A Qualitative Examination of Latent Bloodstain Detection Reagents

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Bloodstains can be tricky

Walk into the crime scene like what up I'm a big shot!
The Reality
Latent Bloodstain Detection

BlueStar

Hemascein

Luminol
Chemiluminescence

Chemiluminescence is caused by the reaction of two molecules at ground state producing a final molecule in an excited state. This excited state causes the molecule to emit a photon of light.

However, it is not necessarily in the visible spectrum....
Hemascein was created in 2008 by Abacus Diagnostics.

Spray the suspect surface with Hemascein Working Solution, followed by Hydrogen Peroxide.

The reaction will take place in seconds, but you need an Alternate Light Source to see it.

The ALS needs to be set to 485nm with a dark yellow filter.
Luminol

Luminol, created in 1928, has seen many reiterations of its formula over the years.

Prepared by mixing a solid tablet in distilled water and then you are set to spray.

Produces a bright blue colour almost immediately after adding hydrogen peroxide.

The chemiluminescence doesn't last long, so a photograph needs to be taken relatively quickly.

The working solution also does not last very long.
BlueStar

Bluestar was made in 2000 for hunting. Wounded animals could be tracked by spraying BlueStar on the ground and following the trail.

Similar prep steps as Luminol.

Same bright blue colour as well as reaction time.
# Pros and Cons

<table>
<thead>
<tr>
<th></th>
<th>Hemascein</th>
<th>Luminol</th>
<th>BlueStar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dilution</strong></td>
<td>1:1,000,000</td>
<td>1:50,000</td>
<td>1:100,000</td>
</tr>
<tr>
<td><strong>DNA</strong></td>
<td>No effect</td>
<td>Degraded</td>
<td>No Effect</td>
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<tr>
<td><strong>Additional Equipment</strong></td>
<td>ALS, Goggles</td>
<td>None</td>
<td>None</td>
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<tr>
<td><strong>Duration of Reaction</strong></td>
<td>Over 1 hour</td>
<td>&lt;1 Minute</td>
<td>&lt;2 Minutes</td>
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<tr>
<td><strong>Health Risks</strong></td>
<td>None</td>
<td>Carcinogen</td>
<td>None</td>
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<tr>
<td><strong>Shelf Life</strong></td>
<td>2 Months</td>
<td>&lt;5 Minutes</td>
<td>24 Hours</td>
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## Dilutions - Hemascein

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<td><img src="image12.png" alt="Image" /></td>
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<tr>
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Dilutions - Luminol

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## Dilutions - BlueStar

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Efficiency

Various surfaces are going to work better for the different reagents

In an experiment conducted by S.J. Seashols:

Hemascein works better on cotton, nylon, and linoleum - ABBA Spray Bottle

BlueStar and Luminol work equally as well on plywood, blue denim, and concrete
False Positives

When at a crime scene, a False Positive can be extremely detrimental to the investigation of a crime scene.

An experiment at the Korean Society of Forensic Science gave the following results.

Also, tomato, red onion, kidney beans and bleach.
Reactions with Bleach
Auto-Oxidation

The chemiluminescent reaction that all of these reagents utilize does not actually require blood.

Blood is simply the catalyst for a reaction that will take place no matter what.

Over-saturating a substrate with any of the products will cause a reaction.

Allowing a reaction to sit for too long a time will cause some chemiluminescence to occur.
Photography of Stains

The ability to visualize a latent bloodstain is only as valuable as the ability to photograph that bloodstain and show it in a court of law.

Luminol and BlueStar can be seen with the naked eye and in sunlight.

Hemascein, BlueStar and Luminol all require relative darkness in order to photograph the reaction.

Hemascein even needs to have an ALS and orange #filter.
Conclusions

Each of the products has pros (Heamscein's duration of reaction) and cons (All three react with bleach)

Some crime scenes may not offer the ability to have complete darkness for photography purposes

The products, depending on the area, may be more cost effective to make small batches or large batches of the working solution.

There is no definitive winner.
Acknowledgments

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References


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Picture References

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