



**DESCRIPTION:**

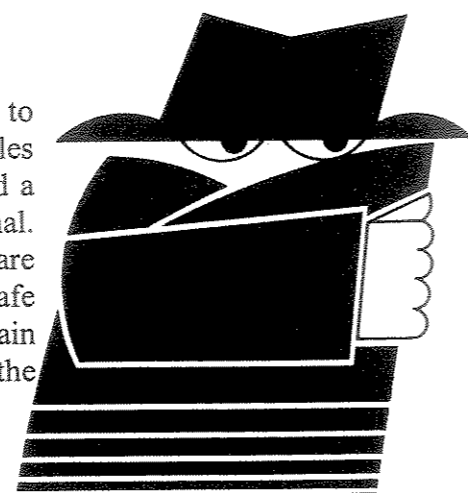
Given a scenario and some possible suspects, students will perform a series of tests. These tests, along with other evidence or test results will be used to solve a crime. No reference materials or calculators are allowed.

**A TEAM OF UP TO: 2**

**APPROXIMATE TIME:** 50 minutes

**SAFETY REQUIREMENTS:**

Students must wear the following or they will not be allowed to participate: close-toed shoes, OSHA approved chemical splash goggles with indirect vents, pants or skirts that cover the legs to the ankles and a lab coat or apron that reaches below the knees. Gloves are optional. Students who unsafely remove their safety clothing/glasses or are observed handling any of the material or equipment in a hazardous/unsafe manner (e.g., tasting or touching chemicals or flushing solids down a drain and not rinsing them into a designated waste container provided by the supervisor) will be disqualified from the event.



**Students must bring:**

Test tubes and test tube holders or any devices in which they can perform the tests, droppers, funnel (s), filter paper, pH or litmus paper, spatulas, plastic spoons or stirring rods, 9 volt conductivity tester (no testers will be allowed that run on AC current), thermometer, flame test equipment (nicrome wire, cobalt blue glass, etc.), **slides**, and metal tongs.

**Supervisor will provide:**

Iodine (Iodine dissolved in KI solution), 2M HCl, 2M NaOH, benedict's solution, (no more than 50 mL of the solutions) a hot water bath, a heat source to perform flame tests, **instructions for the testing of simulated blood samples and the reagents needed to perform such tests and materials** (e.g., various concentrations of salt water, isopropanol, corn oil or other liquids) that may be used for differential density tests and distilled water (no more than 250 mL). The supervisor will provide a candle and matches for burn tests on the fiber samples. The supervisor may provide other equipment (such as a microscope) or substances to perform additional tests.

**THE COMPETITION:** There will be 5 parts and then the Analysis of the Crime.

**1. Qualitative Analysis:** Substances to identify: Sodium acetate, sodium chloride, sodium hydrogen carbonate, sodium carbonate, lithium chloride, potassium chloride, calcium nitrate, calcium sulfate, calcium carbonate, cornstarch, glucose, sucrose, magnesium sulfate, boric acid, and ammonium chloride (there will be no mixtures). The team will be provided with up to **5 powders at Regional (8 at State and National)** of the 15 substances listed above. All teams will have the same set of solids to identify. No more than 15 g of each substance will be given to the team.



**2. Polymer Testing-Natural & Man-made:** Substances to identify: PETE, HDPE, PS, LDPE, PP, PVC, PMMA and PC. Students will be provided with up to polymer samples (**3 Regional, 4 State, & 5 National**) found at the crime scene. Students are to use density tests and characterizations of each sample to help identify the polymer found at the crime scene. Results of burn tests of each sample may be given. No actual burn tests will be performed. Students should have knowledge of the applications of these polymers. Students will be given up to **2 Regional, 3 State and 4 National** samples of cotton, wool, silk, **nylon, spandex**, or polyester. Students will be expected to test the fibers by performing burn tests and using their senses to help identify the fibers. Students may be expected to explain their answers. **Students will be given up to 2 hair samples at Regional, 3 State, and 4 National. The hairs may be human, cat, or dog.**

**3. Forensic Serology:** Students will be expected to determine if a human blood sample is A, B, AB, or O. **Simple simulated tests will be conducted.**

**4. Chromatography/Spectrophotography:** Students may be expected to separate components using paper chromatography, analyze gas chromatograms, UV and/or IR Spectrophotometry.

**5. Fingerprint Analysis:** Students may be asked to identify different patterns on fingerprint evidence. Students should understand terminology such as bifurcation, ridges, island, enclosure, loop, whorl, and arch. Students should be able to answer questions about skin layers and how fingerprints are formed. Students may be asked questions on the different methods of detecting fingerprints and the chemistry behind each of these methods.

**SCORING:**

Part 1-20% Part 2 -20%, Part 3-20%, Part 4-10%, Part 5-10% and Analysis of the Crime 20%. Tiebreaker: Ties will be broken by the best written analysis of the crime scene that includes the reasons why certain suspects have been eliminated or others remain in the pool of possible criminals.



**Legend**

- |                        |                |
|------------------------|----------------|
| 1) Ridge Ending        | 5) Ridge dot   |
| 2) Bifurcation         | 6) Core        |
| 3) Enclosure or Island | 7) Delta       |
| 4) Flexure crease      | 8) Short Ridge |