Developing Fingerprints

Topic

Using chemicals to detect fingerprints

Introduction

As you found in Experiment 7.03: Dusting For Fingerprints, the powder method of making latent fingerprints visible produces good results on hard, shiny surfaces and does not work at all on some surfaces. Alternative techniques devised to reveal fingerprints on different surfaces use chemicals that react with the traces of perspiration and oil left by the skin. For example, scientists discovered that iodine vapor reacted with some of the components of fingerprint traces (even when the fingerprint was made on an absorbent surface), leaving a copy of the print outlined in iodine crystals. Investigators use this vapor technique to detect fingerprints on absorbent surfaces. Criminalists can detect fingerprints made on sticky surfaces using a mixture of phenol and gentian violet, while the chemical ninhydrin causes colorful red and purple fingerprints to show up even on old documents that have not been touched for years. Silver nitrate will react with the sodium chloride in sweat to produce dark silver chloride images of fingerprints. In this experiment, you will use super glue to make latent prints visible. The ethyl or methyl cyanoacrylate in super glue reacts with water (and possibly other substances) in the fingerprint, producing a white deposit in the shape of the fingerprint.

Time required

30 minutes, then 1½ hours for the fingerprints to form

Materials

zippered plastic bag (20 × 18 cm)
8 cm Petri dish without its lid (or similar small plastic bowl or container)
small piece (approximately 4 × 4 cm) cut from a heavy-duty black plastic trash bag
piece of aluminum foil (approximately 4 × 4 cm)
sheet of paper towel
hot water
small heatproof plate (about 15 cm diameter)
tweezers
super glue
hand cream
warm place in which to leave the bag
safety glasses

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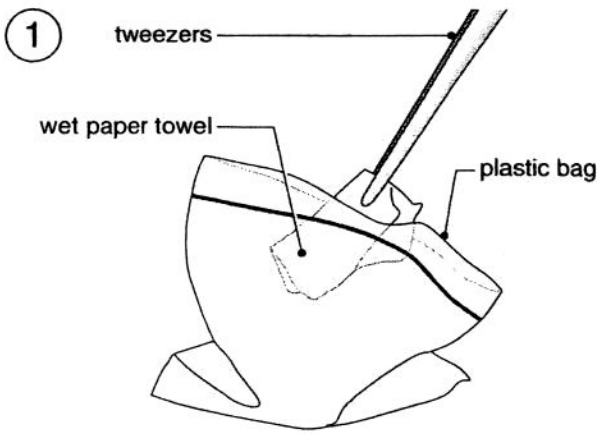
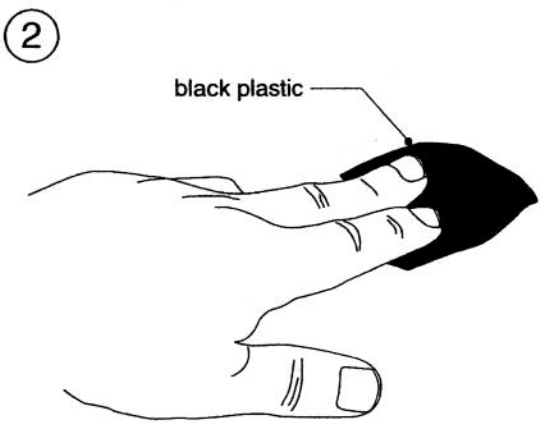
Safety note

Carry out this experiment in a well-ventilated room wearing safety glasses. Super glue vapor is believed to be non-toxic, but it is irritating to the respiratory system, and will bond skin to skin in seconds. If skin is stuck together, soak the affected area in warm soapy water and gently peel or roll the surfaces apart. Do not pull. If glue gets in the eye, wash thoroughly with warm water and seek medical attention.

Procedure

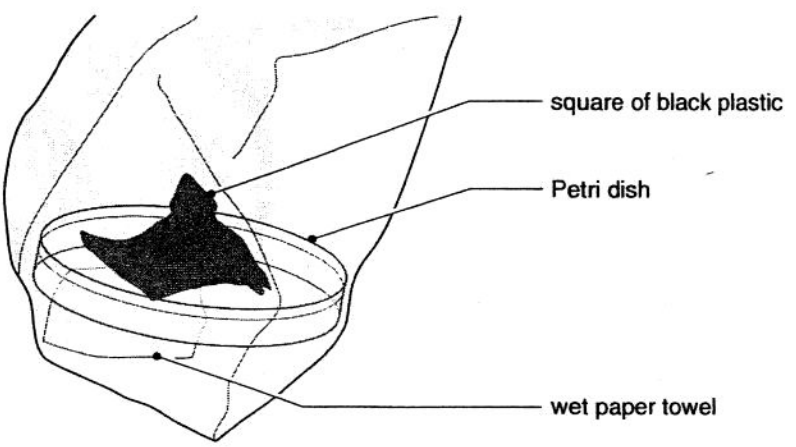


Putting the wet paper towel in the plastic bag



Pressing your fingers onto the black plastic

1. Open the plastic bag and stand it upright.
2. Fold the paper towel. Then put it on the plate and pour hot water over it.
3. Use the tweezers to place the wet paper towel at the bottom of the bag as in diagram 1 above. Place the Petri dish on top of the paper towel inside the plastic bag.
4. Rub hand cream into the ends of your fingers and press your fingers lightly but firmly onto the square of black plastic as in diagram 2 above.
5. Use the tweezers to place the square of black plastic in the Petri dish inside the bag (see diagram 3 below).



Putting the black plastic square into the Petri dish

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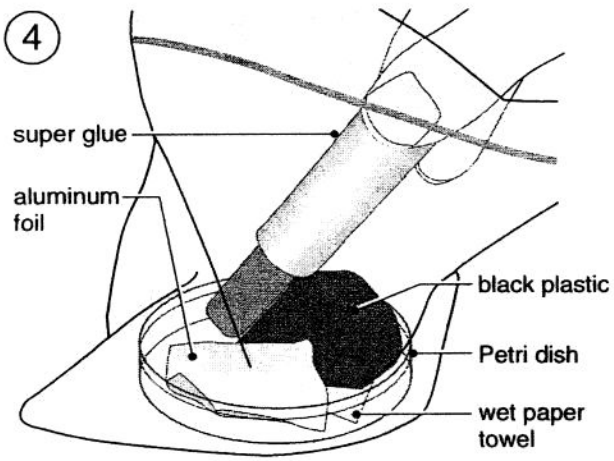
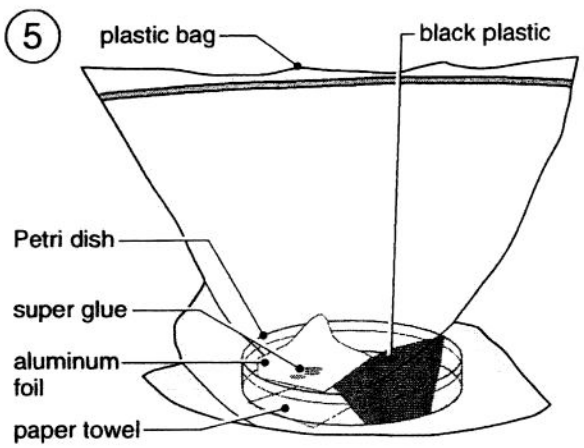
6. Crumple the square of aluminum foil slightly in your fingers and place it in the Petri dish next to the black plastic. Make sure the foil square is flat on the Petri dish.
7. Take the cap off the tube of super glue and hold the end of the open tube inside the plastic bag. Carefully drip about 5 drops of glue on the aluminum foil (see diagram 4 below). Be careful to keep the aluminum foil flat. Replace the cap on the tube of super glue.
8. Seal the bag (see diagram 5 below) and carry it very carefully (so that the glue does not spill over the edge of the foil) to a warm place. Leave it undisturbed for about 1 1/2 hours.
9. After 1 1/2 hours, take the bag outside (or put it under a fume hood) and open it at arm's length to avoid the fumes of glue emerging from the bag.
10. Use the tweezers to remove the square of black plastic from the bag and examine it. Be careful to avoid touching any glue, which might still be wet. Dispose of the bag carefully.



Dripping super glue onto the aluminum foil



Sealed bag

Analysis

1. What did you see on the square of black plastic?
2. Could you see anything on the aluminum foil?
3. Do you know why the wet paper towel is used? Can you think of how to test your theory?

Want to know more?

See Section 10: Our Findings

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