

Separation Anxiety

Name _____

Period _____

You have just been invited to sample the latest creation of your teacher, Chef Neff. Unfortunately, Chef Neff is famous for making concoctions that no human can eat. At your lab station is a cup of something that looks very strange. The mixture contains a number of ingredients—most of them don't even resemble food! However Chef Neff has forgotten how much of each ingredient was used, (the recipe).

Your job is to examine the mixture and determine a way to separate the substances. Then predict how you would separate each ingredient, **before you actually separate it**. When you are done you should be able to tell Chef Neff how much of each ingredient was in his recipe.

Here is Chef Neff's list of ingredients: sand, iron, beans and salt
Can you help Chef Neff determine the recipe?

The Real Problem:

How do you separate different substances from a mixture?

Make Observations

In order to solve the problem, you must take a very close look at the individual ingredients. As you complete the following steps, fill out the chart on the next page to organize your information.

Caution: Do not taste or eat any of the ingredients of the Chef's mixture.

Procedure:

1. Using the physical properties of an ingredient can help you separate it from the others. Observe the physical properties for each ingredient, and answer the following questions in the **"Physical properties"** column of the chart on page 3 of this lab:

1-Does this ingredient dissolve in water?

4-Does it float?

2-Is it large or small relative to the other particles?

5-Is it magnetic?

3-Is it a solid, a liquid, or a gas?

2. Look over the properties you recorded in step 1. For each ingredient, determine which characteristic would help you best distinguish it from the others. Choose from among the following properties:

size

shape

state of matter

density

solubility

magnetic attraction

Record a distinguishing characteristic on the chart for each ingredient.

Make a Prediction

3. Predict how you would separate each ingredient from the rest of the mixture. It may help to look over the materials list, and your past mixture labs. Describe your proposed technique in the "Method of Separation" column in the chart. The first row in the chart is already filled in to help you get started. Protect your hands with tongs when working with the hot plate.

Materials

Tongs

Balance (Share at table)

Beaker

Filter paper

Magnet

Paper towel

Hot plate

Wooden stick

Spoon

3 plastic cups

Screen

Chef Neff's Mixture

4. First have Chef Neff initial the plans you described, then conduct an experiment.

Conduct an Experiment

5. Measure the mass of an empty cup, and record its value here. _____ g
6. Follow your plan on page 3 to separate each ingredient from the mixture. Store each ingredient in a different cup, and label each cup.
7. Measure the mass of each cup and its contents. Subtract the mass of the empty cup in step 5, and record this value in the last column on the chart on page 3.

Analyze the Results

Critical Thinking: Get the true values from your teacher and complete this section.

Ingredient	Measured value (g)	True Value (g)	error	% error
Iron				
Sand				
Bean				
Salt				

8. Were your measurements of the ingredients accurate within acceptable error (5%)? Explain why you think your results were accurate **OR** what might have happened to get inaccurate results.
9. Fill in Chef Neff's recipe card with the correct amounts.

Recipe

Chef Neff's Recipe (My Results)

_____ g salt _____ g sand

_____ g iron _____ g beans