

## EXERCISE 3

### Chemical and Physical Changes

#### OBJECTIVES:

1. To become familiar with chemical and physical changes.
2. To become familiar with types of chemical reactions.
3. To separate materials by differences in solubilities.
4. To perform a filtration and evaporation.
5. Development of capacity for observation and deduction.

A chemical change always results in the formation of a new substance (or substances) which has its own composition and properties. During a physical change no new substance is formed; only the physical form of a substance changes. We will examine the properties of a substance before and after a change to determine if the change is physical or chemical.

#### Equipment

1. test tubes
2. test tube holder
3. iron stand
4. clamp
5. evaporating dish
6. wire gauze
7. burner
8. filter paper
9. funnel

## **Procedure**

Perform the following operations, observe the changes and classify whether the changes are chemical or physical. Briefly explain observations that are the basis for your conclusion. Write appropriate reactions where applicable.

1. Heat approximately .1 g of salt ( $\text{NaCl}$ ) in a test tube.
2. Repeat the above using .1 g of sugar ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ ).
3. Place 0.1 g of copper wool ( $\text{Cu}$ ) and 3 ml of dilute nitric acid ( $\text{HNO}_3$ ) in a test tube. Warm the test tube until all the copper wool reacts.
4. Add a few drops of silver nitrate ( $\text{AgNO}_3$ ) to a solution of sodium chloride ( $\text{NaCl}$ ).
5. Allow a small piece of ice to melt.
6. Place 0.1 g calcium carbonate ( $\text{CaCO}_3$ ) in a test tube and add 5 drops hydrochloric acid ( $\text{HCl}$ ) cautiously.
7. Mix thoroughly .2 g of sodium chloride ( $\text{NaCl}$ ) and .2 g of calcium carbonate ( $\text{CaCO}_3$ ). Dissolve the mixture in water; filter the solution and examine the substance in the filter paper. Perform appropriate test to determine if it is  $\text{NaCl}$  or  $\text{CaCO}_3$ . (See the results from procedures 4 and 6.)
8. Place the filtrate from the step 8 in a clean evaporating dish and evaporate all the water. Examine and taste the substance in the evaporating dish and determine what it is.
9. Explain briefly the reason you were able to separate  $\text{CaCO}_3$  from  $\text{NaCl}$  by the above procedure.

## ANSWER SHEET - 1

### EXERCISE 3

NAME \_\_\_\_\_ SECTION \_\_\_\_\_ DATE \_\_\_\_\_

	<u>Chemical</u>	<u>Physical</u>
1. Heat salt	_____	_____
2. Heat sugar	_____	_____
3. $\text{Cu} + \text{HNO}_3$	_____	_____
4. $\text{AgNO}_3 + \text{NaCl}$	_____	_____
5. Ice to water	_____	_____
6. $\text{CaCO}_3 + \text{HCl}$	_____	_____

Write and balance a chemical reaction for the above changes where appropriate.

7. Substance in the filter paper \_\_\_\_\_

## ANSWER SHEET - 2

### EXERCISE 3

8. Substance in the evaporating dish \_\_\_\_\_

9. Explanation

Look up the following types of chemical reactions and give three examples of each.

(a) Simple displacement -

(b) Double displacement -

(c) Decomposition -

(d) Combination -