



“Paraffin Test” as Junk Forensic Science

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What is a PARAFFIN TEST? The paraffin test is also known as the dermal nitrate test or diphenylamine test. The procedure tests the presence of nitrates and nitrites that may have come from gunpowder or primer inside the bullet casing that ignites when a gun is fired. This procedure involves coating the subject's hand with melted paraffin wax. As the wax cools and a cast of the hand is formed, diphenylamine acid is applied. The reaction of nitrites and nitrates with the diphenylamine then produces a visible blue-violet color on the wax.

How reliable is the paraffin test?

1. Nitrites and nitrates are found in other substances aside from gunpowder or bullet primers. These include soil, water, food and other chemicals. These would produce false positive results.
2. False negative results are also likely to result when there are scanty amounts of gunshot residues (GSR) lifted from the suspect's hands by the paraffin wax or there was a delay in the collection or processing of the alleged shooter's hands.
3. The positive blue reaction reported as a “streaming fleck-type reaction” is very subjective and difficult to identify. Moreover, it disappears fast and requires magnification. Thus, the reaction may not be objectively documented.

Cowan and Purdon published “A Study of the ‘Paraffin Test’” in the Journal of Forensic Sciences in January 1967, which concluded that “a critical evaluation of the type, site and numbers of reactions obtained on casts from hands of persons known to have fired guns and comparison of these characteristics in similar reactions on casts from a control group of persons known or presumed not to have fired guns failed to establish any significant distinction.” This was earlier affirmed in the First ICPO-Interpol Seminar on Scientific Aspects of Police Work in 1964 where 21 country representatives agreed that the traditional paraffin test does not have any value as evidence to put before the courts and that it should no longer be used.



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What other tests can be done to detect gunshot residues (GSR)?

The three tests aim to detect barium, antimony and lead which compounds are found in the primers of bullets.

1. Scanning electron microscopy (SEM): magnifies and detects the physical presence of gunshot residue particles. The sampling method involves application of adhesive tape on the hands of the suspected shooter. The particles that adhered to the tape are then analyzed using SEM.
2. Flame atomic adsorption spectroscopy (FAAS): Sampling method involves application of a weak acid solution on the front, back and medial aspects of the thumb and forefinger.
3. Neutron activation analysis (NAA): Sampling method is the same as FAAS.

Collection of samples must be taken immediately to protect the hand. The standard procedure to preserve the evidence in a cadaver is to wrap the hand with a paper bag and taped up to the wrist.

Equipment to analyze these substances is available in our country.

Even if there are more sensitive and specific methods to analyze GSRs that now exist, there is still no chemical test known to conclusively determine whether an individual fired a gun or not. It is still important to look at the totality of the testimonial and physical evidence. Paraffin test is an ancient examination; it should be discarded and replaced with newer and more reliable testing methods.

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