Identification of Unknown Substances I
Forensics Investigation Kit

Introduction
Is the white powder on the floor aspirin, flour, cocaine, or sugar? How do authorities distinguish between substances that might look alike? To the criminalist the answers may be critical to solving a case or getting a conviction.

Concepts
- Standards/controls
- Chemical reactions
- Precipitation
- Solubility

Background
Substance identification is very important in many real-life situations. An unconscious victim has ingested some drug—it is critical to identify the substance as quickly as possible. A child has swallowed some pills from a medicine cabinet—identification could be a matter of life or death. Someone is seen selling bags of white powder—it must be identified for a criminal conviction to occur. A person has died from someone tampering with drug bottles at a local pharmacy—what was added to the antacid tablets?

The basis for identification of unknown substances always hinges upon using known standards for comparison. Without knowing exactly how a known substance reacts to all tests, it would be impossible to make a positive identification of an unknown substance. As new drugs and substances are created, standards for testing for these substances must also be developed. The FBI Crime Laboratory, for example, works very closely with pharmaceutical companies to produce tests for all new drugs as they are developed. The “standards,” which are kept on file, are critical for proper identification of “unknowns.”

In the first part of this laboratory, a set of standards will be established for the simulated drugs Scogaine, Davlate, Bradlin, Irenin, and Markopan. Once the standards have been established, tests will be run to identify an unknown. Though this simulation is clearly an oversimplification and cannot actually be used to test unknowns, the principles are the same as those utilized by a crime laboratory. In the criminal laboratory, the simple chemical reactions would be replaced by complex chemical analyses utilizing very expensive and sophisticated equipment.

Materials
- Hand lens
- Scogaine, teaspoonful
- Davlate, teaspoonful
- Bradlin, teaspoonful
- Irenin, teaspoonful
- Markopan, teaspoonful
- Unknown drug, teaspoonful
- Hydrochloric acid solution, HCl, 0.1 M, 30 drops
- Aluminum foil, 1½" × 1¼", 5
- Plastic graduated test tubes with screw tops, 5
- Water, distilled, 60-mL
- Sodium carbonate solution, Na₂CO₃, 1.0 M, 18 mL
- Iodine solution, 30 drops
- Silver nitrate solution, AgNO₃, 0.3 M, 30 drops
- Small cups, 5
- Plastic spoon
- Paper towel
- Tongs or forceps

Safety Precautions
Hydrochloric acid, silver nitrate, and iodine solutions are toxic by ingestion or inhalation and severely corrosive to skin and eyes. Sodium carbonate is also a skin irritant. Iodine and silver nitrate solutions will stain the skin and clothing. Wear chemical splash goggles, chemical-resistant gloves, and a chemical-resistant apron. Wash hands thoroughly upon completion of laboratory work.