SEPARATION OF A MIXTURE OF SAND AND SALT
Experiment 12

INTRODUCTION:

Most of the materials we encounter in everyday life are not pure substances. Materials such as cement, wood, soil, and ink are formed from physical combination of various substances, and are called *mixtures*. Mixtures can be classified into *homogeneous* (uniform) and *heterogeneous* (non-uniform). Mixtures are characterized by two fundamental properties: First, each of the substances in the mixture retains its properties; second, mixtures can be separated into their components by differences in their physical properties.

In this experiment you will separate the components of a mixture of sand and salt and determine what percentage of each your mixture contains.

APPARATUS & MATERIALS:

?	balance	?	graduated cylinders
?	beaker	?	funnel & filter paper
?	Erlenmeyer flask	?	watch glass
?	glass stirring rod	?	hot plate
?	unknown mixture of sand and salt		

PROCEDURE:

1. Obtain a sample of mixture of sand and salt of unknown composition. Record the sample number in your laboratory notebook.

2. Determine the mass of a clean and dry beaker on a balance to the nearest 0.01 g.

3. Empty all of your sample into the beaker, and determine the mass of the beaker and the sample.

4. Measure 25-mL of distilled water in the graduated cylinder and add the water to the beaker with the mixture. Stir thoroughly with the stirring rod to dissolve the salt.

5. Determine the combined mass of a watch glass and a piece of filter paper. Record this mass.

? **Label the corner of the filter paper with some identification of your group for later retrieval**.

PROCEDURE (Cont'd):

6. Fold the filter paper, as shown in Figure 1, and fit into the funnel.

Figure 1

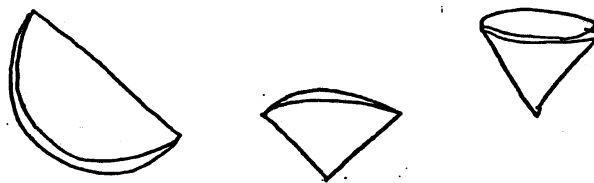7. Place   the filter
    funnel on top of the Erlenmeyer flask. Moisten the filter paper with distilled water
    from the bottle and press it to the walls of the funnel, so that it adheres.

8. Filter the mixture by decanting the liquid slowly into the center of the funnel. The
    liquid filtered through will be collected in the Erlenmeyer flask.

✍   **Pour the liquid through the funnel at such a rate as not to overfill the funnel.**

9. After all the liquid has been filtered, use two 5 mL portions of water to transfer any sand
    remaining in the beaker to the filter paper.

10. Use three additional 5 mL portions of water to wash the material on the filter paper. (The
    first of these is also used to rinse the rubber end of the stirring rod that was used in
    transferring the sample).

11. After all the water has dripped from the end of the funnel, carefully remove the filter
    paper from the funnel (without tearing it) and place on the watch glass and give to the
    instructor to dry in the microwave oven.

12. When the dried sample is returned to your group, determine the mass of the watch glass,
    filter paper and sand, and record in your notebook.

13. Rinse the beaker clean, but not dry, and pour the liquid from the Erlenmeyer flask into
    it.

14. Place the beaker on a hot plate and heat carefully to evaporate the water off.

✍   **Take caution not to overheat the beaker and splatter the salt. To avoid loss of
    sample due to spattering, when the water level becomes low, heat at a gentler rate
    until you hear popping sounds. At this time remove the beaker from the hot plate
    carefully, and return when the popping action has stopped.**

PROCEDURE (Cont'd):

15. When all the water has been evaporated, remove the beaker from the hot plate carefully, and let cool on the bench.

✍ **Remember to turn off the hot plate when done**.

16. After the beaker has cooled to the touch, determine its mass with the salt, and record in your notebook.

17. Place the beaker on the hot plate again, and carefully heat a few more minutes, watching for signs of excessive spattering.

18. After the second heating, remove the beaker, cool and determine its mass. Record in your notebook.

19. Compare the first and second mass obtained for the beaker and the salt. If you have have dried your sample properly, the difference should be within 0.1 g. Use the lower mass value for your calculations.

CALCULATIONS:

1. Calculate the percent sand in the mixture, using the equation shown below:

$$\% \text{ sand in mixture} = \frac{\text{Mass of sand}}{\text{Mass of sample}} \times 100$$

2. Calculate the percent salt in the mixture, using the equation shown below:

$$\% \text{ salt in mixture} = \frac{\text{Mass of salt}}{\text{Mass of sample}} \times 100$$

3. Calculate the Percent Recovery, using the equation shown below:

$$\% \text{ Recovery} = \frac{\text{Total mass of sample recovered}}{\text{Mass of sample}} \times 100$$

> Since there were only two components in the mixture, the percent recovered should equal 100. Any deviation of your Percent Recovered from 100 is an indication of the accuracy of your work.

REPORT FORM
Experiment 12

UNKNOWN NUMBER :_____

1. Mass of empty beaker _____ g

2. Mass of beaker and sample _____ g

3. Mass of sample _____ g

4. Mass of watch glass + filter paper _____ g

5. Mass of watch glass + filter paper + sand _____ g

6. Mass of sand recovered _____ g

7. Percent sand in the mixture _____ %
    Show calculations below:

8. Mass of empty beaker (same as 1) _____ g

9. Mass of beaker and salt (1st drying) _____ g

10. Mass of beaker and salt (2nd drying) _____ g

11. Mass of salt recovered _____ g

12. Percent salt in the mixture _____ %
    Show calculations below:

13. Total mass of mixture recovered (lines 6 + line 11) _____ g

14. Percent Recovery _____ %
    Show calculations below:

QUESTIONS:

1. What physical property difference enabled you to separate sand from salt?

2. What physical property difference enabled you to separate salt from water?

3. Identify each of the mixtures below as homogeneous or heterogeneous:

    a) salad dressing _____

    b) soft drink _____

    c) unpolluted air _____

    d) orange juice _____

4. Other than calculations error, give a reason why each of the following might occur:
    a) your Percent Recovery is lower than 100.

    b) your Percent Recovery is greater than 100.