Name _____ Date _____ Period _____

Iron sulfide Lab Chemistry

Objectives

1. Observe the physical & chemical properties of the elements iron & sulfur.
2. Observe the physical & chemical properties of a mixture of these two elements.
3. Observe the physical & chemical properties of a compound formed from iron & sulfur.
4. Compare & contrast the physical & chemical properties of elements, mixtures, & compounds.

Introduction

Elements are the simplest substances that can exist under normal laboratory conditions. A *compound* is a substance that can be separated into simpler substances by ordinary chemical means, and is a chemical combination of two or more elements (more than one type of atom) in exact proportions. A *mixture* is a physical blend of two or more substances that can be separated by physical means.

There are two types of changes that matter can undergo. A *physical change* is one in which the substance is altered without changing its composition. Changes in state, temperature and pressure are examples of physical changes. No new substances are formed. In a *chemical change*, new substances with different properties are produced. Evidence of such a change includes smoke, color changes, the production of a gas (bubbles), heat, light or electrical energy and the production of a precipitate.

Matter has two types of properties, physical and chemical. A *physical property* is the color, temperature, solubility, mass, odor, hardness, density, electrical conductivity, magnetism, melting and boiling point of a substance. A *chemical property* is one that concerns a substance's ability to undergo chemical reactions to form new substances. Chemical properties describe chemical reactions.

Pure substances consist of one type of matter and are either elements or compounds. The properties of a compound are usually very different from the properties of the elements that it contains. Compounds always have a definite composition with each element present in exact proportions. A mixture is a physical combination of two or more substances. A mixture may be separated into its components by physical means and has the properties of its components.

Safety Notice: **READ ALL THE CAUTIONS IN THE LABORATORY EXERCISE. GOGGLES AND APRONS ARE REQUIRED THROUGHOUT THE ENTIRE LABORATORY PROCEDURE.**

Materials

weighing paper	250 mL beaker	laboratory balance
test tube rack	150 mL tap water	iron filings
test tubes (5)	test tube holder or clamp	1.0 *M* HCl
10 mL graduated cylinder	crucible tongs or forceps	sulfur
laboratory burner	stir bar magnet	scoopula

Methods

PART A

1. Obtain 0.3 g of sulfur and 0.5 g of iron filings on separate pieces of weighing paper. Observe their physical properties and record the observations in Data Table A.
2. Obtain a stir bar magnet and pass the magnet UNDER the weighing paper with the sulfur. Record your observations in Data Table A.
3. Pass the magnet UNDER the paper with the iron filings. Record your observations in Data Table A.
4. Using the scoopula, mix the iron and sulfur on one piece of weighing paper. Pass the magnet under the mixture and record your observations in Data Table A.

PART B

1. Place four test tubes in a test tube rack. Label them A, B, C, and D.
2. Pour approximately 5 mL of 1 M HCl into each test tube.
3. Measure two 0.3 g samples of sulfur. Add one each to test tube A and to test tube C.
4. Measure two 0.5 g samples of iron filings. Place one sample in test tube B and the other in test tube C. Set aside test tube D for use in Part C step 9.
5. Observe test tubes A, B, and C and record your observations in Data Table B, noting any odor or gaseous products.

PART C

1. Get another clean, dry test tube and put 1.5 g of sulfur in it. Measure 2.0 g of iron filings and place it in the test tube with the sulfur. Using a scoopula, mix the sulfur and iron.
2. Take a 250 mL beaker and fill it with about 150 mL of cool tap water.
3. Light your lab burner and place the test tube in a test tube holder or clamp.
4. Heat the test tube in the burner flame by starting at the top of the mixture in the tube and gradually moving the tube down so that after 1 minute you are heating the bottom of the test tube. Be sure and point the tube away from everyone while you are heating it. Heat the test tube in the hottest part of the flame for about 3 minutes. A definite red glow should be seen in the contents at the bottom of the tube. Record your observations in Data Table C. NOTE: If you do not heat the contents of the tube until they glow red, the reaction will not be complete.
5. Turn off the burner. Immediately point the test tube toward the wall and put it into the beaker of cool water. The test tube will break and smoke and steam will come out of the beaker. Carefully set the top part of the broken tube on a piece of paper towel.
6. Decant the water from the beaker. Use crucible tongs or forceps to remove the pieces of glass and product from the beaker and place them on the paper towel.
   Caution! They still may be hot.
7. Carefully break off one small piece of product with your hand.
8. Test the piece of product with the stir bar magnet and record your observations.
9. Place this second piece of product in test tube D. Observe what happens and record your observations, noting the odor of any gaseous product, in Data Table B.
10. Wash the test tubes with soap and water using a test tube brush.
11. Dispose of the hydrochloric acid by pouring the liquid only down the sink and flushing with lots of water. Place any solid sulfur, iron or product in the trash can. Wash the test tubes with soap and water using the test tube brush.
12. Dispose of the broken test tube in a broken glass container as instructed by your teacher.

Results

DATA TABLE A

Observation of Physical Properties	
Sulfur	Iron
Mixed together	

DATA TABLE B

Observations in HCl			
Test tube A (sulfur)	Test tube B (iron filings)	Test tube C (sulfur and iron)	Test tube D (after strong heat)

DATA TABLE C

Observations	
Contents of tube while heating	Color and Magnetism after cooling

Questions

1. Part A: How did mixing iron and sulfur together affect their physical and chemical properties? Explain your answer.

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2. Part A: When the iron and sulfur were mixed together, did a chemical reaction take place?

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3. Part C: What did you do to make a chemical reaction take place between the iron and sulfur?

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4. Part C: When the iron and sulfur mixture was heated in the test tube, what evidence suggests that a chemical reaction occurred?

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5. Part C: How was the product in the beaker different than either the iron or the sulfur?

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6. Part C: Was the product recovered from the beaker a new substance? Use your observations to support your answer.

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