



B30 The Effect of pH on Presumptive Forensic Serological Testing

Ariel B. Smart, BS*, Wilmington, DE 19801-7100; Kimberlee Sue Moran, MSc, Rutgers University-Camden, Camden, NJ 08102; Ja'Neisha Hutley, MS, Philadelphia, PA 19102; Stephanie L. Murphy, PhD, Rutgers University, New Jersey Agricultural Experiment Station New Brunswick, NJ 08901

Learning Overview: After attending this presentation, attendees will better understand how and if soil pH affects blood and semen stains. In addition, this presentation will investigate whether the length of time that semen or blood is exposed to soil affects presumptive test results.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing more detailed information on presumptive testing for blood and semen and if a negative result obtained after presumptively testing buried material could be the result of a false negative.

When clothing is found buried at a crime scene, a presumptive test will be conducted to determine whether biological evidence in the form of blood or semen stains is present. If the result is positive, evidence is sent for a confirmatory test, followed by DNA analysis. If the result is negative, in most instances, testing ceases. Presumptive serological testing is a cost- and time-effective way to determine if suspected biological fluid is present. However, presumptive testing is known to produce false positive results with some substances. What is less known is whether false negatives exist. This research attempts to answer the question: “If blood or semen was present on clothing exposed to soil, could the pH of the surrounding soil and the length of exposure cause a false negative result?”

Two hundred fifty 2cm² fabric swatches were prepared: 108 swatches were stained with 50µL of human blood and 108 swatches with 100µL of human semen. The presumptive tests chosen for this project were Acid Phosphatase for seminal fluid and Kastle-Meyer test for blood. To determine if soil pH would affect presumptive testing, acidic, neutral, and alkaline soil was prepared. Approximately 145g of each soil type was placed in its own plastic container, resulting in 66 containers of acidic soil, 66 containers of neutral soil, and 66 containers of alkaline soil. After the stains had dried in ambient conditions, each fabric swatch was placed into its own container and surrounded with soil. Positive controls (stained fabric left unburied) and negative controls (fabric buried but not stained) were also prepared. Soil containers were stored in the lab in darkness at 70°F. Fabric was left exposed to soil over the following intervals: 3 days, 7 days, 11 days, 30 days, 45 days, and 60 days. Five replicates of each fluid sample at each exposure time in each soil type was prepared, as well as a negative and positive control. Once a sample reached its designated exposure time, the fabric was removed from the container and any loose soil was cleaned off. Presumptive testing was conducted according to manufacturer’s guidelines. Presumptive testing was also conducted on a positive and negative control.

Results show that soil pH does, indeed, impact serological screening results as does the duration of exposure. Blood stains in the neutral soil appeared more deteriorated when compared to stains from other soils, even when exposure time was greater. The reaction time and intensity of the results for both the Kastle-Meyer test and Acid Phosphatase test for neutral soil samples changed after the 11-day exposure period. The intensity of the result of the Kastle-Meyer test directly compared to the intensity of the blood stain. The Acid Phosphatase test result was in the last acceptable time range for color change (i.e., 60 seconds). Forensic serologists should be aware that buried evidence can impact screening tests. It is important for analysts interpreting screening test results on buried evidence to exercise caution when determining whether or not a weak result is a true negative.

Presumptive Testing, Serology, Soil pH