

Name: _____

No Trace Left Behind

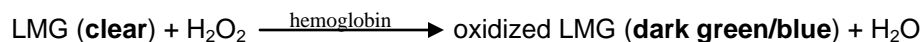
A Forensic Serology Activity

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On January 2nd, 2010, emergency operators responded to a call reporting that Leif Steele, 36, was found dead by a neighbor. Officers arrived to the scene to find Steele's body on the kitchen floor of his townhouse. Upon examining the scene, officers found red splatter on the refrigerator door above the body. On the floor next to the body, there was a broken bottle of what appeared to be hot sauce. Mr. Steele's pants pockets were turned inside out, but there was no evidence that anything had been stolen from the house. Examination of Mr. Steele's hands revealed a brown substance under his nails. The kitchen door was open, leading to the garage where his cat was found hiding.

Crime scene investigators meticulously processed the scene and gathered information about Mr. Steele's previous whereabouts. Leif Steele, a Maryland native, was last seen at Mr. Crab's Crab Shack four hours before his body was discovered. Although it was reported that he left the restaurant in his 2006 black Mustang, police have been unable to recover the vehicle. Further investigation showed that Mr. Steele had made several calls on his cell phone the night before his body was found. Police suspect foul play.

Crime scene investigators collected several samples of unknown fluids for examination by you, a forensic serologist whose job is to analyze trace evidence in order to determine the presence of possible body fluids (blood, saliva, urine etc.) or hair. In particular, you will use a Leuco-malachite green (LMG)-test to determine if any of the samples collected by officers contain blood. LMG is normally clear with a very faint green tint, but in the presence of hemoglobin and hydrogen peroxide, it becomes dark green/blue. Hemoglobin, which is a protein found in red blood cells, catalyzes the reaction of LMG with hydrogen peroxide thus leading to a change in color.



UNDERLINE ANY INFORMATION THAT YOU THINK WILL BE RELEVANT TO YOUR INVESTIGATION

What is the role of hemoglobin in the LMG reaction and how does it determine the presence of blood?

MATERIALS

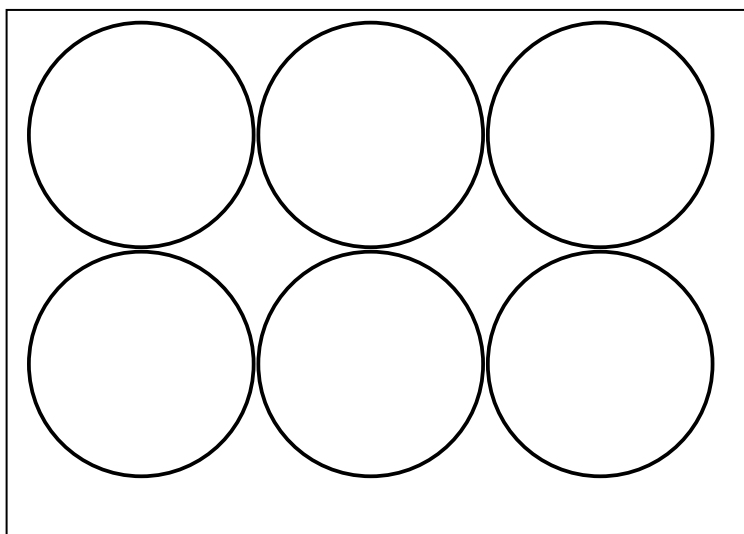
Evidence samples x3
Bovine hemoglobin
Water

Micropipette and tips
6-well plate
Cotton swabs x2

LMG (leuco-malachite green)
Hydrogen peroxide

PART I – Test evidence and control samples

- 1. Assign your controls and evidentiary samples to separate wells in your 6-well plate. Label the diagram below with these assignments to keep track of your samples.



Positive control: _____
We know this will test positive for blood

Negative control: _____
We know this will test negative for blood

Evidentiary sample # 1: _____
You will test this evidence to determine if blood is present

Evidentiary sample # 2: _____
You will test this evidence to determine if blood is present

Evidentiary sample # 3: _____
You will test this evidence to determine if blood is present

NEGATIVE CONTROL

- 2. Add 50 uL of negative control onto a cotton swab. Place this swab in the well labeled “-”.
- 3. Add 50 uL of hydrogen peroxide to the swab.
- 4. Add 50 uL of LMG to the swab. Record your observation in table 1.

POSITIVE CONTROL

- 5. Add 50 uL of positive control onto a different cotton swab. Place this swab in the well labeled “+”.
- 6. Add 50 uL of hydrogen peroxide to the swab.
- 7. Add 50 uL of LMG to the swab. Record your observation in table 1.

EVIDENTIARY SAMPLES

- 8. Place your evidence sample 1 in the appropriate well.
- 9. Add 50 uL of hydrogen peroxide directly to sample 1.
- 10. Add 50 uL of LMG. Write down your observations in table 1.
- 11. Repeat steps 8-10 for samples 2 and 3. Record all data in table 1.

PART II – Data analysis

Compare the evidence samples to the controls. Which evidence, if any, tested positive for the presence of blood (fill in the “Result” column in the table below)?

Table 1 – Observations and results of LMG test for evidentiary samples and controls

Sample	Observation of the swab after adding LMG:	Result?
-		-
+		+
1		
2		
3		

PART III – Conclusion

When making a conclusion, forensic serologists have to make up their mind about proceeding with additional confirmatory tests. Should you proceed with confirmatory tests for samples that tested positive for blood? Should you eventually perform DNA analysis? Do these results tell you anything important about the death of Leif Steele?