

PHYSICAL & CHEMICAL PROPERTIES & CHANGES

Experiment 11

INTRODUCTION:

Properties are those characteristics of a substance that enable us to identify it and to distinguish from other substances. *Physical properties* are inherent characteristics of substances that can be determined without altering its composition; they are associated with its physical existence. Common physical properties include color, state of matter, density, melting and boiling points and solubility. A *physical change* includes any change in a material substance that does not involve a change in its composition. Examples of physical changes are freezing, melting, vaporization, etc.

Chemical properties describe the ability of a substance to form new substances, either by reaction with other substances, or by decomposition. Flammability, corrosion and reactivity with acids are examples of chemical properties. A *chemical change* is a change in a substance that involves a change in its composition. Examples of chemical changes are rusting of iron, fermenting of wine, and burning of gasoline.

PROCEDURE:***Part A: Periodic Table of Elements***

1. After viewing the periodic table video, answer the questions on the Report Form.
2. Examine elements from each group specified below, and complete Table 1 on the Report Form with the pertinent information:

<i>Name of Group</i>	<i>Group No.</i>
Alkali metals (1)	1
Alkaline earth-metals (1)	2
Transition metals (2)	3-12
Halogens (1)	17
Noble gases (1)	18

Part B: Physical & Chemical Changes

For each question, (a) Describe the change and (b) tell whether it is *physical* or *chemical*. Write your responses on the Report Form

1. Add a small amount of sodium bicarbonate (baking soda) to a test tube and fill about 1/3 with distilled water. Stir the solution with a stirring rod until all of the solid dissolves. Add few drops of 1% phenolphthalein solution. Observe any changes that occurred and record on the Report Form. Afterwards, dispose of the mixture in the sink and clean the test tube.
2. Sandpaper a nail to make it clean and shiny. Obtain 1/2 test tube of cupric sulfate (CuSO_4) solution, and gently place the nail in it. Let it stand for several minutes. Remove the nail and examine its surface, then wipe it clean with a paper towel. Dispose of the paper towel in the trash and the cupric sulfate solution in the WASTE container. Clean the test tube.
3. Place a small amount of sodium chloride (NaCl) from the stock bottle into a test tube. Fill tube about 1/3 full with distilled water. Stir the contents carefully until the crystals disappear. Save the test tube and its contents for the next step.
4. Pour the contents of the test tube from step 3 into a beaker and place over a hot plate. Heat just enough until the liquid is gone. Observe the change, then let the beaker cool. When it has cooled, clean it by rinsing with water.

Note: Use caution when heating the beaker on the hot plate. Once the liquid is gone, the contents of the beaker could spatter and create a safety hazard.

DO NOT OVERHEAT THE BEAKER.

5. Fill a test tube 1/3 with 3% hydrogen peroxide. Add a few drops of potassium iodide (KI) to the test tube. Shake gently and let stand for a few minutes. Observe the changes. Discard the solution into the sink and clean the test tube.

TABLE 1

<i>Element</i>	<i>Symbol</i>	<i>Atomic No.</i>	<i>Common Group Name</i>	<i>Physical State</i>	<i>Metal/Nonmetal</i>

Part B: Physical and Chemical Changes

1. (a) _____

(b) _____

2. (a) _____

(b) _____

3. (a) _____

(b) _____

4. (a) _____

(b) _____

5. (a) _____

(b) _____

QUESTIONS:

1. Name and write the symbols for each of the following elements:

a) Alkali metal from period 3 _____

b) Noble gas from period 5 _____

c) Metalloid from group 14 _____

2. Classify the following properties of sodium metal as *physical* or *chemical*:

a) silver metallic color _____

b) turns grey in air _____

c) melts at 98°C _____

d) reacts explosively with chlorine _____

e) dissolves in water to produce a gas _____

f) malleable (can be shaped) _____

3. Classify the following changes as *physical* or *chemical* :

a) steam condenses to a liquid on a cool surface _____

b) baking soda dissolves in vinegar, producing bubbles _____

c) moth balls gradually disappear at room temperature _____

d) when a can of soda is opened bubbles form _____