

Student Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Activity Sheet 1: Build a Hoffman Apparatus

1. Make a pipette stand (as shown) by bending a piece of copper insulated wire into the desired shape. The stand will need to hold two pipette bulbs upright.
2. Cut off the stem of two pipettes so that about 0.5 cm of each stem remains.
3. Using a push pin, poke one small hole in the top of each of the pipette bulbs.



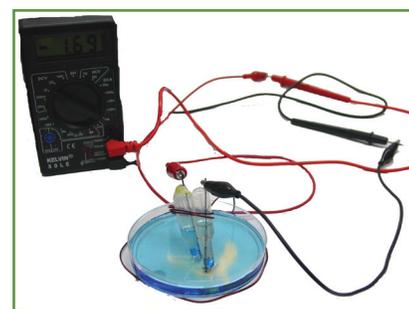
4. Carefully push one piece of graphite through each of the holes.
5. After pushing the graphite pieces through, cover each hole with a small piece of Para film or playdough, so that pipettes remain water and gas tight. Be sure that the graphite pieces protrude slightly from the stem.
6. Fill the Petri dish half full with saturated  $\text{Na}_2\text{SO}_4$  solution (already mixed with bromothymol blue).



7. Place the prepared pipettes into their wire holder and turn all upside down. Using an uncut pipette, fill both bulbs with the same solution as is in the Petri dish.

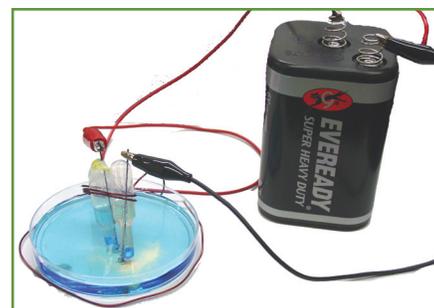
8. Turn the pipettes (and their holder) so that the open ends are immersed into the solution in the Petri dish.

9. Using the alligator clip wires, connect each graphite pieces to the volt meter (as shown). Turn switch on volt meter to 20 DCV. Be sure the red wire is in the middle hole and the black wire is in the bottom hole on the volt meter.



Record the voltage here \_\_\_\_\_

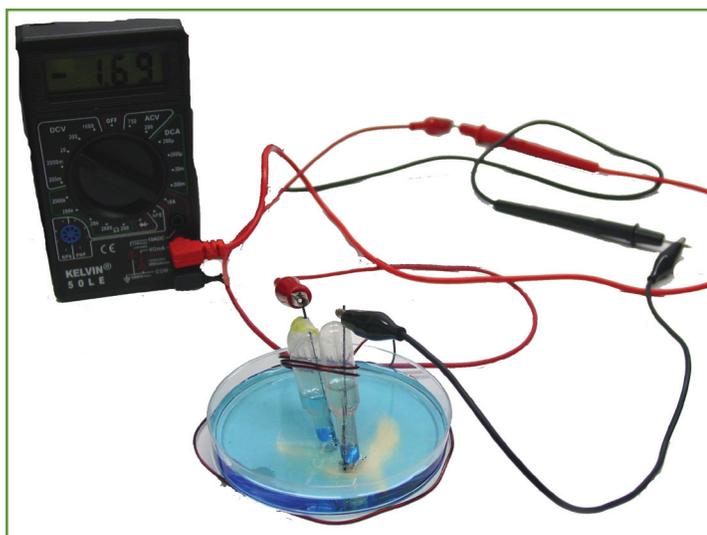
10. Using the alligator clip wires, connect each graphite pieces to the battery (as shown).



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## Activity Sheet 2: Convert your Hoffman Apparatus into a Fuel Cell

1. Be sure your Hoffman Apparatus has had a chance to run for about 2 minutes.
2. Connect the red and black wires to the voltmeter and set the meter to DCV (20).
3. Disconnect both alligator clips from the battery.
4. Prepare to start timing and recording data immediately after connecting to volt meter (see chart below). Record a voltage every 15 seconds.



5. Connect the alligator clips to the volt meter wires as shown. Begin recording data.

Time	Voltage	Time	Voltage
0 sec.		1 min..	
15 sec.		1 min. 15 sec.	
30 sec.		1 min. 30 sec.	
45 sec.		1 min. 45 sec.	

## Activity Sheet 1: Build a Hoffman Apparatus

Record any observations that you believe may be evidence of a chemical reaction in the left hand column. On the right, record your ideas about what might explain these observations

Observation	Hypothesis/Explanation
1	
2	
3	
4	

