CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
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Project Number
S0602

Project Title
Playing CSI: The Effect of Exposure Time and Fuel Type on Fingerprints

Abstract

Objectives/Goals
I am doing this experiment because I am fascinated with the field of criminology, and if I could potentially help the field, I would be very eager to do so. There are two main factions of superglue fuming, one using sodium hydroxide, and the other using heat. Both methods create the same fumes from the glue that develops the fingerprint. I hoped to find if either worked faster than the other, and if one produced particularly better-looking prints than the other.

Methods/Materials
I will take 32 fired bullet shells and give them each my thumbprint. I will then test four of them per level of independent variable, (either the NaOH or lamp heat source, with either 2.5, 5, 7.5, or 10 minute exposures). This will be done inside a fish tank. Inside, I will place a small bowl of hot water as a humidifier, a quarter with glue on it, and either place the heat light nearby, or put flakes of NaOH on the quarter. After fuming, I will photograph and scan them onto my computer, take the images, enlarge them by an equal factor, and measure the ridges. Each print will be assigned a ranking of 0-4 on how clear the print is, the hope being to find an ideal ridge width for the clearest print possible.

Results
As the interval of time increased, the average width of each print ridge did increase, with the interval of ten minutes, (the longest), producing the best prints. In terms of qualitative measurements, visual clarity also noticeably improved as time went on. However, both ten minute sets exhibited the best prints as well as ruined prints that were overdeveloped. This shows that careful observation is required when fuming. In terms of the better fuel source, I observed no difference between the two methods, and the data supports this equivocal conclusion.

Conclusions/Discussion
My hypothesis about time affecting ridge width was correct; with light, the average width after 2.5 min was .30mm, whereas after 10 min, that average was .59mm. When using NaOH, the ridge measured .27mm after 2.5 minutes, and .58 after 10. Also, my hypothesis about more time making a better print was false, as after a 10 min exposure, some shells were well-developed, while others had been overexposed, and ruined by the long time.

My second hypothesis was disproved. I predicted that Sodium Hydroxide would have had a significant effect on how the prints turned out, but my results proved equivocal, with no clear victor in terms of results.

Summary Statement
I tested two variations of super glue fuming to assess their effects on the development of latent fingerprints.

Help Received
I received no help in making this project, besides my parents purchasing the poster materials...