Forensic Science International 249 (2015) e1–e6

Contents lists available at ScienceDirect

Forensic Science International

journal homepage: www.elsevier.com/locate/forsciint

Case Report

Luminescent ecstasy tablets. Authentication tool or cunning marketing tactic?

M. Cox *, M. Cook

Forensic Science SA, 21 Divett Place, Adelaide 5000, South Australia, Australia

ARTICLE INFO

Article history:
Received 20 October 2014
Received in revised form 18 January 2015
Accepted 23 January 2015
Available online 3 February 2015

Keywords:
Phosphorescence
Fluorescence
Ecstasy
Glow parties

ABSTRACT

Forensic Science SA (FSSA) in combination with South Australia Police (SAPOL) has detected luminescent ecstasy tablets. This paper examines the emergence of luminescent ecstasy tablets and their potential role as an extra level of authentication for the user and/or as a marketing tactic aligned with their use at glow parties.

1. Introduction

Within the illicit ecstasy tablet market the labelling on tablets may be secondary in importance to the trust developed from social relationships between buyers and sellers [1]. In many cases buyers may seek to ensure a steady and safe supply of ecstasy for both their own use and their friend's consumption. Ecstasy users may be aware that multiple batches with similar tablet designs can have variable contents. The types of illicit substances now commonly detected in recreational illicit drug tablets (herein referred to as ecstasy tablets) have become many and varied with several studies showing that tablets often contain substances other than 3,4-methylenedioxymethylamphetamine [2,3].

Notwithstanding this, tablets are sold using their tablet design or brand despite the 'brand' providing no information about the content of the tablet [1]. Tablet producers can potentially use a variety of means to establish a brand and consequently its reputation in the ecstasy using community. Tablets may be pressed with particular colours, shapes and logos as a means to develop brand awareness. Ecstasy users who may have had previous experience(s) with a particular tablet design, may seek such tablets again and may use the features of the tablet to determine the 'authenticity' of a particular tablet.

South Australian police (SAPOL) recently seized a tablet press, tablets and tableting materials from a suburban Adelaide address. *Transformer* shaped tablet punches and a corresponding die were located and, as a result of thorough SAPOL investigative work, it was found that *Transformer* shaped tablets had been previously made and they could also be linked to this tablet press. A pillreports.com advertisement about the *Transformer* shaped tablets indicated that the tablets had the novel ability to glow in the dark. This appears to be a particularly innovative marketing tactic and may represent a sales gimmick and/or provide the user with an extra level of authentication. The authors are not aware of any reported ecstasy tablets with luminescent properties.

Glow party events have become popular since at least 2012. These events involve the use of ultraviolet lights in combination with fluorophoric paint materials. Chemiluminescent 'glow sticks' also appear to be used at these events, which have occurred in various locations across the globe in the last two years. Locations of these events include Amsterdam, Auckland, Melbourne and Adelaide. Footage from these events is available on the Internet site YouTube. These events are essentially rave parties where ecstasy usage has been associated with enhancing the experience [4].

2. Experimental

The *Transformer* shaped tablets and tablet press seizure occurred in August 2013. The seizure included four groups of beige coloured *Transformer* shaped tablets.

* Corresponding author. Tel.: +61 8 8226 7700; fax: +61 8 8226 7777.
E-mail address: matthew.cox@sa.gov.au (M. Cox).

http://dx.doi.org/10.1016/j.forsciint.2015.01.019
0379-0738/

Eleven separate seizures which comprised a combined total of four hundred and eighty-two *Ferrari* logo tablets were submitted to Forensic Science SA in July/August 2014. At least one tablet from each seizure was analysed by GC/MS. All *Ferrari* logo tablets from these seizures were observed in the dark under UV light.

Since August 2014 all ecstasy tablets submitted to FSSA for analysis have been tested for their fluorescent properties. The tablets with the 'droplet' design were identified in this period. Six separate seizures which comprised a total of one hundred and thirty-one 'droplet' design tablets were submitted to Forensic Science SA since August 2014. At least one tablet from each seizure was analysed by GC/MS. All 'droplet' design tablets from these seizures were observed in the dark under UV light.

2.1. Fluorescence

Fluorescence was observed in the dark using a Spectroline model ENF-240C/FE long wave (365 nm) ultraviolet (UV) light (Spectronics corporation, Westbury, NY, United States).

2.2. Reagents and standards

3,4-Methylenedioxymethylamphetamine (MDMA) and 3,4-methylenedioxymethcathinone (methylone) were obtained from the National Measurement Institute (North Ryde, NSW, Australia). Dodecane and quinine (90%) were obtained from Sigma-Aldrich (Castle Hill, NSW, Australia). Ammonia solution (30%) was obtained from Chem-Supply (Gillman, SA, Australia). HPLC grade isooctane was obtained from Stennick Scientific (Melrose Park, SA, Australia).

2.3. Gas chromatography–mass spectrometry (GC–MS)

The tablets mentioned in this report were initially analysed by GC-MS. A small amount of each tablet (approximately 1–2 mg) was crushed to a powder, basified with a drop of ammonia solution and extracted into internal standard solution (1 mL). Each sample was vortexed for 10 s and then 1 μL was injected onto the GC–MS. GC–MS analyses were performed on an Agilent 6890 plus gas chromatograph using an HP-1MS capillary column (15 m × 0.25 mm × 0.25 μm) fitted with an Agilent 5973 mass selective detector. Helium was used as the carrier gas. The injector temperature was set to 300 °C, with an initial oven temperature of 60 °C, then ramped at 45 °C/min to 300 °C and held there for 4 min. The mass selective detector operated between m/z = 40 and 500 in electron impact (EI) mode with an ionisation energy of 70 eV.

2.4. Preparation of internal standard solution

Dodecane internal standard solution (0.15 μL/mL) was prepared by dissolving dodecane (150 μL) in isooctane (1 L).

2.5. Photography

Images 1–3, 7 and 8 were obtained using a Nikon D5100 digital SLR camera. Image capture of the luminescent *Transformer* shaped tablets (Images 2 and 3) was achieved in the dark after the tablets had been exposed to light for about 30 s.

Image 1 was obtained with an F-stop of 5.6, exposure time of 1/60 s and ISO speed 200. This image was prepared using auto flash mode.

Image 2 was obtained with an F-stop of 9, exposure time of 8 s and ISO speed 250. The flash was disabled during image capture.

Image 3 was obtained with an F-stop of 7.1, exposure time of 6 s and ISO speed 250. The flash was disabled during image capture.

Image 6 was obtained using a Leica Microsystems DFC500 digital camera with oblique white lighting and an exposure time of 0.87 s.

The upper picture from Image 7 was obtained with an F-stop of 4.8, exposure time of 1/100 s and ISO speed 400. Oblique white lighting was used throughout image capture and the flash was also disabled. The lower picture from Image 7 was obtained with an F-stop of 4.8, exposure time of 1 s and ISO speed 400. The flash was disabled during image capture. Image capture of the *Ferrari* logo tablet was achieved in the dark while the tablet was illuminated with UV light (365 nm). The tablet remained illuminated with UV light throughout the exposure period.

The upper picture from Image 8 was obtained with an F-stop of 4.8, exposure time of 1/200 s and ISO speed 400. Oblique white lighting was used throughout image capture and the flash was also disabled. The lower picture from Image 8 was obtained with an F-stop of 4.8, exposure time of 2 s and ISO speed 400. The flash was disabled during image capture. Image capture of the 'droplet' design tablet was achieved in the dark while the tablet was illuminated with UV light (365 nm). The tablet remained illuminated with UV light throughout the exposure period.

2.6. Scanning electron microscopy (SEM)

This was performed using a Zeiss EVO50 Scanning Electron Microscope with accelerating voltage of 25 kV and an 80 mm^2 silicon drift detector. The analysis software used was Inca suite version 5.04 in "Point and ID" mode with a 20 second acquisition for spectra.

3. Results and discussion

3.1. Beige transformer tablets

The SAPOL seizure included four groups of beige coloured *Transformer* shaped tablets. Screening by GC–MS confirmed the presence of methylone as the active drug in tablets. This in house laboratory GC–MS screening method did not detect any other components in the tablets. Part of one of these groups of tablets is pictured in Image 1. After becoming aware of the pillreports.com advertisement about the *Transformer* shaped tablets we investigated the glow-in-the-dark properties of these tablets. These tablets were observed to phosphoresce in the dark after exposure to light.

In the dark after being radiated with light each of the fourteen tablets from one of the groups of tablets were found to re-emit an intense green colour (Image 2). The other three groups of tablets

Image 1. Photograph of part of a group of beige *Transformer* shaped tablets