

White Substance Analysis and Identification Lab

Target Audience 9-12

Background and Notes:

Chemistry is the study of matter and the changes that occur to matter. These changes can be chemical or physical. Physical changes can be tearing, grinding, melting, boiling, dissolving or any change that does not change the chemical identity of the substance. A chemical change is a process that alters the identity of the substance, creating one or more new substances. Release of a gas, production of a precipitate, a change in color or energy absorption or release can be examples of chemical change.

Fundamental understanding: What are physical and chemical characteristics (properties) of substances?

Essential Question: How does a physical or a chemical change affect the identity of a substance?

Purpose: As an inquiry based activity, this laboratory exercise involves experimental design and data analysis to compare and contrast chemical and physical changes of different white substances.

Safety Precautions:

Wear safety goggles and lab aprons.

Use caution when handling HCl (hydrochloric acid) and iodine. They can be harmful to your skin and clothing.

Be sure that there are no open flames when using methanol.

Materials:

Equipment and supplies:

1. Micro well plates
2. Droppers
3. Spatulas
4. Toothpicks
5. pH paper

Reagents and chemicals:

1. Distilled water
2. Methanol
3. Hydrochloric acid 3.0 M
4. Iodine (dissolved in isopropyl alcohol)
5. Iron (III) Nitrate 0.1 M
6. Benedict's Solution
7. Universal Indicator
8. White substances
 - A. Sugar
 - B. Flour
 - C. Alum (aluminum sulfate)

- D. Sodium bicarbonate
- E. Calcium carbonate (chalk)
- F. Sodium chloride
- G. Cornstarch
- H. Benzoic acid
- I. Aspirin
- J. Tylenol

Procedure (s):

Design a Data Table (s) to record the following investigations:

- I. Observations: Determine the physical characteristics of each substance on a (e.g. texture, odor, and color).
- II. Melting Point Determination: Place each substance on a small piece of foil (approximately 5 cm square). Determine the amount of time it takes to melt (after 1 minute consider it not melting).
- III. Test a small amount (no more than 0.5 cm size scoop) of each white substance in a micro well plate.
 - A. Solubility in water
 - B. Solubility Methanol
 - C. Hydrochloric acid 3.0 M
 - D. Iodine (dissolved in isopropyl alcohol)
 - E. Iron (III) Nitrate 0.1 M
 - F. Benedict's Solution
 - G. Universal Indicator
 - H. pH paper
- IV. Possible white substances
 - A. Sugar
 - B. Flour
 - C. Alum aluminum sulfate
 - D. Sodium bicarbonate
 - E. Calcium carbonate (chalk)
 - F. Sodium chloride
 - G. Cornstarch
 - H. Benzoic acid
 - I. Aspirin
 - J. Tylenol
 - K. Glucose
 - L. Unknown 1
 - M. Unknown 2

Conclusion:

1. Restate purpose.
2. What is a physical property?
3. What is a chemical property?
4. What is a chemical reaction?
5. What were the identities of the 2 unknowns?
6. What chemical properties match the unknown?
7. What physical properties match the unknown?

Name _____
 Period _____
 Team _____

Evidence Sheet for White Powders

	Fe(NO ₃) ₃	Iodine	3.0 M HCl	Universal indicator Color and pH	Soluble in water	Soluble in methanol
Cornstarch						
Sodium bicarbonate						
aspirin						
Benzoic acid						
Crime Scene						

	Fe(NO ₃) ₃	Iodine	3.0 M HCl	Universal indicator	Soluble in water	Soluble in methanol
Suspect # 1						
Suspect # 2						
Suspect # 3						
Crime Scene						

Which tests match the crime scene white powder? _____

Check the matching tests below

Fe(NO ₃) ₃	Iodine	3.0 M HCl	Universal indicator	Soluble in water	Soluble in methanol

Which suspect matches the crime scene evidence? _____

Would you send the unknown white substance out to the SBI for further testing?

