Name:_____ Vial Number:_____ Date:_____

Separation of a Mixture Lab Makeup

Background:

It is often necessary to separate mixtures of two or more substances. There are different ways of accomplishing this process. It might be a purely physical procedure, by *distillation* where substances of different boiling points are involved, or by the differences in the *solubilities* of the components of the mixture. In this experiment a mixture of sand, salt, and iron filings will be separated in order to determine the *percent composition* of a mixture.

Purpose:

To separate the components of a mixture based upon physical characteristics of each component within the mixture.

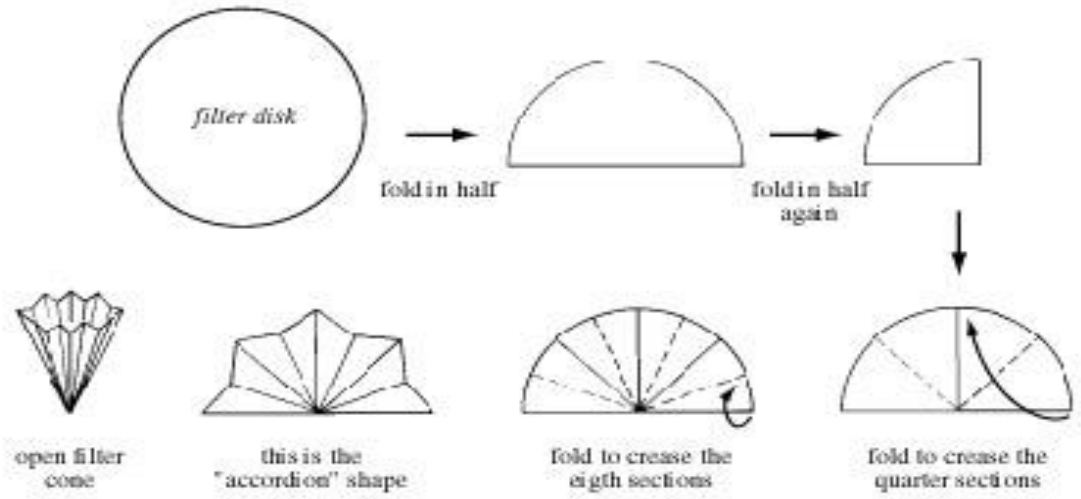
Materials:

sand/salt/iron mixture	bar magnet	
250 mL beaker	two paper filters	
balance	plastic baggie	plastic vial watch glass
sheet of paper	wash bottle	ring stand
drying oven	scoop	ring clamp
funnel	evaporating dish	wire screen

DAY 1 Procedures:

1. Record the **letter** and **mass** of your given plastic vial and contents of sand/salt/iron mixture.
2. Empty contents of the vial onto a sheet of paper, then reweigh the empty vial and record result.
3. Wrap bar magnet in a plastic baggie and remove the iron filings from the mixture by using a bar magnet.
4. Place a weighing boat on the scale and record the mass of the empty boat.
5. Then place filings on the boat and record the mass of the iron filings and weigh boat.

6. On a piece of filter paper write your name around the edge in pencil. Fold the filter paper as shown in the diagram below (be sure your name is visible), and record the mass of the empty filter paper. Place the filter paper in the funnel and then the funnel on the clay triangle resting on the ring stand. Use the distilled water bottle to wet slightly to stick.



7. Place the remaining sand/salt mixture into a 250-mL beaker. Add 20.0 mL of water to the sand/salt mixture and stir until all of the salt has dissolved.

8. Obtain and record the mass of a clean, dry 100 or 150 mL beaker and watch glass. Filter the salt solution through the funnel containing the filter paper. *Note: Most of the sand should remain in the beaker.*

9. Transfer the remaining sand with two or more 2.00 mL portions of water and continue to collect this ***filtrate*** in the beaker.

10. Carefully transfer the filter paper with the residue (sand) to the tray in the classroom. The teacher will place this sample in the drying oven.

11. Next, place the beaker and watch glass on a wire gauze and carefully place a watch glass on the evaporating dish to prevent spatter heat gently allowing the water to boil off. When dry and cool to the touch, obtain the mass of the beaker and watch glass and the remaining white residue (**salt!**) in the dish.

DAY 2 Procedures:

12. Obtain your filter paper containing dried sand from the teacher. Place the filter paper and dry sand on the scale and record result.

13. Complete all calculations on the reverse side of this sheet.

14. Complete all questions on the reverse side of this sheet.

Observations: (Qualitative Data) *Please use bullet format for your entries.*

- **Iron stuck to baggie with magnet**
- **Sand stuck to the beaker**
- **Water in salt water took a long time to evaporate**

Data:

Mass of vial and mixture	**8.15 grams**
Mass of empty vial	**5.82 grams**
Mass of empty weighing boat	**2.35 grams**
Mass of weighing boat with iron	**2.93 grams**
Mass of filter paper (with name on it)	**0.48 grams**
Mass of filter paper and sand (Day 2)	**1.27 grams**
Mass of beaker and watch glass	**100.69 grams**
Mass of beaker, watch glass, and salt	**101.49 grams**

Calculations: *(Show the math and use proper units).*

1. Total Mass of the Mixture:

2. Mass of Iron:

3. Mass of Salt:

4. Mass of Sand:

Analysis: *(Show the math and use proper units).*

1. The following items pertain to **IRON**:
    a. Calculate the experimental percentage of iron in the mixture.

    b. List the actual percentage of iron in the mixture (see front board). **27.2 %**

    c. Calculate the percent error.

2. The following items pertain to **SALT**:
    a. Calculate the experimental percentage of salt in the mixture.

    b. List the actual percentage of salt in the mixture (see front board). **36.4 %**

    c. Calculate the percent error.

3. The following items pertain to **SAND**:
    a. Calculate the experimental percentage of sand in the mixture.

    b. List the actual percentage of sand in the mixture (see front board). **36.4 %**

    c. Calculate the percent error.

Conclusions:

1. Define the following:
    a. Heterogeneous mixture –

    b. Homogeneous mixture –

    c. Pure substance –

2. Using this experiment, give an example of each of the above.
    a. Heterogeneous mixture example –

    b. Homogeneous mixture example –

    c. Pure substance example –

3. Which physical property of each of the following allowed them to be separated from the mixture?
    a. Iron

    b. Sand

    c. Salt

4. Were the changes in the material in this lab physical changes or chemical changes? Explain how you know.

5. Add up your experimental masses for iron, sand and salt. Does this value equal the mass of the original mixture? If not, can you suggest why the masses are not equal?

6. What law can be illustrated in this laboratory activity?

7. Devise a way to separate a mixture of charcoal (*low density so it floats on water*), sugar, and sand.