

Detection of Latent Bloodstains Covered With Three Types of Current Top-Selling Paint/Primer Mixtures Using BlueStar

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MOTIVATION

This poster will impact the forensic science community by promoting a better understanding of the capabilities of BlueStar™ in presumptively detecting the presence of human blood under between one and nine layers of three commonly sold paint/primer combinations. Similar research has previously been completed; however, much of it is outdated and does not include commonly available paint-primer combinations. Furthermore, the majority of previous research involved the use of Luminol, not BlueStar™.

BlueStar™ is commonly employed by investigators and is widely viewed as an effective search reagent because of its effectiveness in detecting latent bloodstains and ease of use.

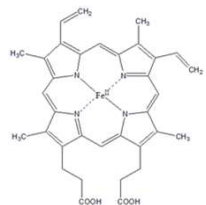


Figure 1. Heme Moiety of Hemoglobin (Hb).

METHODOLOGY

Approximately .05 mL of undiluted human blood was projected onto 108 Goldbond ½" drywall samples and allowed to air dry for a minimum of 24 hours. Four drywall samples were each painted with between one and nine layers of three commonly sold paints within the United States:

- 1) Antique White Colorplace Ultra interior paint plus primer;
- 2) Warm Caramel Glidden interior paint plus primer;
- 3) White Flat Glidden interior paint plus primer.

Each layer of paint was allowed to air-dry before the next layer was applied. BlueStar™ was then applied to the samples in an effort to determine if chemiluminescence could be observed, thus providing a presumptive identification of blood. Results were photographed using a Nikon D5200 DSLR camera.

The bloodstains were tested with BlueStar™ based on the chemical reactions below:

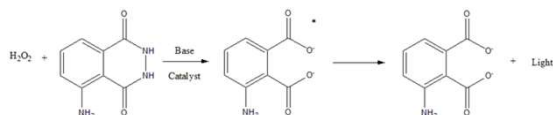


Figure 2. Chemical Reaction of Hemoglobin with BlueStar.

RESULTS & DISCUSSION

Chemiluminescence was observed upon application of BlueStar™ in 104 of 108 (96%) drywall samples. The intensity of the chemiluminescence based on subjective visualization was rated as medium or high in all samples with three or fewer coats of the paints. A gradual decrease in intensity was observed as additional layers of paint were applied. The duration of chemiluminescence ranged from five seconds to greater than thirty seconds. The duration was greater than 30 seconds for all samples with four or fewer layers of paint. Significant decreases in duration were observed across all paint types with eight and nine layers of paint.

The results of this study illustrate that BlueStar™ is an effective search reagent when human blood is concealed under one to nine layers of three commonly sold paint plus primer combinations. Because of diminishing intensity and duration of chemiluminescence resulting from several layers of paint, our recommendations include using the reagent in total darkness and ensuring time to allow eyesight to adapt to the dark environment. Photographic equipment should be pre-set to allow ample time to photograph the chemiluminescence.

Paint (with Primer)	Maximum Layers of Paint with detected blood	Duration range	Percent Samples Positive Luminescence
Flat White	9	10s to > 30s	100%
Antique White	9	15s to > 30s	95%
Warm Caramel	9	5s to > 30s	95%

Acknowledgements

Methodist University Center for Undergraduate Research

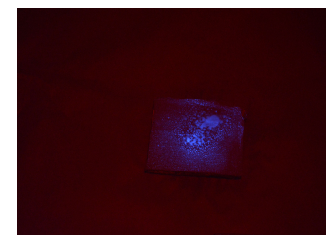


Figure 3. Blood detected under three coats of warm-caramel paint plus primer. Strong chemiluminescence was present in all samples with three or fewer coats of paint.

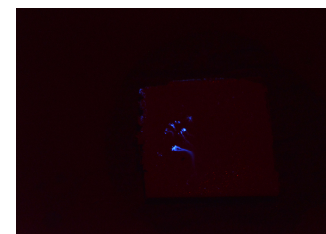


Fig 4: Blood detected under five coats of white flat paint plus primer.

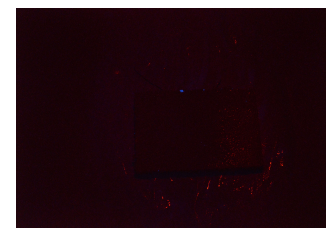


Fig 5. Blood detected under 8 coats of antique white paint plus primer. Chemiluminescence observed in samples with eight and nine layers of paint was less intense and had a shorter duration than samples with fewer coats of paint.