shortest science reading assignments become huge challenges as I seek to fully understand the principles that explain why a statement in the book is true. At one point, I was trying to understand how my generator made hydrogen gas using its PEM (a proton-conducting plastic membrane). To avoid thinking about it as I tried to fall sleep, I told myself that the protons squeezed through "Swiss-cheese" like holes in the plastic. The next day, after I figured out that my assumption was incorrect and after having done hours of research, the answer clicked: the plastic was transporting protons from one embedded sulfonic acid group to the next.

Today, the General Electric **15EHG2B1** hydrogen generator still sits in the laundry room and is constantly used for balloons, for fire shows, to fill up tanks, for fuel cells, and for countless other experiments. To me, the generator has not only been a fun toy to tinker with, but has also led me to many other scientific endeavors. In addition, it stands as a testament to my belief that if something is built well and taken care of, it can last as long as you want it to. I plan to keep the rusty box in running shape for as long as I possibly can.