

Nombre _____

Fecha _____

Overview:

The purpose of a Biodigester is to harness the methane gas that microbes in manure produce as they break down the manure in order to burn it for cooking. To do this we will build an apparatus that will hold the manure/water slurry and store the methane that the microbes will make.

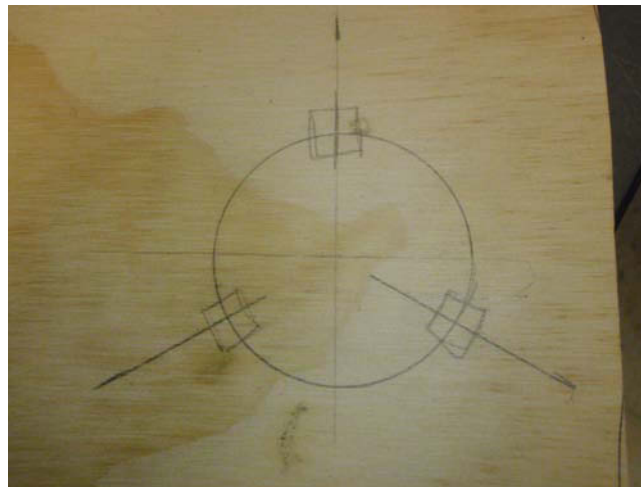
Instructions:

1) Cut base to dimensions: 12" x 7"

Layout the Uprights:

2) 2" from one of the 7" edges draw a line parallel to that edge and approximately perpendicular to the 12" edge

3) Measure 3.5" down from the 12" side and make a mark crossing the line from step 3

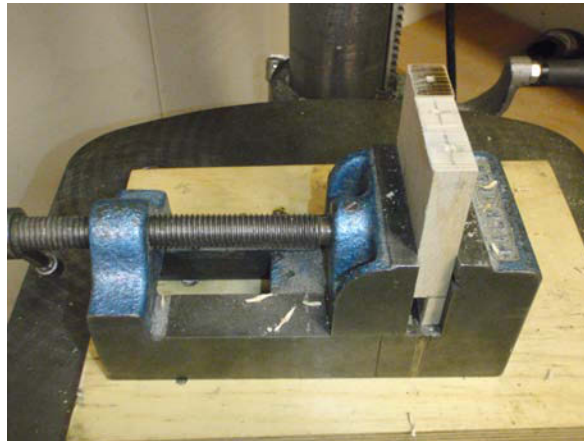


4) Using a compass, draw a circle with radius 1 1/8" and with center at the intersection you made in step 4

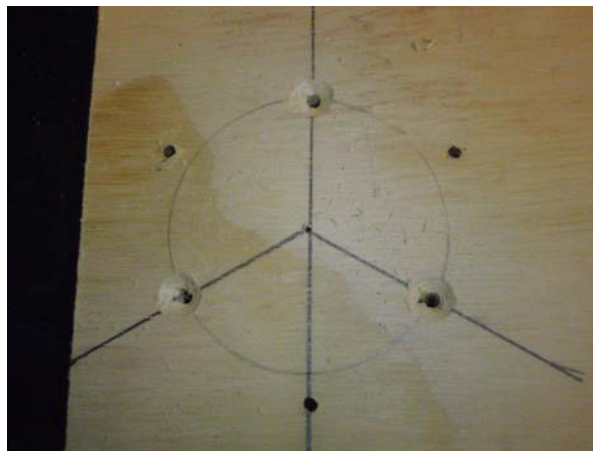
5) Make the marks for the uprights: make three marks on the circle 120 degree apart (recognize that you will want to have the spout of your manure bottle running the length of the base, so make your marks for the braces so they won't interfere with the spout)

Make the Uprights:

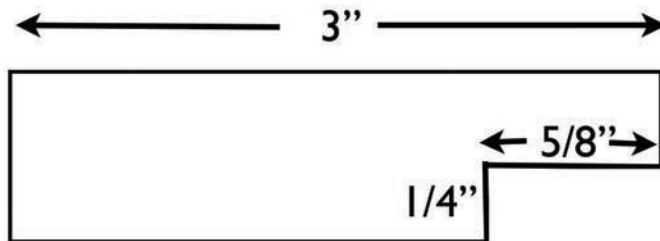
- 6) Cut three 3" pieces of the 3/4" x 1/2" square dowel
- 7) On one end of each mark the center of the piece.
- 8) Using the drill press and the mini vice (at the drill press) drill holes at the center marked in step 7 with successively bigger drill bits: #52 then #41 then #34. These are metric sizes, which is what we have the most of in this lab. Don't skip steps here. The square dowels crack very easily and



the drill steps open up the holes without cracking the wood.



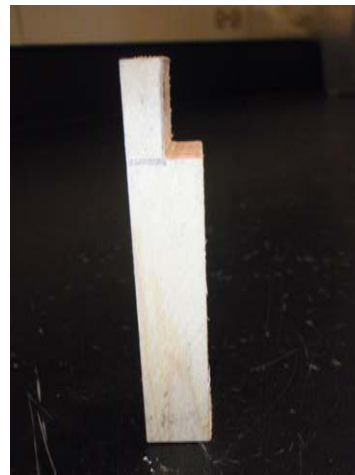
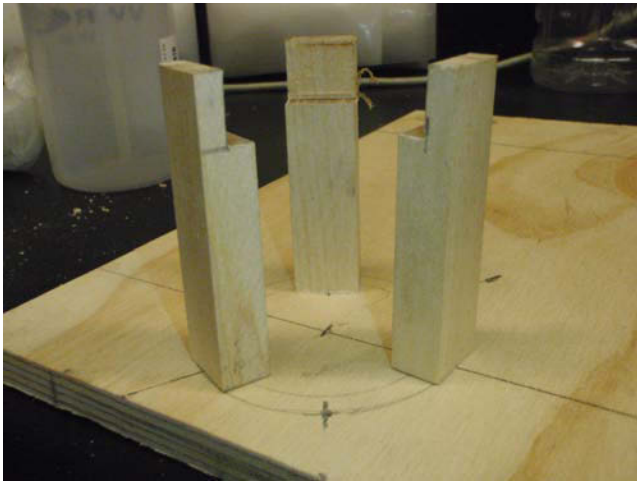
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- 9) Drill holes using the #34 bit in the marks on the base. The plywood doesn't crack as easily so the stepped drilling is not necessary here.
- 10) Flip the base over and using the 3/8th bit, drill the three holes out **just a tiny bit**-- just enough to open up the very top for the screw to be inset in the wood.
- 11) Make notches in the uprights: mark, and then cut, the other end of the uprights according to the picture below:



- 12) Use three 7/8th *drywall* screws to attach the uprights to the base.
- 13) Check that the VWR bottle fits well within the uprights. If the fit is loose you can wrap a rubber band around the uprights to tighten it.

Tubing:

- 14) Cut 7" of the clear tubing
- 15) Poke a hole in one of the "feet" of the 2L base
- 16) Cut 3 sections of the red tubing: 2: 1" and 1: 6"
- 17) Attach one of the 1" pieces to the clear tubing and feed the clear tubing through the hole in the 2L until the red tubing is almost touching the bottle.
- 18) Hot glue around the tubing to seal the hole (so water doesn't leak out) and also glue down the bottle to the base.



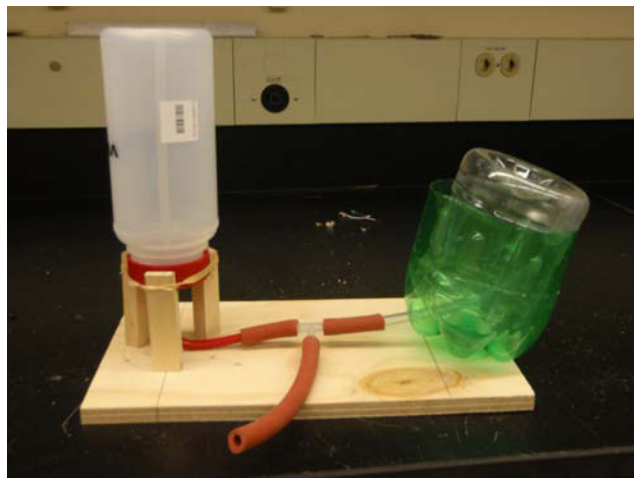
- 19) Attach the three red tubing pieces to the T-joint with the longest piece hanging off the edge of the base. Also attach the remaining short tubing piece to the VWR bottle (cut off the end of the



bottle to get rid of the point).

Now your digester is ready for filling!

Fill the VWR bottle about $\frac{3}{4}$ of the way with the manure/water slurry. Fill the gas storage tank (the



other bottle setup) about $\frac{1}{2}$ way with water.

Questions: (save this paper and fill these out once you've tried burning your methane)

- 1) Were you able to burn methane? What did the flame look like?
- 2) Do think you could cook off of this flame?
- 3) If the answers to #s 1 and 2 are no, why do you think your biodigester did not produce methane (or enough to burn)?

- 4) How could the design of this mini-digester be improved and/or how do you think you could scale this up?

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