

assembly and operating instructions

PREPARATION

Items you will need that are not included in this kit:

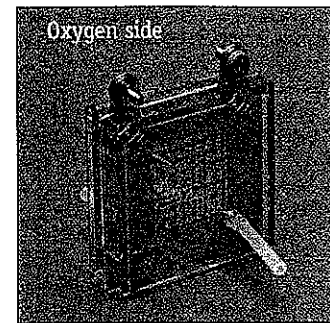
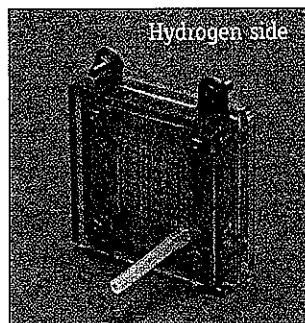
- 2 AA batteries
- 100 ml distilled water (you can purchase this at your local grocery store; **purified water is NOT the same—it must be DISTILLED or DEIONIZED**)

STEP 1

Remove the back of the battery power pack.
Insert two AA batteries.

STEP 2

Snap the wheels and the motor cover onto the chassis. You must press the wheels firmly. It may seem like they are going to break, but they won't.

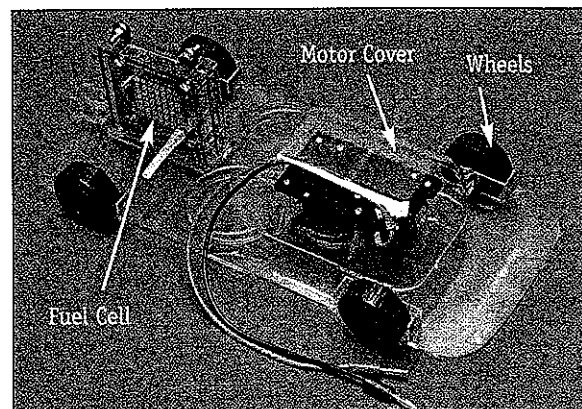


STEP 3: Attach a small tube to each side of the fuel cell.

STEP 3

Attach the small tube with the black plug to the lower nozzle on the hydrogen side of the fuel cell. Attach the small tube with the red plug to the lower nozzle on the oxygen side of the fuel cell. Remove the plugs from the tubes.

NOTE: An alternative method is to position the small tubes at the top of the fuel cell, but for this car, setup will be easier if placed as shown.

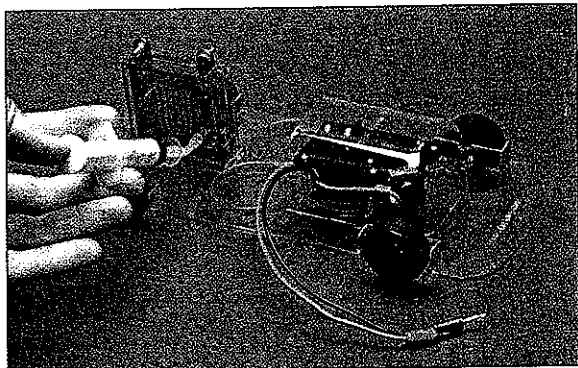


STEP 4: Insert fuel cell into car chassis slot.

STEP 4

Insert the fuel cell with the attached tubes into the rectangular slot on the car chassis.

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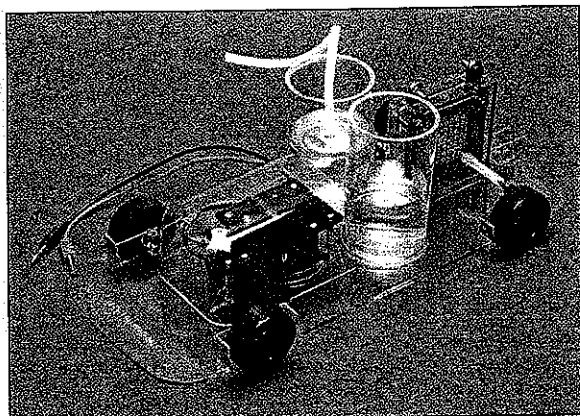


STEP 5: Push water through the fuel cell with the syringe.

STEP 5

Using the syringe, push water (about one ml) into the hydrogen side of the fuel cell until you see water filling the chamber in front of the screen. The syringe may not fit snugly into the tubing, in this case line up the tube with the syringe as best you can. You may spill some drops of water.

Repeat on the oxygen side of the fuel cell.



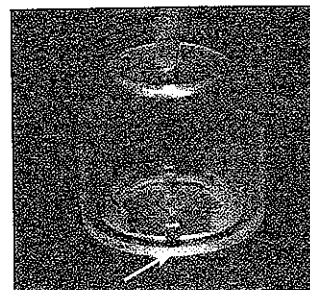
STEP 6: Fill the cylinder to the zero mark and attach to the car chassis.

STEP 6

Insert the hydrogen and oxygen outer storage cylinders into the round slots on the chassis. Fill the cylinders with distilled water to the zero mark on each of the cylinders. Insert the inner cylinders into the outer cylinders so the inner cylinders are filled with water.

There are two notches at the bottom of each of the inner cylinders. Be sure these are not blocked by the raised plastic frame for the inner cylinders.

The opening allows gas to escape the inner cylinder into the outer cylinder for storage. Push on the top of the inner cylinders to be sure they are fit snugly onto the rim at the bottom of the outer cylinder.

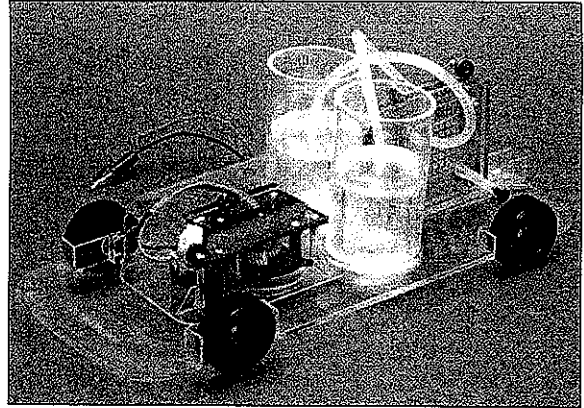


Two notches should not be blocked on inner cylinders.

continued

STEP 7

Attach the long tube coming from the top of the hydrogen storage cylinder to the upper nozzle on the hydrogen side of the fuel cell. Repeat this on the oxygen side of the fuel cell. We prefer to put the hydrogen cylinder on the car chassis on the side opposite the hydrogen side of the fuel cell so that the tubes cross, giving the fuel cell and cylinders a little more stability.

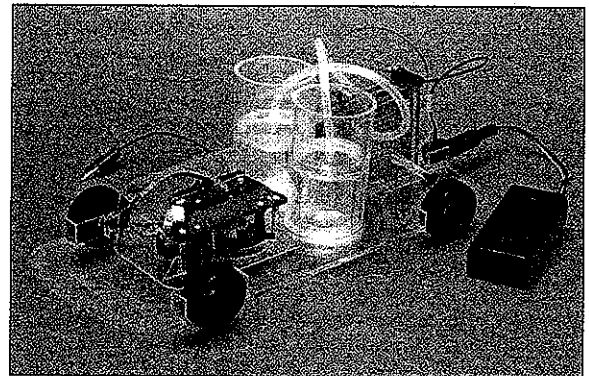


STEP 7: Attach the long tubes from the cylinders to the fuel cell.

STEP 8

Attach the plug from the battery pack into the power jack on the front of the car chassis. Insert the red and black wires from the power jack into the red and black banana jacks on the fuel cell.

WARNING: If you accidentally reverse the red and black wires when connecting the power, you will destroy the fuel cell.



STEP 8: Attach the power supply to the battery pack.

STEP 9 - ELECTROLYSER MODE

Hydrogen and oxygen are invisible. You will know gas is being produced when water is displaced to the top of the inner storage cylinders. You can measure the gas produced by measuring what looks like empty space increasing in the bottom of the cylinders, or by measuring the amount of water displaced to the top of the cylinders.

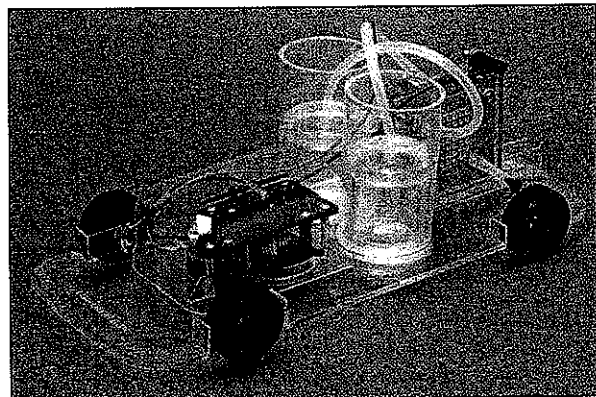
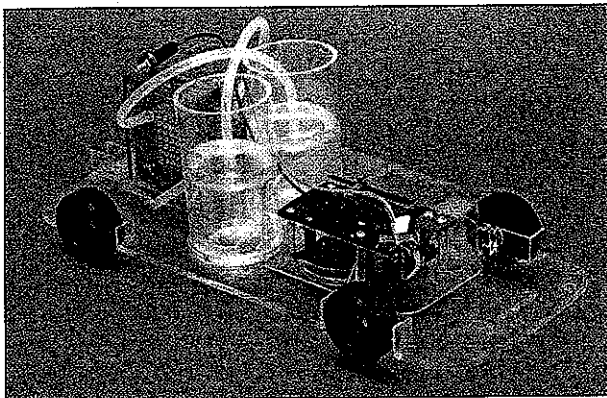
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STEP 10

When the hydrogen cylinder is filled, you will begin to see bubbles being released from the top of the hydrogen cylinder. Turn the battery pack off. Unplug the wires from the fuel cell and remove the power jack from the front of the fuel cell.

STEP 11

Plug the red and black wires from the car motor to the red and black banana jacks on the fuel cell. Put the car on a flat surface and watch it go! When the car hits a barrier, it will turn 90 degrees and keep moving. Note: You will not have maximum performance until you have used the car three or four times. This is because the PEM membrane becomes better hydrated once it has been used. You can produce hydrogen and oxygen two or three times before adding additional water to the fuel cell. Just be sure the reservoir is at least 3/4 full with distilled water before electrolyzing.



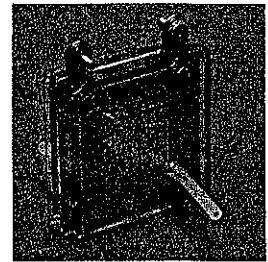
STEP 11: Assembled car,
right and left views.

STEP 12

When you are finished working with the Intelligent Fuel Cell Car, shake excess water from the fuel cell. Disconnect the power jack from the battery pack. Remove the batteries from the battery pack.

tips for success

1. **Your car will run for a longer period of time if it is on a smooth surface.** If it is on a rough surface, like a carpet, it has more resistance and will go slower and for a shorter period of time. Also, turning requires a larger amount of energy for the car, so **the fewer turns it has to make, the longer will run.**
2. In electrolyser mode, make sure you **fill the fuel cell with water each time you use the electrolyser.** It is normal for your fuel cell to have minimal power the first few times you use it. This is because the fuel cell is not well hydrated. Go through the complete cycle of electrolysis/car motor a number of times before you do any initial measurements.
3. **Make sure the small outlets on the inner cylinders are not blocked** by the plastic rim on the bottom of the outer cylinder. The water uses these small holes to escape to the outer cylinder. Hydrogen and oxygen are lighter than water, so they flow to the top of the inner tube and the water has to go somewhere. If these small holes are blocked, too much pressure will build in the fuel cell and you can damage the fuel cell.
4. When you run the fuel cell multiple times, water in the upper part of the outer cylinder might not descend to the inner cylinder. This is because a vacuum has been created in the tubing. **Disconnect the tubing from the upper nozzle of the fuel cell and the water will descend into the inner cylinder.**
5. **It is very important to only use distilled or deionized water.** Other water includes minerals that will destroy the membrane. If you see brown or orange rust forming in your fuel cell, that means someone did not use distilled water.



NOTE: For easier assembly, we attach the small tubes to the bottom of the fuel cell.

An alternative method is to attach the small tubes to the top of the fuel cell.

Either placement will work fine on a small fuel cell, but on a large fuel cell stack, the exhaust tubes should be on top.