



Blood Stain Analysis

Teacher Instructions

Goals:

Introduce students to some of the techniques used by forensic scientists for analyzing blood.
Introduce students to the concept of blood type.
Provide opportunity for students to practice critical thinking skills in the context of scientific inquiry.

Materials:

Blood (chicken or cow; can be obtained from meat packing facility)
Red paint
Red food coloring
Fresh tomato
Fresh, raw beet
Canned tomato sauce or spaghetti sauce
small plastic containers in which to aliquot each of the above substances (6 per student group)
set of envelopes containing cotton squares with stains from crime scene (one set per student team)
small dropper bottles or small plastic tubes and pipettes or droppers
hydrogen peroxide
phenolphthalein solution (instructions for prep immediately below)

Stock solution:

Combine
2 g phenolphthalein (powder)
20 g potassium hydroxide (CAUTION: caustic, strong base)
100 ml water.
Mix thoroughly.
Add
20 g powdered zinc.

Allow 48 hours for solution to become colorless. Store in brown bottle or bottle wrapped with foil.

Working solution:

20 mL stock solution

80 mL ethanol

- "Case of the Burglarized Bronco Fan"
1 envelope with dry cotton square stained with tomato sauce labeled "A"
1 envelope with dry cotton square stained with cow or chicken blood labeled "B"
- "Case of the Hacked High Tech Lab"
1 envelope with dry cotton square stained with red dye labeled "A"
1 envelope with dry cotton square stained with cow or chicken blood labeled "B"
- "Case of the Cyanide Cocktail"
1 envelope with dry cotton square stained with red paint labeled "A"
1 envelope with dry cotton square stained with cow or chicken blood labeled "B"

NOTE: Rather than providing the students with stains to test, you may have them test the actual stains they collected from the crime scene.

Simulated Blood Typing Kit (Wards # 36 W 0019) with samples transferred to new tubes labeled "suspect 1", "suspect 2", "suspect 3", and "evidence".

Place liquid from the same sample in both tubes "suspect 1" and "evidence" (e.g. Mr. Smith from the Wards kit). Place liquid from individuals with different blood types in tubes "suspect 2" and "suspect 3".

Instructions:

This activity contains two parts. Part One is intended to teach students about the catalase test for the presence of blood. While there are more sensitive tests for the presence of blood that an investigator might use, this is by far the cheapest. Following the student handout should be fairly straightforward. Students predict whether or not the substances provided will be catalase positive or negative, then they test their predictions. They also test whether each substance tests positive for blood using the phenolphthalein test. After this step they open the evidence packets provided, and test whether each stain that was found is likely to be blood.

Part Two addresses blood typing. A good way to avoid using actual human blood for this exercise is to purchase a simulated blood typing kit from a biological supply company. Their price range is approximately \$35-\$50.