



TeachEngineering

Engineering the Efficiency of Alcoholic Fermentation



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Water Displacement Apparatus

Option 1: Assemble Directions

1. Using a permanent marker and a ruler make two dots on the lip of the traffic cone at 7 and 9 cm markers.

****Repeat on opposite side of cone.****



Water Displacement Apparatus

Option 1: Assemble Directions

2. Using a permanent marker and a ruler make two more dots under the lip of the traffic cone perpendicular with the two original dots
perpendicular with the two original dots
****Repeat on opposite side of cone.****



Water Displacement Apparatus

Option 1: Assemble Directions

3. Using the knife make an angled cut an ~0.5 cm in length over each bottom dot.

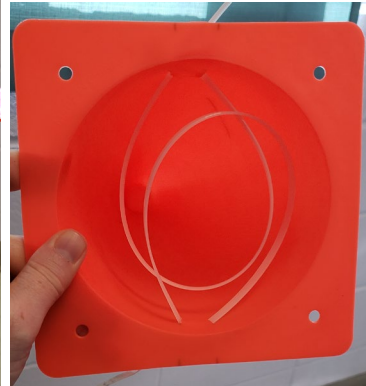
****Repeat on opposite side of cone.****



Water Displacement Apparatus

Option 1: Assemble Directions

4. Slide one of the zip ties through one diagonal cut to the back end of the opposite cut on the SAME side. Creating a hoop on the inside of the cone. DO NOT PULL THE zip tie through the securement yet. **Repeat on the opposite side of the cone.**



Water Displacement Apparatus

Option 1: Assemble Directions

5. Place the plastic beaker in the hoops in the center of the cone, and pull the zip ties tight on both sides, so the beaker is held in place inside the cone. ****It is ok if the beaker can come out of the hoops, you just do not want it to fall through inside the cone.****



Water Displacement Apparatus

Option 1: Assemble Directions

6. From the tip of the cone mark a dot at 8 cm from the end. Draw a line at this length around the circumference end of the cone. Use the knife to remove the enclosed end of the traffic cone.



Water Displacement Apparatus

Option 1: Assemble Directions

COMPLETE!



Water Displacement Apparatus

Option 1: Standard Operating Procedure

1. Set up your ring stand with clamp.



Water Displacement Apparatus

Option 1: Standard Operating Procedure

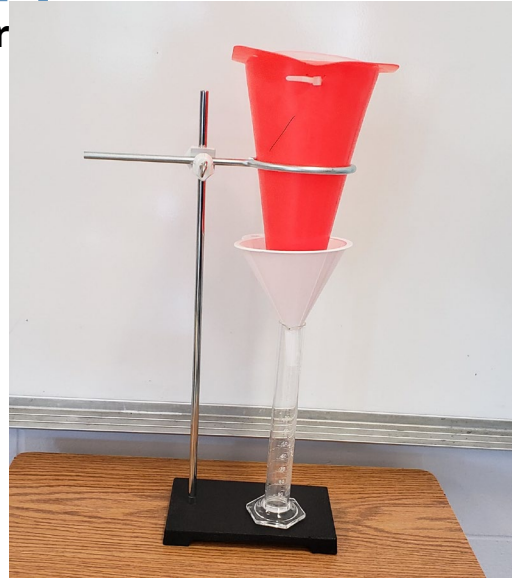
2. Place the traffic cone/zip tie/beaker set up inside the ring of the clamp.



Water Displacement Apparatus

Option 2: Standard Operating Procedure

3. Place a funnel and 100mL graduated cylinder under the traffic cone.



Water Displacement Apparatus

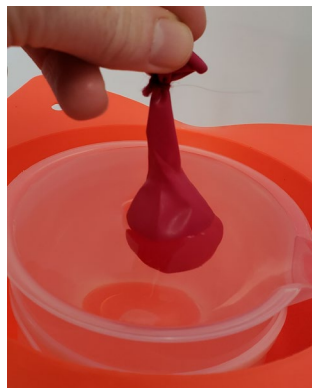
Option 1: Standard Operating Procedure

4. Fill the inside beaker with water until the water is about to spill over the edge. Carefully place the balloon sample in the beaker of water.

****It is ok if water spills over your balloon will have a START volume.****

Place a foam plate on top of the balloon over the beaker with a bag of rice on top of that.

****This will hold the balloon down into the water as it fills with CO₂ gas.****

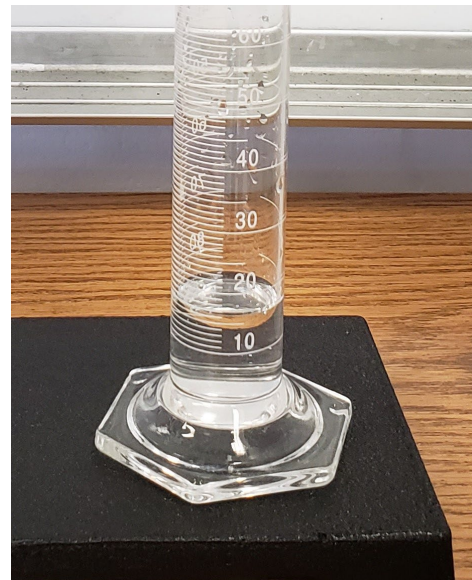
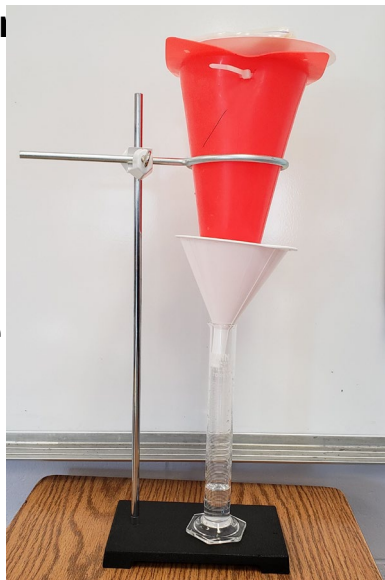


Water Displacement Apparatus

Option 1: Standard Operating Procedure

5. The apparatus is set to measure the water displacement as the balloon's volume increases overtime.

Remember to take your **START** volume which is the water level in the graduated cylinder and continue to document until time is called.



Water Displacement Apparatus

Option 2: Standard Operating Procedure

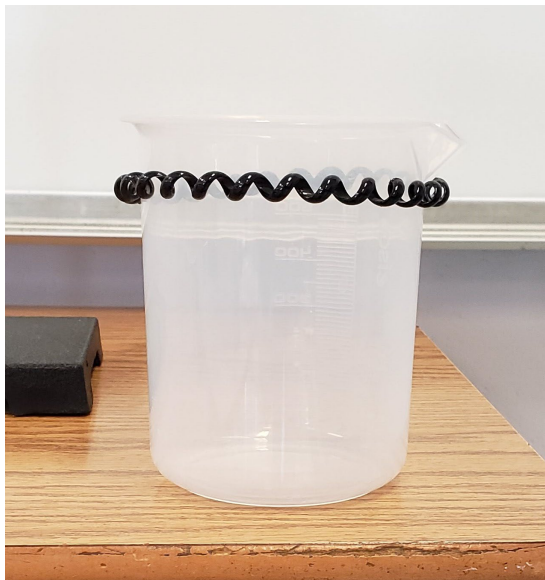
1. Set up your ring stand with clamp.



Water Displacement Apparatus

Option 2: Standard Operating Procedure

2. Put plastic cord tie around the neck of the plastic beaker and set the beaker w/ tie inside the ring of the clamp.



Water Displacement Apparatus

Option 2: Standard Operating Procedure

3. Place a larger funnel and 100mL graduated cylinder under the beaker.



Water Displacement Apparatus

Option 2: Standard Operating Procedure

4. Fill the beaker with water until the water is about to spill over the edge. Carefully place the balloon sample in the beaker of water.

****It is ok if water spills over your balloon will have a START volume.****

Place a foam plate on top of the balloon over the beaker with a bag of rice on top of that.

****This will hold the balloon down into the water as it fills with CO₂ gas.****



Water Displacement Apparatus

Option 2: Standard Operating Procedure

5. The apparatus is set to measure the water displacement as the balloon's volume increases overtime.

Remember to take your start volume which is the water level in the graduated cylinder and continue to document until time is called.

