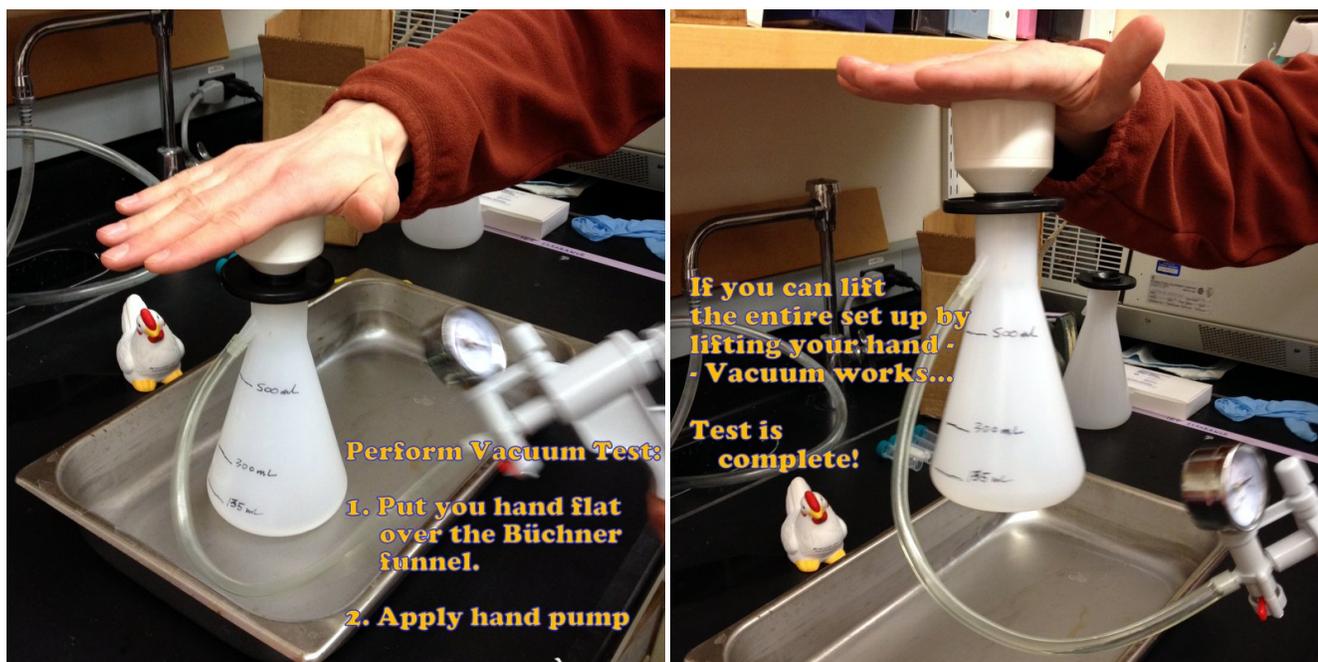


Use of the hand vacuum pump to filter water

There are several things that you can do to insure that your pump works well for your students.

1. Have the students practice with the pump before hand. Start by blocking the tubing with a finger and seeing that the pressure on the gauge does rise.
2. Next set up the flask with the funnel and attach the pump. Make sure the funnel is securely put together. Place a hand over the top of the funnel, press straight down firmly, and carefully pump the handle. Stress to the students that it will take longer than when they blocked the tube directly since the pump needs to evacuate all of the air in the flask before it will establish pressure. They should be able to develop enough pressure so that the flask can be lifted simply by lifting the hand covering the top of the funnel. Have the students practice with the empty funnel.



3. The pump is designed for large hands. It may be easier for students with small hands to rest the pump in one hand and squeeze the handles with the other.

4. Squeeze the handles all the way in and make sure the piston comes back out. If the piston fails to go all the way in or doesn't return all the way out, gently push or pull the piston rod (white arrow) with your fingers until the handles are at their full range. Do not force the piston - it should move with gentle pressure. Pump repeatedly using full strokes of the handles. It is not necessary or beneficial to pump really fast or hard. You just need the piston to follow through its complete range. You should hear a soft gentle whoosh of air with each stroke of the pump.



5. When actually filtering the samples, the flask and funnel should be on a level surface and the funnel should be supported in the black holding ring. One student should apply a steady downward pressure on the sides of the funnel, making sure there are no places where air can enter the system. A second can add the collected water, and a third can work the pump. It should take about 5 -8 minutes to pump through 300 ml of water, slightly longer if the water is really turbid.

