OC Spray and Alternate Light Sources

By: Harold W. Ruslander, SCSA and Anthony Mead

A study in the fluorescence of OC (Oleoresin Capsicum) Sprays and the vehicles they are suspended in when subjected to Alternate Light Sources.

Recently, in the early morning hours, a woman was run-down by an automobile. The automobile was operated by a female, with another female passenger. The victim suffered compound fractures to both legs and her jaw. She also suffered extensive "road rash" abrasions to her body.

The ensuing investigation showed that this was not the average hit and run. Rather, it seemed to be an intentional act. After striking the victim, the car drove off.

Speaking to witnesses, the following information was obtained by the lead investigator. The victim was heavily intoxicated. She becomes violent when drinking and had been shouting obscenities at the occupants of the vehicle. The operator of the vehicle had gone past then turned around to find out what the woman's problem was. After this action, the victim apparently sprayed OC. spray into the vehicle. The occupants never tried to exit the vehicle. The vehicle pulled away and drove a short distance down the street. The driver and passenger exchanged places and the vehicle came back in the direction of the victim. The victim was struck by the left front finder of the vehicle and thrown up onto the hood before falling off onto the pavement. The OC. spray container was found lying on the street near the victims' shoes.

Approximately one week later, the car owner was identified and interviewed. Of course, her story differed from that of the witnesses. She executed a consent search form and the vehicle was placed in the Sheriff's Office processing garage.

I spoke to one of the chemists [1] assigned to our lab in order to formulate a plan of action in processing the vehicle for OC. spray residue. The only thing we could come up with was to swab the vehicle with cotton soaked with isopropyl alcohol. This would "cut" the residue from the surface of the vehicle. It should also be noted, it had rained for almost the entire week. The vehicle was driven every day since the incident. The sun, when it did shine, caused temperatures to be in the mid 80's.

After discussing our course of action, I started of thinking of ways to obtain results without swabbing the surface and causing destruction to any fabric impressions or face and/or fingerprints still on the car. I decided to see if using an alternate light source would cause a reaction. I got the victims OC. spray out of evidence, appendix 1, and sprayed it to cause the discharge area to become wet with the contents. I also used my issued OC. spray and did the same thing, appendix 1.

Using the Omnichrome, Omniprint 1000, I examined the two canisters. The open setting on the Omniprint 1000 has a UV filter in it. I also used the Spectroline model BIB150PX UV light with a wavelength of 365nm, I found that using the orange goggles and setting the Omnichrome at 450nm, I got a medium red reaction. This is best described as the same red color a fire extinguisher is painted. This reaction was the same on my issued OC. spray and the victims' canister. Using the open (UV) setting on the Omnichrome and the Spectroline UV light source, I observed a reaction similar to a Luminol reaction to blood, a bluish glow on the victims' canister. My issued spray did not cause this type of reaction.

After processing the suspect vehicle with the Omniprint 1000, and getting results, I decided to try this experiment with several other types of CS, CN and OC sprays. I felt this could aid Law Enforcement in identifying suspects who have been sprayed. This would be similar to the dye packs that mark suspects in bank robberies.

I obtained ten different sample canisters from our Departmental Armorer, (appendix 2). I sprayed a burst of spray from each canister onto a glass microscope slide [2]. Each slide was marked with a blank permanent marker [3] (sharpie) on the reverse side with the type of spray used.

It should be noted that I tested a marked slide without any spray applied under all wavelengths and all four filters prior to performing this test. I did not observe any reactions caused by either the marker or glass. This way, I knew that I would not get any false positive reactions from these sources.

After allowing the slides to air dry, I placed each slide on top of a white chrome-kote fingerprint card, and laid it on the copy stand. I secured the ALS lens in a test tube holder and stand, approximately 12 inches above and 12 inches away from the surface and angled it at approximately 30 degrees to avoid reflected light into the camera lens. I began testing each sample with both light sources and all available settings. Each setting was observed with all 4 colors of goggles and the reactions or lack thereof noted. See appendix 3.

While I was conducting my experiments, I passed on the preliminary results to my co-workers in the event they needed to examine a subject or surface. CSI A. Mead, my counterpart at the Belle Glade substation, conducted the same tests I did and obtained similar results. He also tested the results when OC is sprayed on a white towel, (see appendix 4).

After completion of those tests, he sprayed his own forearm. Allowing the OC to air dry he examined his arm and using red goggles and 450nm setting on the Omnichrome observed a strong orange reaction. After washing the skin with soap and water, he observed the same strong reaction. He then held his arm under running water for 5 minutes and wiped it dry with a towel. He observed a moderate orange reaction with the red goggles and 450nm setting. Finally, he held his arm under running water for 10 minutes and wiped it dry with a towel. He was able to observe a light orange reaction when wearing red goggles.

While it is obvious that OC spray leaves an orange deposit on the surface it comes in contact with, the reactions described above were not caused by this natural coloration. In fact, the OC residue was not visible to the unaided eye during the final test. It had, after all, been washed off with soap and water and rinsed under running water for over 15 minutes!

Our test showed that if a subject is sprayed with any of the products tested, results can be obtained using an alternate light source and filter goggles. This procedure could aid in an investigation where OC, CS or CN has been discharged.

Due to the irritation to skin caused by the OC spray, it was not possible to determine how long the residue would react to ALS examinations. It could be assumed that, due to perspiration and absorption, there would be a loss of reaction after some undetermined passage of time.

It should also be noted that 2 of the samples used, one a mix of OC and CS [4] and the other OC only [5], had UV dyes mixed in by the manufacturer for aiding Law Enforcement in the identification of individuals sprayed.

After the visual examination, I set up the camera, a Nikon FM-2, equipped with a 55 mm Nikon lens, and a cable release, on the copy stand and loaded the camera with Kodak Gold 200 ASA color print film.

I used the following filters, a #29 red filter, a #56 orange filter, the yellow goggles that were supplied with the Omnichrome and the gray goggles since we did not have a gray filter. As mentioned, the light was positioned at about 30 degrees to avoid bounce back into the lens and was set approximately 12 inches above and behind the slides. Using timed exposures from 1 second to 120 seconds, I photographed the reactions through all 4 filters and using all 7 light settings. The lens was set at F3.5 for all photographs. A cable release was used to prevent "shutter shake". Appendix 3 shows the results for each sample tested and the wavelength at which results were observed.

[1] Mr. Bill Hightman.
[2] CIDA Plain Microscope Slides, pre-cleaned, 3"X1"mm, stock # 30-1011.
[3] Sanford Fine Point Permanent marker, "sharpie".
[4] Freeze +
[5] Punch II M-3

Appendix 1.

Mace Security Intl., MK-XI Peppermace, 5.5% OC fogger in a flammable carrier.
Club brand pepper spray, 6.6% OC in an unknown carrier.

Appendix 2.

First Defense MK-3 10% OC vehicle unknown.

Punch II M-3 with UV dye, 5% OC in isopropyl alcohol with an isobutane propellant.
Freeze+ with UV dye, .25% OC and 1% CS in a non-flammable carrier.
Devastator, 5% OC in an unknown carrier.
CAS-OC, 5.5% OC in a non-flammable carrier.
MK III Pepper Foam, 10% OC in a non-flammable carrier.
Federal Mini-Streamer #582, .5% CS in a volatile solvent.
Federal #1, .8% CN in an unknown carrier.
Pacifier ZB1, 1% CS in an unknown carrier.
Cap-Stun M-2, 1% OC in a flammable carrier.
MK-XI Peppermace, 5.5% OC in a flammable carrier.

Appendix 3.

Gray Filter
530 nm no reactions observed with any product.
525 nm same.
485 nm same.
450 nm same.
570 nm same.
Open setting both Freeze and Punch gave a red reaction.
365 nm both Freeze and Punch gave a black reaction.

Yellow Filter
530 nm no reactions observed with any product.
525 nm same.
485 nm same.
450 nm Punch gave an orange glow.
570 nm no reactions.
Open setting Punch gave a blood red reaction.
365 nm both Freeze and Punch gave black reactions.

Orange Filter
530 nm no reactions observed with any product.
525 nm same.
485 nm Punch gave a white powdery appearance.
450 nm Punch and Federal Mini gave pink powdery appearances.
570 nm no reactions observed.
Open setting Freeze gave a red reaction.
365 nm Freeze appeared black, Punch appeared red.

Red Filter
530 nm Devastator appeared hot pink, Punch had a red glow MK-XI gave a red glow.
525 nm no reactions observed.
485 nm same.
450 nm Devastator gave an orange glow, Punch and Cap-Stun appeared red and MK-XI gave a red glow.
570 nm MK-XI gave an orange glow.
Open setting no reactions observed.
365 nm Freeze appeared black, Punch gave a red glow and MK-XI appeared pink.

Appendix 4.

Test performed by CSI A. Mead.
MK-XI OC, sprayed on black plastic, observed using 450 nm setting with both orange and red goggles produced a medium red reaction.
MK-XI OC, sprayed on stainless steel, observed using 450 nm and both orange and red goggles produced an orange reaction.
MK-XI OC, sprayed on a white terry cloth hand towel, using; 450 nm with both orange and red goggles produced an orange reaction.
570 nm with both orange and red goggles also produced an orange reaction.
The towel was then soaked in water and wrung out, all tests repeated and similar results obtained. The towel was placed under running tap water for 5 minutes, wrung out and all test were repeated again. Again, similar results were obtained.
The towel was then placed under running tap water for 10 minutes and wrung out. All test were repeated and the sane results obtained.
As you can see, rinsing with water, even for as long as 15 minutes, while causing marked lightening of the reaction on human skin, did not fade out on the towel at all. Even though the reaction faded, it was still visible on skin and would aid in the identification on a person sprayed. ■

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Mr. Mead has over 24 years in law enforcement. He retired from the Waukegan, Illinois Police Department. He has worked for 7 years as an Investigator with the Medical Examiners Office, District 5, Palm Beach County Florida. He has been employed as a crime scene investigator for the Palm Beach County Sheriff's Office for the last 3 years. He is an active member of the IAI, the FDIAI, the IABPA, the SFFA and NAME.)