

Tips on How to Maximize the Power of your Fuel Cell

The fuel cell for the National Middle School Science Bowl is a four-cell fuel cell. You should receive a minimum of 2.8 volts and up to 4.0 volts when the fuel cell is providing electricity to the motor. You can check the voltage of your fuel cell by hooking the leads to a multimeter and take measurements. If you are receiving less electricity than this, try some of the following procedures.

1. During the electrolysis of the water the hydrogen and oxygen produced will displace the water in the fuel cell. Be sure you have allowed as much water as possible to be displaced in the fuel cell during electrolysis. When you begin using the fuel cell each day, it is important to fill the chambers next to the membranes with water. This hydrates the membranes so they can work efficiently and electrolyse. However, when you begin to use the fuel cell as an energy provider, having water on the membrane blocks some of the reaction. The excess water you put into the chamber initially results in a drop in the output of the fuel cell.

We recommend that the first time you use the cell each day, open the input valve that is used for purging (the one not connected to your storage) and electrolyse for about 10 minutes. You might see water coming out of the fuel cell. If you are going to use syringes as your storage container or some other storage that does not allow an overflow of hydrogen to bubble out, you might want to electrolyse for as long as 20 minutes before closing the system.

2. Do **not** add water each time you electrolyse. With this fuel cell it is possible to electrolyse for up to an hour continuously with no visible water in the cell. Only add water when you do not see any hydrogen or oxygen being produced when you connect the battery to the fuel cell. If it is electrolysing, it does not need additional water.
3. Be sure you use only Distilled Water or Deionized Water. Any other water will damage the membrane. Also, be sure that the storage you use is clean. If you use balloons, for example, they must not have any powder in them because the hydrogen will move the powder into the fuel cell causing damage. Make sure your hands are clean!
4. USE your fuel cell. Do not save it for race day. Fuel Cells take some time to become broken in – with all of the membranes saturated and working correctly. A used fuel cell is likely to have more power than a brand new fuel cell – as long as care has been taken to use only clean water and clean hydrogen and oxygen.