# Can We drink it?

**Name** _____

**Date** _____

**Period** _____

Title: Distillation of Water

Purpose: To understand How different boiling points can be used to separate substances.

Background: Distillation is the process of superheating water, causing it to vaporize, then condensing the vapor and collecting only the purified water. Distillation is a process that relies on evaporation to purify water. Contaminated water is heated to form steam.
Inorganic compounds and large non-volatile organic molecules do not evaporate with the water and are left behind. The steam then cools and condenses to form purified water.
Distillation is most effective in removing inorganic compounds such as metals (iron and lead) and nitrate; hardness (calcium and magnesium); and particulates from a contaminated water supply. The boiling process also kills microorganisms such as bacteria and some viruses. The effectiveness of distillation in removing organic compounds varies, depending on such chemical characteristics of the organic compound as solubility and boiling point. Organic compounds that boil at temperatures greater than the boiling point of water (some pesticides) can be effectively removed from the water. Organic compounds that boil at temperatures lower than the boiling point of water (ex., benzene and toluene) will be vaporized along with the water. If these harmful compounds
are not removed prior to condensation, they will re-contaminate the purified product.

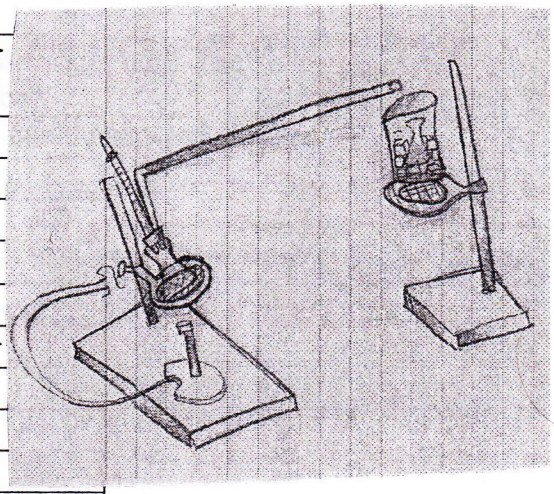
Materials:

2 Ring Stands, Stopper w/ bent glass pipe & Thermometer, 2 Rings, 2 wire mesh, Bunsen Burner, 250 ml Flask, 150 ml of water, 1000 ml Beaker, Ice, 25g of Rock Salt. 100 ml graduated cylinder, Silver Nitrate, Test Tube

Procedure: (Use goggles through the entire procedure!)

1) Set up the apparatus as the picture illustrates – Two ring stands with wire mesh holding the 250 ml flask and stopper inserted. The 1000 ml beaker should sit on the other ring/mesh assembly and the other empty flask in the beaker with an ice bath. The empty flask will collect the distilled water.
2) Pour 150 ml of tap water into the flask and add 25 grams of rock salt. Make sure it's thoroughly mixed. Siphon off a small amount into a test-tube and check for salt content by adding a pinch of Silver Nitrate. The whiter the solute – the more saline the solution.
3) Measure out 10 ml of the salty water in the graduated cylinder. Find the density of the salt water. (remember density is g/ml)
4) Light the Bunsen burner and record the temperature each minute until the water boils, and slightly beyond.
5) After about 50 ml of distilled water is collected, pour 10 ml of the distilled water into the graduated cylinder and determine its density. Siphon off a small amount into a test-tube and check for salt content by adding a pinch of Silver Nitrate. The whiter the solute – the more saline the solution.

6) After the density of the distilled water is determined, switch the flasks and heat the distilled water until it boils. Record the temperature each minute just past boiling.
7) Graph and compare the data from the salt water boil and the distilled water boil.



| Minutes of Time | Salt Water Temperature | Distilled Water Temperature |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
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| 30 | | |

Conclusion 4 Paragraphs:

1) Purpose/Hypothesis – Listed above
2) Background information – like what's the boiling point of water? What is its density? Listed above
3) Important observations - At what temperature does the salt water boil? The distilled water? How does this relate to the density of each?
4) Source of errors – What things would you change if you could and why? Similar labs from the past? Any real-life examples to relate?