As we look around the world, we see many many examples of mixtures. Rocks, soil, the air that we breathe, even our bodies are mixtures. Frequently, we want to separate these mixtures. We want top soil that is rich in nutrients for the growth of plants. We want iron ore from the rocks to make our machines. We need to find the one chemical in a type of cancer cell that is different enough from a normal cell to help cure the disease. How do we do this?

If this was east then 1 – Cancer would already be cured and 2 – careers in science would be very few and far between. The truth is that all of the knowledge and observation that we can bring to work on the problem is needed. With this knowledge we have been able to make cars out of iron, we have tests for air purity, etc. This lab will give you a chance to look at this important area.

You will be given a mixture of 4 substances: salt, sand, rock (blue from a fish tank) and black beans. You will separate these substances by taking advantage of their different physical properties.

The physical properties you will be concerned with in this experiment are size, density, sublimation and solubility.

**PROCEDURE**

1. Weight a clean, dry weigh boat. You will need two of these for your experiment as well as two clean beakers
2. Add approximately 4 grams of the mixture to the evaporating dish and record the mass of the evaporating dish and mixture. Record this mass in your lab notebook.
3. Place a screen over a large beaker. Slowly pour the mixture through the screen. Shaken or tap to insure that all small material passes through.
4. Transfer the larger material from the screen into a weigh boat. Place the salt and sand mixture into a beaker.
5. Add about 15mL of water to the salt and sand mixture. Gently stir from about 3 minutes. Decant (pour water off the top) the liquid into a second beaker.
6. Add 5mL of water to the beaker containing the salt water mixture. Stir and decant again. This will remove any remaining sand from the mixture. Repeat until you do not see any sand remaining in the salt mixture. Be careful not to add too much water because it will take a long time for it to boil off.
7. Place the beaker containing the salt water solution (NaCl, Sodium Chloride) on the hot plate. Evaporate at low heat to prevent splattering near the end of drying.
8. When the salt is dry, let the beaker cool. Weigh the beaker and NaCl (record their mass together, then subtract the mass of the beaker to get the mass of NaCl).
9. Place the beaker containing sand on a hot plate and heat slowly until the clumps break up and the sand appear dry. You may filter your sand solution first to remove the access water then dry the remaining solution. Once the sand is dry remove the beaker from the hot plate and let it cool. Then record the mass of the sand (record their mass together, then subtract the mass of the beaker to get the mass of sand).
10. Clean up all materials from the lab today. The dried materials may be returned to the larger beaker you took them from.

**CALCULATIONS**

1. Calculate the percent of each component according to the formula below

*Place all calculations in the calculations section of your lab report. Make sure to show all of your work.*

1. Create a pie chart to include in your conclusion. You can complete the pie chart in excel (type in your values then highlight your values and select pie chart, make sure that you’ve created a key and that the graph is color coded). When you’ve finished tape the graph into your lab notebook under the conclusions section) or you can draw one by hand (make sure to color code the material and provide a key, place the graph into the conclusion section of your lab notebook). Also make sure to include a Title and all other appropriate headings for your graph.

**CONCLUSION**

Report on all of your findings in your conclusion. The conclusion must be 6-8 sentences long. Make sure to discuss in your conclusions the relative amounts of each material you ended up having. Was there a different between the homogenous and heterogeneous mixtures?