

Shedding light on the matter – detecting bloodstains 2

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Intro: Forensic chemists need highly sensitive, yet easily understandable, tests that can be performed easily at a crime scene in order to detect even the faintest traces of evidence. One such test, the luminol test, can be used to detect even invisible minute blood residues by causing them to glow.

Luminol test for detecting blood residues

Equipment:

- Luminol reagent (mix 0.1g luminol (3-amino-phthalhydrazide) with 5.0g sodium carbonate (Na_2CO_3) in 100ml distilled water. Immediately prior to use, add 0.7g sodium perborate ($\text{NaBO}_3 \cdot 4\text{H}_2\text{O}$), place solution in spray bottle).
- Blood sample (can be animal blood)
- Darkened room

Method:

1. Prepare luminol reagent immediately prior to use.
2. In a darkened room, spray the blood sample with the luminol reagent.

Results: If successful, the blood will glow dimly for a short amount of time (around 30 seconds). Take a long-exposure photo to preserve the image!

Safety: Use safety goggles and gloves. Blood sample is a bio-hazard, so dispose of it accordingly.

Science: The reagent contains a mixture of luminol and hydrogen peroxide, which react together to produce light in the presence of a catalyst. The iron in the blood's haemoglobin acts as the catalyst, speeding up the reaction and causing the production of light in a process known as chemiluminescence. This reaction is also seen in glowsticks and in fireflies. The experiment is highly sensitive, as only a tiny amount of the iron in haemoglobin is needed to catalyse the reaction – the luminescence “amplifies” the presence of even a tiny, dilute amount of blood.

The experiment can give false positive results in the presence of bleach, urine, faecal matter and vegetable extracts, as well as copper and copper alloys.

See also: *A Grisly business – detecting blood stains* by the Biochemical Society
Bloodstain patterns by David A. Katz
Luminol Chemiluminescence test for blood – About.com: Chemistry -
<http://chemistry.about.com/od/glowinthedarkprojects/a/luminolblood.htm>