

A Grisly Business – detecting blood stains

Keywords: forensics, chemistry, enzymology

Intro: When searching the scene of a violent crime, a forensic chemist must be able to distinguish between a damning blood stain and a harmless custard mark on the carpet. In the following experiment, the presence of enzymes in the blood and the blood's pH are used to identify the mystery substance.

Kastle-Meyer test for indentifying blood stains

Equipment:

- Kastle-Meyer reagent (1% phenolphthalin in 100% ethanol)
- 3% hydrogen peroxide (H_2O_2)
- Distilled/deionised water
- Ethanol ($\text{C}_2\text{H}_5\text{OH}$), 100%, in small dropper bottle
- Blood sample (can be animal blood)

Method:

1. Add 1 drop of water or ethanol to suspected bloodstain.
2. Add 1 drop of Kastle-Meyer reagent to suspected bloodstain.
3. Add 1 drop of 3% hydrogen peroxide solution to suspected bloodstain.

Results: If any colour change occurs at step 2, then the test is considered negative due to the presence of chemical oxidants contaminating the sample. If, after step 3, the sample is a pink colour, then the sample is most likely blood, although it could be a vegetable extract, which also contains peroxidases.

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

Science: Blood, along with some vegetable materials such as horseradish, contain enzymes known as peroxidases. These accelerate the rate at which organic compounds (such as phenolphthalin) are oxidised in the presence of peroxides (such as the hydrogen peroxide added). This oxidation will be marked by the phenolphthalin in the Kastle-Meyer reagent turning into pink phenolphthalein. Phenolphthalein is colourless at low or neutral pH, but turns a pink colour at high pH, indicating that the sample contains peroxidase enzymes, and is in fact blood (or horseradish or a similar vegetable extract).

See also: *Shedding light on the matter – detecting blood stains 2* by the Biochemical Society

Bloodstain patterns by David A. Katz

Blood, I presume? by Stephen Gallagher -

<http://www.scienceteacherprogram.org/biology/SGallagher09.html>