Activity #2: What's the Matter with Your Gases

Materials:

Modified Syringe with luer Lock	Two 600 mL or 800 mL Beakers	Thermometer
2.5" Nail	Two Watch Glasses	pH Paper and Filter Paper
Electronic Balance	Masking Tape and Ruler	Deionized Water
Bags of Unknown Gases	Hole Puncher	Unknown Solutions A & B

Procedure: (Always Record ANY Evidences)

Part A: What is a Vacuum?

1. Measure and record the mass of a modified syringe with luer lock when the plunger is down (the nail is inside) and the lock is shut (Figure 1).

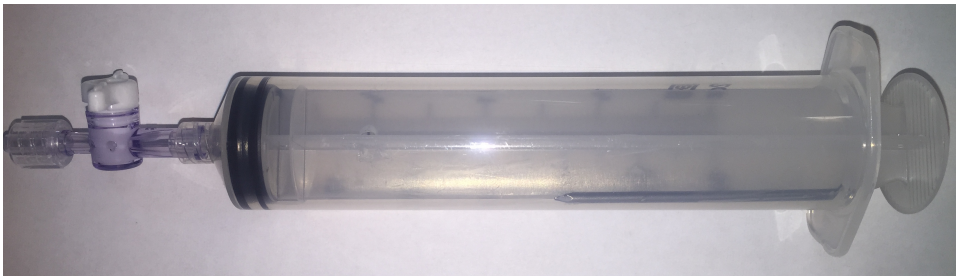

Figure 1 (Plunger Down; Lock Shut; Nail Inside)

2. Now pull the plunger out with the lock remained shut until you can see the pre-drilled hole out of the syringe. (You will need to use a bit of force to do this.) Have your lab partner place the nail through the hole so the plunger will stay in place (Figure 2). Measure and record the mass and volume.

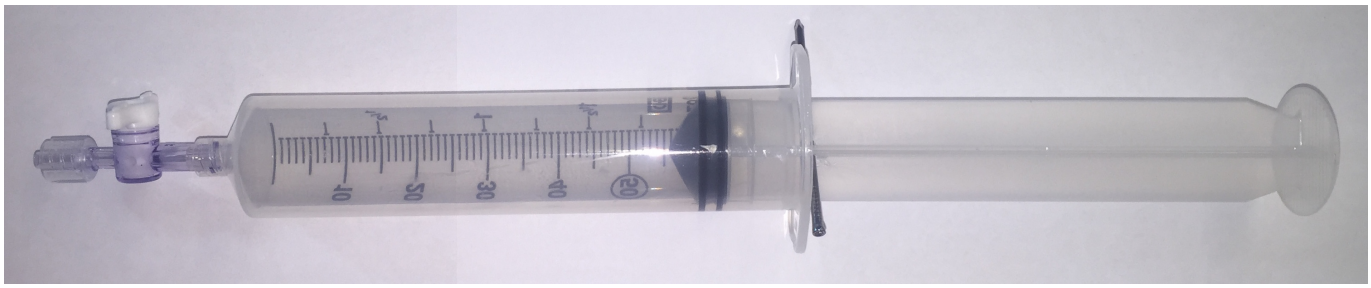

Figure 2 (Lock Shut then Plunger Out; Nail Through Hole)

3. Open the luer lock for 2 seconds (Figure 3). (Did you hear anything? Write that down if you do!). Shut the lock. Measure and record the mass and volume.

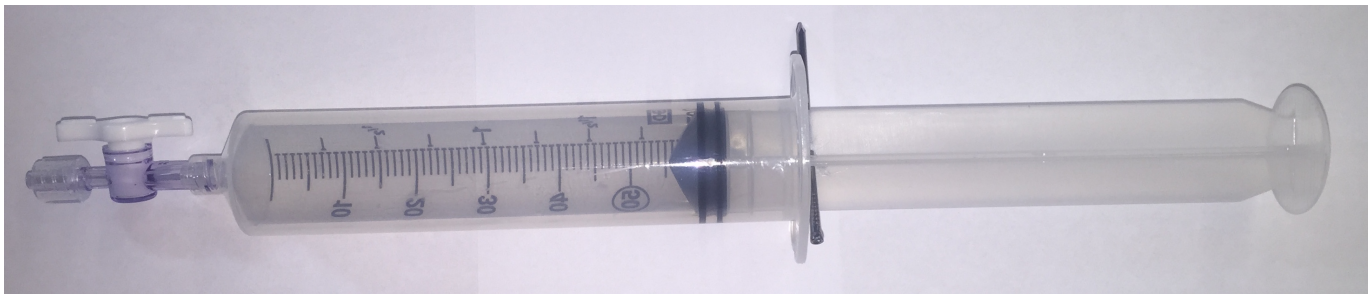

Figure 3 (Plunger Out; Lock Open then Shut; Nail Through Hole)

Part B: What are those Gases?

1. Configure the syringe like in Figure 2 above. Attach the luer lock securely with the bag label Sample A. Open the luer lock for 2 seconds. Shut the lock. Measure and record the mass and volume.
2. Let out the gas by opening the luer lock. Take out the nail and push the plunger down. Repeat the last step with the other samples of gases.
3. Record the temperature using a thermometer and write down the barometric pressure from your instructor.

Part C: Passing Gases

1. Invert both beakers. Label A on one side of one beaker and label B on the opposite side of the same beaker. Repeat with the second beaker given.
2. Obtain two small punched out filter paper circles from your instructor. Place one on the top of the inverted beaker labeled A and place the other one by the label B (Figure 4).
3. Bring the beaker to the fume hood with a watch glass. Let the instructor place Solutions A and B on the filter paper circles. Cover immediately with the watch glass and record what happened. You may want to take a picture.
4. Use a ruler to measure the distance from Solution A circle where the gases met. Do the same for the distance of Solution B circle to the meeting place of the gases.
5. Rip two small square pieces of pH paper. On the second inverted beaker, place one square by the label A and the other square by the label B. Not place 3 to 4 pH paper equally spaced between them (Figure 5). Use some deionized water and wet the squares and the pH paper strips. Get a paper towel and blot out any excess water. Allow it to dry for a minute.
6. Bring the beaker to the fume hood with a watch glass. Let the instructor place Solutions A and B on the filter paper circles. Cover immediately with the watch glass and record what happened. You may want to take a picture.
7. Use a ruler to measure the distance from Solution A square where the gases met. Do the same for the distance of Solution B square to the meeting place of the gases.

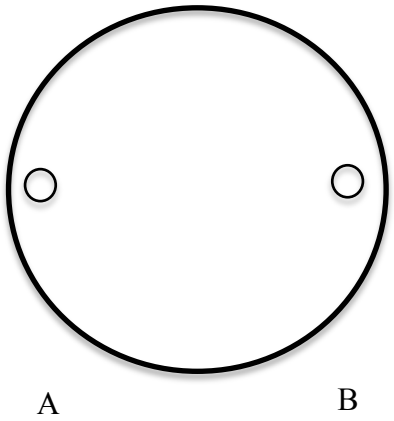

Figure 4

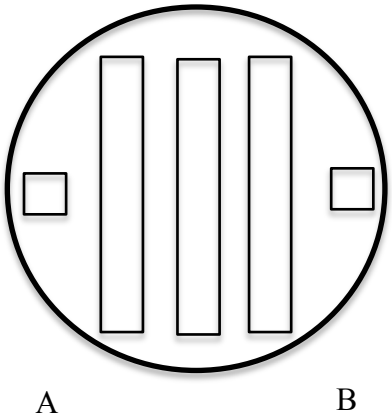

Figure 5

Questions to Ponder Before Writing the Statement of Understanding:

1. In Part A, explain the difference or similarities in masses. Why are the masses is the same when the plunger is down (Figure 1) as compared to the air is in the syringe (Figure 3)? What is the phenomenon here? When the plunger is out while the lock is shut the whole time (Figure 2), what is in the syringe? Why would that mass be different than the other two?
2. What is the density of the gas in Part A compared to Gas Sample A in Part B? What is the identity of Sample A?
3. What are the densities of the other gas samples?
4. Sample B is a compound containing carbon and hydrogen. Sample C is a compound containing carbon and oxygen. Sample D is a compound containing carbon, hydrogen and fluorine. Knowing their densities, temperature and pressure, how can you find the identities of these gases?
5. In Part C, what phenomena are exhibited? From your observations, what classes of chemicals are solutions A and B?
6. Solution A is a compound that contains hydrogen and chlorine. Solution B is a compound that contains hydrogen and nitrogen. Using the distances you measured, identify the two solutions.

Statement of Understanding:

You are to write 3 statements (one for each part). When writing the paragraphs, make sure you address the following:

1. What are the phenomena you are investigating? (There are many for each part. Choose one for each part.)
2. How can you explain the phenomenon using the evidences you collected (please list those evidences and include any necessary calculations and drawings)? (**Particle Reasoning** please!)
3. What claims are you making from your explanations?

Hand in the observations along with your statements of understanding! A Title for each statement is also highly appropriate.