

Chemistry 51

Experiment 10

Forensics Fingerprint

- Divide up into teams of three people, one team per set-up.
- Each team should choose a team leader.
- The team leader is in charge of the lab materials.

Materials in Lab Kit

- pair of tweezers
- an ink pad with index cards
- fingerprint brush
- talc powder
- clear packaging tape
- magnifying glass
- 2.0 M Sodium Hydroxide, NaOH
- Parafilm Pieces
- Cotton balls
- Tube of super glue
- Uncontaminated Aluminum Foil in a Baggie

Procedure

1. During this experiment wear a pair of gloves when handling all materials, especially when handling the foil. Everyone on your team should (1) secretly choose an identity of either “A”, “B”, or “C” and then (2) make a fingerprint (left hand) on the piece of aluminum foil provided. Make two sets of aluminum foil prints. First wipe your thumb on an oily part of your face or palm. Then simply roll your finger over the piece of foil, once! This should be the only time anyone touches the foil with his or her bare hands. Use gloves to move the foil. This should be done secretly, not letting any of the other teams know whose print is on the foil. Identify the foil as either “A”, “B”, or “C”.
2. Next wipe a finger across your nose or any oily/sweaty area and then tightly grasp the glass section of a 250-mL beaker. Do this twice also. Label the beaker with a pencil as either “A”, “B”, or “C”. Place one of the foils inside one of the beakers and set it aside for later.
3. Each team member should create two sets of inked print of his or her left-hand fingers on two separate index cards. Label the wide card with your name and date and three thin cards as your “secret identity”. This time choose your favorite number as your secret identity. Again do not let the other teams know your secret letter and number. Use the ink blotter to put some ink on your fingers. Practice on cheap paper first. If you do not make a clean print on your first try, repeat on the practice paper. Next, roll your thumb on an index cards in one swift motion. Begin first with your thumb then finish with your pinkie. Write your name & date on the index card once you have clean prints on it. Indicate which finger each print belongs to by labeling the fingers as thumb = 1, index finger = 2, etc until the pinkie finger as 5. Wash your hands with soap, baking soda, & water or isopropyl alcohol. Place one of the thin cards in each of your team’s beaker. With the wide card, on the report sheet, classify your own print according to the types given on the next page.

4. Take the second set of prints created in steps 1 & 2 and analyze your own prints as practice. First, open the talc powder jar and gently brush some powder over the fingerprint area on the beaker. Carefully use the provided tape to "lift" the print off of the glass and place on a dark card. You may have to practice this technique several times before acquiring a readable print. Use the UV lamp to bring out the fluorescence powder mixed in the talc powder. On the report sheet, classify your own print.
5. Obtain a 100 or 150-mL beaker, a pair of tweezers, and a cotton ball from your kit. Put the cotton ball and the foil containing your print into the beaker. They should not be on top of each other, but they can slightly touch each other. **A chemical reaction between the super-glue, the strong base, and moisture in the air forms a visible polymer. This polymer sticks to the oil and dirt left behind by your finger (your fingerprint). This reaction takes place in the gas phase, the fumes from the super glue. Super-glue fumes are not particularly toxic, but they will make your nose burn, so DO NOT SMELL THE SUPERGLUE OR THE CONTAINER.** Now quickly, place 10 drops of sodium hydroxide and 5-7 drops of super-glue directly on the cotton ball and immediately cover the container with Parafilm, stretching it over the container so that it makes a good seal. Record the time you started the process. Wait 20-25 minutes, uncover the container then remove the foil with the tweezers and, using a magnifying glass, analyze your prints.
6. Next give the other unused foil and inked prints to the instructor. Remember to wear gloves when handling the evidence. The instructor will distribute two random sets of "evidence" to your group. Using the techniques learned above, determine the identity of the "criminal" per set of "evidence". Compare your analyzed prints to the provided inked prints.