# **Lab – Separation of a Mixture**

**Objective:** To separate a heterogeneous mixture based on the chemical and/or physical properties of each component.

**Discussion:** A mixture is a combination of two or more pure substances that retain their separate chemical identities and properties. Since the amounts of each substance making up a mixture can be changed, the physical properties of a mixture depend on its composition. In contrast, the composition of a pure substance is constant, and thus pure substances have characteristic physical properties that do not change. Examples of physical properties that can be used to describe pure substances include solubility, conductivity, magnetism, density, boiling point and melting point.

By taking advantage of the unique physical properties of individual components within a mixture, it is possible to separate a mixture into its components. This leads to one of the definitions of a mixture – a substance whose composition can be altered by a physical change.

Mass percent composition is a convenient way to express the actual composition of a mixture in quantitative terms. The mass percent of each component in a mixture is calculated as follows:

% = (mass of component / total mass of mixture) x 100%

In order to determine the percent composition of a mixture, it is necessary to separate the components and then measure the mass of each component. The sum of the percentages of all components in a mixture equals 100%.

In this experiment you, will separate a mixture of sand, salt, and iron based on their physical properties.

**Equipment Available:**mixture funnel filter paper wash bottle
balance magnet plastic bag scoopula
hot plate beakers distilled water Stirring rod

**Procedure:**

*(Record the step by step procedure that you use to separate your mixture. Be specific! Every detail is important!)*

 **Data:** *(Just some suggestions of measurements that you may want to record. You may take other masses as needed in the blank spaces below.)*

|  |  |
| --- | --- |
| Mass of beaker |  |
| Mass of weighing boat |  |
| Mass of weighing boat and mixture |  |
| Mass original mixture |  |
| Mass iron filings |  |
| Mass salt (dry) |  |
| Mass of sand (dry) |  |
|  |  |
|  |  |
|  |  |
| Percentage of iron |  |
| Percentage of salt |  |
| Percentage of sand |  |

**Calculations:** Show work and answers for all calculations below and put final answers in data table above.

1. Calculate the mass of the mixture
2. Calculate the mass of iron.

1. Calculate the mass of salt.
2. Calculate the mass of sand.
3. Calculate the percent of iron.
4. Calculate the percent of salt
5. Calculate the percent of sand.

**Separation of a Mixture Pre-lab:**

1. What property of iron will be used in the lab to separate the iron?

1. What property of salt will be used to separate the salt?

1. The department of transportation uses a mixture of sand and salt to de-ice roads in the winter. The mixture contains 8.35 tons of salt and 6.28 tons of sand. What is the mass percent of each component in the mixture?

1. A bakery needs a mixture of flour and sugar to make cookies. The mixture should contain 62.5% flour and 37.5% sugar. You are in charge of ordering enough ingredients to make 275 pounds of this mixture. How many pounds of flour and sugar should be ordered?

**Post-lab Question:**

1. Add the mass of iron, salt, and sand recovered. How does this total compare to the initial amount of the mixture? If the total at the end is more than the initial, what are some possible reasons for this? If the total at the end is less than the initial, what are some possible reasons for this?