

Name _____ Date _____

WHITE POWDERS

A Lab on Standardized Tests Used to Identify Unknown Substances

Objectives

You will perform a series of tests to determine the physical and chemical characteristics of several unknown powders.

You will utilize your test results to identify an unknown substance.

Background Information

Jackson High School has a drug problem. Over the past year, illegal drugs have been seized from student lockers on five occasions. All of these illegal drugs are white powders that look remarkably like table salt. During a recent locker search, investigators collected several ziplock bags filled with a white powder. Before charges can be pressed on the individual in possession, the identity of the powders must be established.

You are a member of a forensic science lab team that has been sent to Jackson High School. A temporary lab facility has been prepared at the high school. The unknown white powders are delivered to you in the lab so you can determine their identity.

Due to limitations in equipment at the school, you have been asked to use a simple series of tests to determine the identity of the powders. To enable you to do this, six known white powders have been provided. You will run tests on each of the six known powders and record your results. Later you will compare results with those from tests of unknown powders collected during locker seizures. Your findings will determine the charges (if any) brought against the students in possession of drugs.

A brief overview of the white powders previously discovered at Jackson High School includes the following:

Brogaine—a mild hallucinogen. First offense is usually probation.

Speclate—a mild stimulant; often results in psychological dependence. First offense results in 6 months to 1 year in prison.

Rotaran—a strong stimulant; causes physical dependence. First offense results in 1 year to 3 years in prison.

Barrop—a moderate depressant; causes physical dependence. First offense results in 1 year to 3 years in prison.

Lixonin—a strong narcotic that causes physical and psychological dependence. First offense can result in 5 to 10 years in prison.

Table salt—this was found in one student's locker as a joke.

Materials

Samples of the six white powders (A, B, C, D, E, F) in individual ziplock plastic bags:

- A — Brogaine
- B — Speclate
- C — Rotaran
- D — Barrop
- E — Lixonin
- F — Table salt

Teaspoon
Hand lens
Black construction paper
Aluminum foil
Hot plates
Labels
Lugol's solution
Medicine dropper
Dilute acetic acid
Distilled water
1M (Molar) sodium carbonate solution
7 test tubes and stoppers
Stirring rod
Unknown sample in a ziplock bag

Procedure, Part A: **Developing a positive test for the six known powders**

Obtain a ziplock bag of each of the six known samples A through F. Record your results for tests conducted on the six known powders in Data Table 1. If nothing happens in a specific test on a known substance, record ND (no data) in the proper location on the data table. At the end of Part A, you should have something written in each box on the chart.

1. Place a small amount of sample A on the black paper and observe its appearance with a hand lens. Record your results. Repeat this for samples B through F. Dispose of the samples and the paper in the waste disposal can.
2. Place 1/2 teaspoon of sample A in a test tube. Add 10 drops of vinegar to the test tube. Record your observations. Repeat this test with the remaining five powders. Wash out each test tube.
3. Label the six pieces of aluminum foil with A, B, C, D, E, F. Place 1/2 teaspoon of each of the six samples on the appropriate piece of foil. Place the six squares of foil on a hot plate set at a medium setting. Observe each for several minutes. Record your results. Dispose of the foil and contents.

- Place 1/2 teaspoon of sample A in a test tube. Add 10 ml of distilled water. Stopper the test tube and shake for a few seconds. Record your observations. Repeat this for the remaining samples. Do not dispose of these samples. You will use them in the next step.
- Using the six test tubes from step 4, add 5 ml of sodium carbonate solution to each test tube. Observe and record what occurs in each test tube. Wash out the test tubes.
- Place 1/2 teaspoon of each sample in a clean test tube. Add 10 drops of Lugol's solution to each test tube. Record your results. Wash out the test tubes.

DATA TABLE 1

Observations from tests done on white powders.

Name of known substance	Observation with hand lens	Addition of acetic acid	Hot plate results	Addition of water	Addition of sodium carbonate	Addition of Lugol's solution
A—Brogaine						
B—Speclate						
C—Rotaran						
D—Barrop						
E—Lixonin						
F—Table salt						

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Procedure, Part B:

Identification of unknown substance

You now have the test results for each white powder on Data Table 1. These results will help you to determine the identity of an unknown substance by comparison. Several unknown substances were discovered in student lockers today. Different forensic teams have been asked to identify some of the unknowns. In Data Table 2, write down the number of the ziplock bag whose contents you will analyze. This number indicates the locker from which the baggie was taken. Compare your results with those in Data Table 1 to determine what substance the student had in his or her locker. Be careful; your results will determine whether or not charges should be pressed against the student.

- Write down the locker number on the bag in Data Table 2.
- Perform all the tests you performed in Part A on this unknown substance. Record your findings on Data Table 2.
- Compare the results in Data Table 2 with the results in Data Table 1.

DATA TABLE 2
Reaction of powders to chemical tests.

	Hand lens observation	Addition of acetic acid	Hot plate results	Addition of water	Addition of sodium carbonate	Addition of Lugol's solution
Unknown sample # _____						

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Postlab Questions

1. Describe one positive test from Data Table 1 for each of the six powders.

2. Was the powder you examined in Part B one of the illegal drugs or was it table salt? Explain how you arrived at this conclusion.

3. Explain why forensic scientists must be very accurate when examining substances in the laboratory.

4. Explain why Part A was a vital part of this experiment.
