CALCIUM ASSOCIATED WITH GSR



#1

651

**Re: [Forensic_SEM] 25 Auto Ammunition**

**From:** mmvefors <mmvefors@tin.it>
**To:** Forensic_SEM@yahoogroups.com
**Date:** 10.05.2007 13:12



Lebiedzik, J., Morin, M. Giacalone, J.R., Schwoebel, A.J. McVicar, M.J.

At 21.42 10/05/2007, you wrote:

Hello Group,

I was working on case [murder+suicide] where 25 auto ammunition was used. The cartridge stamp said: "25 Auto R . P"
The GSR was strange since there was calcium associated exclusively with the GSR particles. Any ideas about this ammo and primer? It was difficult to analyze automatically since the calcium masked off antimony and only manual deconvolution or stripping of the Ca peak would allow to detect the Sb.
There are not many primers with Ca. Have you seen such a primer? I have similar problem when surgical gloves are involved. They contain Ca powder but there I get a lot of Ca alone.

Thanks for your insight.

Jozef Lebiedzik

---

Calcium is usually detected in GSR produced by by priming mixtures containing calcium silicide added to antimony sulphide as extra fuel. See, for example, the RWS "Sinoxyd" primer or the U.S. patent 1,851,398.
Best regards.
M. Morin

Prof. Marco Morin
S. Polo 2705/a
30125 Venice
Italy
Tel +39 041 5244103
Fax +39 041 719027 - 5244103

**Re: Ca in GSR....[Forensic_SEM] 25 Auto Ammunition**

**From:** "John Giacalone" <jrgiacalone@hotmail.com>
**To:** Forensic_SEM@yahoogroups.com
**Date:** 11.05.2007 10:49

Hello,

I have had a few cases where Si/Ca/Ba spheriod particles were identified. And it turns out that this was the reside in the spent ammunition.

This, now a days is rare, and this was back in the mid 90's. Going out on a limb relying on memory, it was from shot gun shells Remmington ? I wish it was logged into SLICE (Spectral Library Identification and Classification Explorer) a Forensic particle x-ray analysis data base developed by Dennis Ward/FBI and xK Inc. An overview of SLICE was presented at Scanning 2007 in Monterey, CA. This is an example of a reason ( -me not able to confidently recall the exact ammo) for such a data base and we all should be contributing to it. Any one ordering a new SEM/EDS should include in the specs and purchase SLICE, and those with systems can add it on to your PC.

Si/Ca/Ba is GSR and is the species type sighted in Aerospace Report as unique (I believe). As Dr. Morin said the Ca Si is contributed by calcium silicide which I believe acts like sand paper or basically fine ground glass ergo a frictionator to insure spark initiation.

ASTM has not included this species because it is even more rare today -just as the mercuric and corrosive primers.

Bottom line is try to obtain the formulation of the ammunition involved.

This of course can be done directly from spent or test fires or indirectly if the scenario dicates from the close proximity shot of the vicitim or inside a vehicle or a small enclosed space. This may be the only souce of the 'known' if the firearm/ammo is missing.

Therefore, I always advoacte collect victim samples incase the particles recovered offer probative value. Those in our profession that teach officers not to collect victim samples are making a mistake.

Sure, in most instances the victim samples would not be analyzed and in the report a statement is offered as to why. But at least you have them for when they become important -as in the infrequently encountered formulations.

Cardinal rule in any kind of evidence collection is that it should collected and then its probative value assessed. Evidence items may not be important in the beginning of an investigation but they may become key pieces to the puzzle.

John Giacalone

>From: mmvefors <mmvefors@tin.it>
>Reply-To: Forensic_SEM@yahoogroups.com
>To: Forensic_SEM@yahoogroups.com
>Subject: Re: [Forensic_SEM] 25 Auto Ammunition
>Date: Thu, 10 May 2007 22:12:15 +0200
>
>
>
>
>
>
>
>
>

**RE: [Forensic_SEM] 25 Auto Ammunition**

**From:** "Skip Schwoeble" <sschwoeble@rjlg.com>
**To:** Forensic_SEM@yahoogroups.com
**Date:** 11.05.2007 13:44

Hi Jozef, Besides pulse stripping, if you look for the bump of the 4th peak (Lg1) of Sb, that grows on the left side of the 1st Ba peak (La1) it may help you in your confirmation. Bump up the intensity of the spectrum and expand it. Observe the spectrum early in the acquisition and this may help you in the decision in taking the time to perform the pulse stripping. Or you possibly could have enough information to make a confirmation.

On another note, the Ba, Ca, Si particles that John G. is referring to in the Aerospace report, also contain trace S in that classification.
Skip Schwoeble

A.J. "Skip" Schwoeble

Director, Forensic Science Department
sschwoeble@rjlg.com

direct line: 724-387-1840

mobile: 412-897-7841

main office: 724-325-1776
fax: 724-733-1799

<http://www.rjlg.com/>



---

From: Forensic_SEM@yahoogroups.com [mailto:Forensic_SEM@yahoogroups.com]
On Behalf Of mmvefors
Sent: Thursday, May 10, 2007 4:12 PM
To: Forensic_SEM@yahoogroups.com

**Re: Ca in GSR....[Forensic_SEM] 25 Auto Ammunition**

**From:** mmvefors <mmvefors@tin.it>
**To:** Forensic_SEM@yahoogroups.com
**Date:** 11.05.2007 12:51



At 19.49 11/05/2007, you wrote:

A minor remark to the very interesting mail of John Giacalone. In my message I indicated calcium silicide ($CaSi_2$) as a fuel and not as a "frictionator": see, for example, Frost, G.E. - *Ammunition Making* - Washington, 1990; p. 50 and ss. -

Best regards.

M. Morin

**Re: Ca in GSR....[Forensic_SEM] 25 Auto Ammunition**

**From:** "John Giacalone" <jrgiacalone@hotmail.com>
**To:** Forensic_SEM@yahoogroups.com
**Date:** 11.05.2007 18:10

Ah thank you for clearing this up.

is it however just ground glass....?

What is the actually chemical structure / formular ?

like carbide ?

John Giacalone

>From: mmvefors <mmvefors@tin.it>
>Reply-To: Forensic_SEM@yahoogroups.com
>To: Forensic_SEM@yahoogroups.com
>Subject: Re: Ca in GSR....[Forensic_SEM] 25 Auto Ammunition
>Date: Fri, 11 May 2007 21:51:52 +0200
>
>
>
>
>
>
>
>
>
>
>
>
>
>
>
>
>
>
>
>
>
>
>
>
>
>
>At 19.49 11/05/2007, you wrote:
>
>
>
>
>
>A minor remark to the very interesting mail of John Giacalone. In my
>message I indicated calcium silicide (CaSi2) as a fuel and not
>as a □□frictionator□□: see, for example, Frost, G.E. □□ Ammunition
>Making □□ Washington, 1990; p. 50 and ss. □□
>
>
>Best regards.
>
>□□
>
>M. Morin□□□□□□□□□□
>
>
>

**RE: Ca in GSR....[Forensic_SEM] 25 Auto Ammunition**

**From:** "McVicar, Mike \(JUS\)" <Mike.McVicar@ontario.ca>
**To:** Forensic_SEM@yahoogroups.com
**Date:** 14.05.2007 06:44

(4)

Hi Skip,

You likely already have a copy but Jim Wallace's 1990 paper in the AFTE Journal (vol.22,n.4 (Oct. 1990), pp.364-389; "Chemical Aspects of Firearms Ammunition") contains a lot of interesting background information about primer, propellant, and projectile compositions.

He references the use of ground glass in primers back to at least 1901 and its use in ammunitions that were contemporary with his article. We routinely see Si Ca Na K Al in GSR particles from test shots, as I expect you do, and attribute these to the frictionators in the primer. Wallace included a great deal of historical information about formulations that have gone out of use as well.

Mike

Michael J. McVicar
Assistant Section Head
Chemistry Section
Centre of Forensic Sciences
25 Grosvenor Street, Toronto, Ontario
Canada M7A 2G8
Tel: (416) 314-3117
Fax: (416) 314-3225
E-mail: Mike.McVicar@Ontario.ca

-----Original Message-----
From: Forensic_SEM@yahoogroups.com [mailto:Forensic_SEM@yahoogroups.com]On Behalf Of Skip Schwoeble
Sent: Saturday, May 12, 2007 4:38 PM
To: Forensic_SEM@yahoogroups.com
Subject: RE: Ca in GSR....[Forensic_SEM] 25 Auto Ammunition

Hi John, Check out the publication Peter Collins et. al.. J Forensic Sci. May 2003, Vol. 48 No. 3 Glass-Containing Gunshot Residue Particles: A New Type of Highly Characteristic Particle ? I am pursuing some research in this area involving other ammo primers. Skip

A.J. "Skip" Schwoeble
Director, Forensic Science Department
sschwoeble@rjlg. <mailto:sschwoeble%40rjlg.com> com

direct line: 724-387-1840
mobile: 412-897-7841
main office: 724-325-1776
fax: 724-733-1799

**Re: Ca in GSR....[Forensic_SEM] 25 Auto Ammunition**

**From:** mmvefors <mmvefors@tin.it>
**To:** Forensic_SEM@yahoogroups.com
**Date:** 14.05.2007 09:21



At 03.10 12/05/2007, you wrote:

>From: mmvefors <mmvefors@tin.it>
>Reply-To: Forensic_SEM@yahoogroups.com
>To: Forensic_SEM@yahoogroups.com
>Subject: Re: Ca in GSR....[Forensic_SEM] 25 Auto Ammunition
>Date: Fri, 11 May 2007 21:51:52 +0200

Calcium silicide, CaSi or $CaSi_2$, an electric-furnace product made from lime, silica, and a carbonaceous reducing agent, is used also as a steel deoxidier.
In priming mixtures it is mainly used as a fuel but, at the same time, it is also a frictionator.
For instance in U.S. Patent 1.942,274 we can read:
*"For example if the characteristics of a particular cartridge make it desirable to use a fuel of somewhat abrasive character, lead sulphocyanate may be replaced wholly or in part by antimony sulphide and/or **calcium silicide** in such mixture as the following: ....."*
Graund glass can be usually be found in very old central fire ammunition or in rim fire cartridges.

The present invention comprises the discovery that calcium silicide possesses properties which render it especially desirable as a fuel for priming mixtures of the type heretofore discussed. The constituents of this compound, calcium and silicon, both have a very great affinity for oxygen. The substance is very hard and once ignited projects out incandescent particles well adapted to trav-

erse the propellant powder and effect uniform and thorough ignition thereof. The great affinity of calcium silicide for oxygen and its capacity for emitting incandescent particles is strikingly illustrated by the fact that a mixture of calcium silicide with barium nitrate can be ignited with comparative ease, and its combustion is accompanied by a shower of sparks.

(from U.S. Patent n. 1,971,030)

**A sample of a non-mercuric, rim-fire mixture:**

| | Per cent |
|---|---|
| Tetracene | 1 to 5 |
| Lead styphnate | 20 to 50 |
| Lead nitrate | 15 to 35 |
| Mono or di-basic lead 3-nitro-phthalate | 5 to 10 |
| Glass or another abrasive material | 15 to 25 |

**A sample of a center-fire mixture:**

| | Per cent |
|---|---|
| Mercury fulminate | 0 to 50 |
| Lead styphnate | 0 to 50 |
| Antimony sulphide | 5 to 15 |
| Calcium silicide | 3 to 12 |
| Barium nitrate | 25 to 50 |
| Mono or di-basic lead 3-nitro-phthalate | 5 to 20 |

Best regards.

Prof. Marco Morin
S. Polo 2705/a
30125 Venice
Italy
Tel +39 041 5244103
Fax +39 041 719027 - 5244103