JHS Regents Chemistry Laboratory
Analysis of a Mixture

Introduction:
Sand and salt are two common substances. When mixed together create a heterogeneous mixture.

- ***Sand fun facts***: Sandy soils are excellent for growing watermelons, peaches and peanuts! One grain of sand contains as many ***atoms*** as there are grains of sand on a beach! The IUPAC (International Union of Pure and Applied Chemistry) name for sand is Silicon Dioxide or Silicon (IV) Oxide (SiO_2)
- ***Salt Fun facts:*** All salts are ionic compounds and every cell of your body contains salt. Salt is used in manufacturing an estimated 14,000 products. The IUPAC name for the most common salt (table salt) is Sodium Chloride (NaCl)

When asked to separate a sand salt mixture into its constituent parts, the method used is determined by the physical and chemical properties of those substances. In this lab you will separate a mixture of sand and salt using your knowledge of mixtures and chemistry.

Objective:
To demonstrate the process of separating a sand/salt mixture and to determine the percent by mass of each substance in the mixture.

Caution:

- **Handle glassware gently.**
- **Goggles required.**

Signed_____
Dated:_____

Procedure:

1. Using a 150 mL beaker, obtain a scoop of a sand salt mixture from your teacher. *Record the mass of the mixture in your data table.*
2. Add about 40 ml of water.
3. Stir the mixture using a stirring rod thoroughly until you are confident all the salt has dissolved. *About one minut of stirring.*
4. *Write your initials* on and weigh a piece of filter paper. Record the mass on the data chart. Fold the paper into a cone and place it into a funnel.
5. Assemble the following set-up:
   -Ring stand with a ring clamp attached.
   -Clay triangle placed on ring clamp
   - Place the funnel (with folded filter paper) in the triangle.
   - Carefully weigh a dry 150-250 mL Erlenmeyer flask, record the mass on the data chart. Place this clean and dry Erlenmeyer flask beneath the funnel.

   To avoid splattering, make sure the end of the funnel is inserted into the flask.
6. Swirl the mixture of sand, salt and water and immediately pour the mixture into the funnel, getting as much sand out of the beaker and onto the filter paper as possible. Rinse the remaining sand out of the beaker using a wash bottle.
   Warning: *Don't use a lot of water. This will increase the time needed to evaporate the water.*
7. Remove the initialed filter paper containing the sand from the funnel hand it over to your teacher. WHEN the filter paper containing sand is ***dry*** carefully weigh it.
8. Record the mass of the sand on the data table.
9. Place the beaker containing the salt solution on a hot plate.
   BE CAREFUL NOT TO LET THE SOLUTION SPLATTER.
   When the amount of solution is very small, heat *very* gently until the salt is completely dry.
10. Weigh the beaker with the white residue contents and record the mass of the salt on the data chart.

Data: **Show all measurements in significant figures and proper units.**

Mass of sand salt mixture obtained	5.000g
Mass of *initialed* filter paper *before* placed in funnel	1.293g
Mass of Erlenmeyer flask used under funnel	89.373g
Mass of 250ml beaker and dried salt	2.983g
Mass of dry salt	1.690g
Mass of filter paper and dried sand	92.683g
Mass of dry sand	3.310g

Calculations:

Find the percent sand and the percent salt in the original mixture using the following units. Show all work using significant figures and show all units.

% sand = mass of sand / mass of mixture x 100

④ ④

$\frac{1.690}{5.000} \times 100 = .3380 \times 100 \quad 33.80\%$

Answer: 33.80%

Accepted Value % sand (obtained from teacher) = 40%

% salt = mass of salt / mass mixture x 100

④ ④

$\frac{3.310}{5.000} \times 100 = .6620 \times 100 \quad 66.20\%$

Answer: 66.20%

Accepted Value % salt (obtained from teacher) = 60%

Questions:

1. Calculate your percent error for your **sand** and **salt** values. ***Show the work of both calculations.***

Percent Error calculation for ***sand***

$$\frac{33.80 - 40}{40} \times 100$$

$$\frac{6}{40} \times 100$$

$$.15 \times 100$$

$$.2 \times 100 = 20\%$$

33.80 − 40

Percent Error calculation for ***salt***

$$\frac{66.20 - 60}{60} \times 100$$

$$\frac{10}{60} \times 100$$

$$.17 \times 100$$

$$.2 \times 100 = 20\%$$

66.20 − 60 = 6.20

10

2. Suggest **two** possible sources of error.

did not dissolve all salt, did not filter out all sand

did not evaporate all water

3. Why should splattering be avoided while evaporating the salt solution?

you would lose salt out of beaker & % would be less than it should be.

4. A student weighs out a 12.6 gram sample of a sand salt mixture. The student separates the mixture and has an experimental yield of 3.3 grams of salt. What is the percent salt in the mixture according to the student's values?

$$\frac{3.3g}{12.6g} \times 100$$

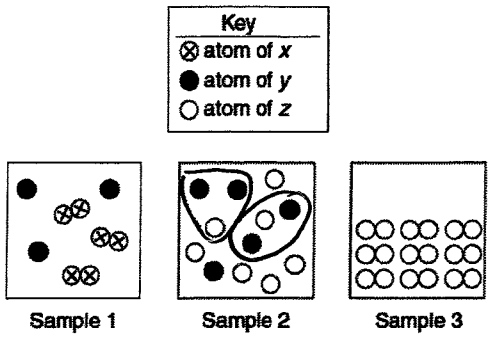
$$.26 \times 100$$

$$.26 \times 100 = 26\%$$

5. Another way of separating a mixture is through **distillation**. Look up this technique and describe how you would separate a mixture containing the following: **water, gasoline, and alcohol.** Distillation video

distillation seperates liquids based on boiling points smaller molecules have lower boiling points

6. Base your answers to questions **a** through **c** on the particle diagrams below, which show atoms and/or molecules in three different samples of matter at the same temperature and pressure.



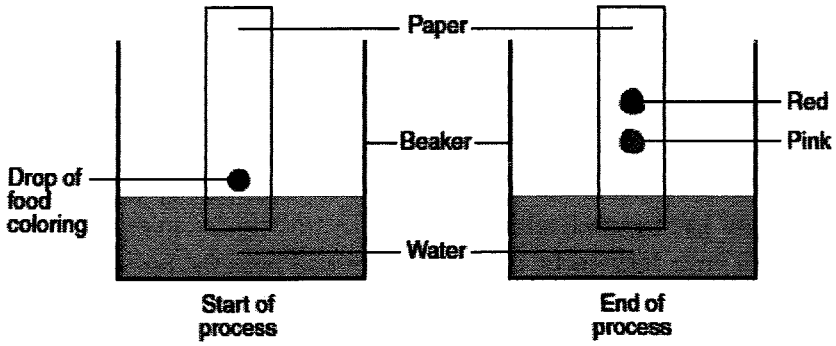
a. Which sample represents a pure substance? 3

b. When two atoms of *y* react with one atom of *z*, a compound forms. Using the number of atoms shown in sample 2, what is the maximum number of molecules of this compound that can be formed? 2

c. Explain why ⊗⊗ does *not* represent a compound.

same elements and is diatomic. A compound is 2 or more elements chemically combined.

7. Given the diagram representing a process being used to separate the colored dyes in food coloring:



* Chromatography - seperation technique based on solubility of substances.

Which process is represented by this diagram?
(1) chromatography (2) electrolysis (3) distillation (4) titration

When a mixture of water, sand, and salt is filtered, what passes through the filter paper?
(1) water, only
(2) water and sand, only
(3) water and salt, only
(4) water, sand, and salt