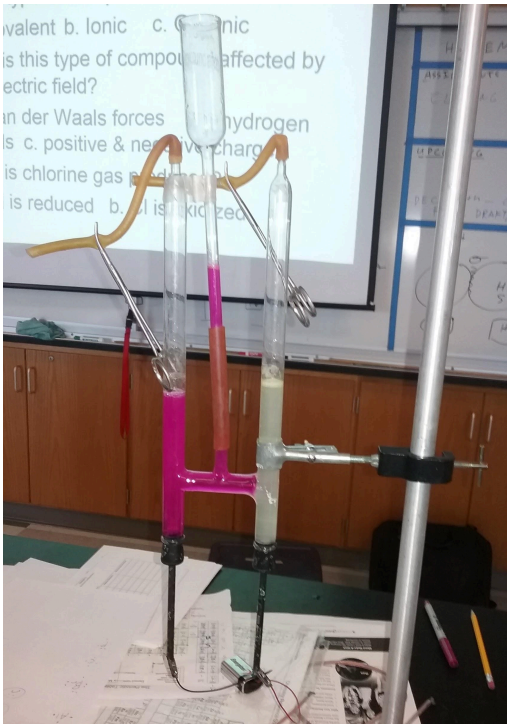
Electrolysis of Sodium Chloride Demo

Materials:

- Electrolysis apparatus
- Battery
- Alligator clips and wires
- Salt water solution (NaCl)
- Phenolphthalein



Safety:

- Wear safety glasses
- The reaction will produce chlorine gas, so keep the system closed.
- Pour out the solution in the fume hood to avoid exposure to the chlorine gas and neutralize the solutions before disposal.

Procedure:

1. Make about 30 mL of about 10% sodium chloride solution and add a few drops of phenolphthalein.
2. Be sure to seal the bottom of the electrolysis apparatus and then add the sodium chloride solution to the electrolysis apparatus until the solution fills about halfway to the top.
3. Close the tubes to prevent escape of chlorine gas (I used surgical clips).
4. Use alligator clips to connect a battery to each electrode on the electrolysis apparatus and observe the changes taking place. Pressure will build over time due to the formation of gases, so do not let it run too long.

Explanation:

At the negative electrode, sodium is formed which then produces sodium hydroxide causing the phenolphthalein to turn pink. At the positive electrode, chlorine gas is produced resulting in a pale yellow-green color and bubbles. As a side reaction hydrogen and oxygen gas are formed as well as water is also split through the electrolysis process.

At the negative electrode sodium is reduced.

$Na^+ + e^- \rightarrow Na$

At the positive electrode chlorine is oxidized.

$Cl^- \rightarrow Cl + e^-$

You just split table salt (NaCl) into its elements!