Drugs on the Dance Scene: The investigation of diluents in illicit drugs by high performance anion exchange chromatography with pulsed amperometric detection

Z.L. Hall, TICTAC Communications Ltd., Toxicology Unit, St George's University of London

1. INTRODUCTION

Drugs and the Dance Scene

- The drugs most often encountered in clubs are the "ecstasy" drugs (most commonly MDMA), cannabis, cocaine and amfetamine.
- Some club owners provide amnesty bins where customers and/or door staff can dispose of drugs[1].
- TICTAC®, a tablet and capsule identification database, is updated by the analysis of a selection of these amnesty bin contents[2].

Diluents in Illicit Drugs:

- Form the bulk of the tablet or powder
- Are generally inexpensive, inert and easily available
- Are often sugars, such as lactose, glucose, mannitol and sucrose[3]
- Maximise profit
- Make the dose easier to handle
- Assist compression of the drug into tablet form[4]

2. AIMS OF STUDY

- To observe current trends in drug use on the dance scene in the UK
- To identify any new drug preparations on the street and update TICTAC®
- To study the use of simple sugars as diluents in illicit drugs and explore the possibility of chemical profiling of these sugars in order to gain intelligence

3. METHODS

- Amnesty bin contents (2004/5) were collected from Manchester and Swansea nightclubs.

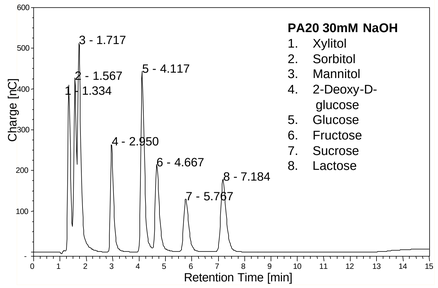
- 1 174 tablets, 20 capsules, 132 powders, 133 cannabis products and 30 liquids were sorted, catalogued and identified.
- Identification was by primarily by TICTAC® and gas chromatography-mass spectrometry.

- Diluents were identified by high performance anion exchange chromatography with pulsed amperometric detection (HPAE-PAD).

GC-MS Instrumentation and Conditions

- HP 6890 series GC system (5% phenyl methyl siloxane capillary column) coupled to a HP5973 Mass Selective Detector
- Temperature program: 80 ^{0}C (4 mins), ramp to 280 ^{0}C (20 ^{0}C/min), hold for 8 mins; ramp to 290 ^{o}C (20 ^{o}C/min), hold for 9.5 mins
- Methanolic sample extracts (1 mg/mL) with internal standards (quinoline, pyribenzamine and flurazepam) were injected in split mode (split ratio 25:1)
- A standard mix of common drugs was injected for comparison

HPAE-PAD Instrumentation and Conditions

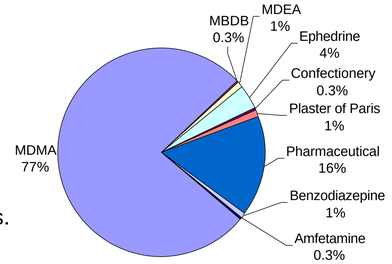


- Dionex ICS2500 ion chromatograph equipped with an electrochemical integrated amperometric detector
- CarboPac™ PA20 (0.5 mL/min, 30 mM NaOH) and CarboPac™ MA1 (0.4 mL/min, 420 mM NaOH) analytical separation columns were used.
- Aqueous sample extracts (0.1 mg/mL) with internal standard (2-deoxy-D-glucose) were injected.
- A standard mix of common sugars was injected for comparison.

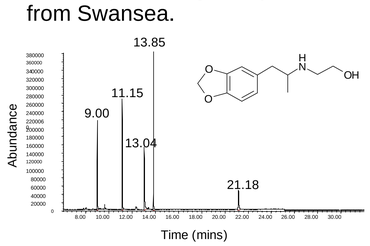
4. RESULTS: DRUG IDENTIFICATION

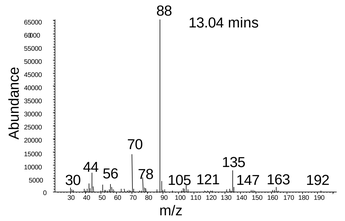
Tablets

- MDMA "ecstasy" tablets remain the most popular drug amongst club-goers (n = 304).
- MBDB, MDEA, MDA, amfetamine and ketamine tablets were absent, or present in negligible proportions.



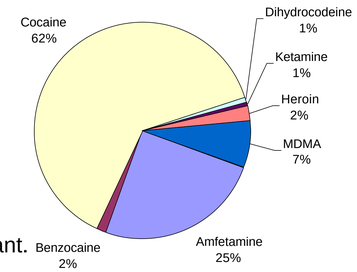
- 3,4-methylenedioxy-*N*-(2-hydroxyethyl)amfetamine (MDHOET, Pihkal #107)[5], previously unreported in the UK, was found in ecstasy tablets from Swansea.





Powders

- Most of the powders (n = 132) contained cocaine or amfetamine.
- Ketamine constituted less than 1% of all powders analysed (down from 20% in 2003/4)[6].
- Anti-worming agent, levamisole, was identified as an unusual cocaine adulterant.

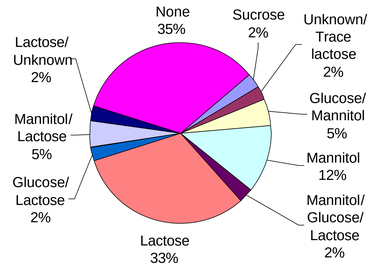


Cannabis

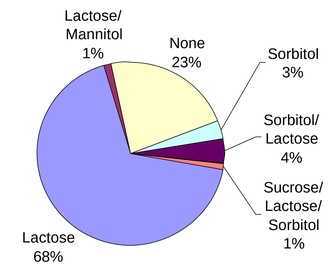
- Cannabis was the second most prevalent drug overall (23%, n = 604) indicating its popularity with club-goers (ecstasy and cocaine made up 40% and 14% of samples analysed).

5. RESULTS: DILUENT ANALYSIS

- The most common cocaine and ecstasy diluent was lactose.

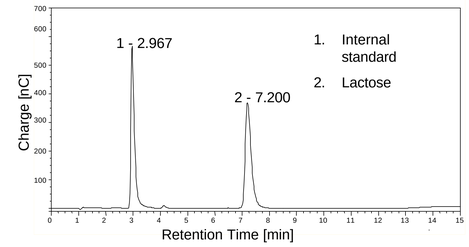


Cocaine diluents (n = 41)



Ecstasy diluents (n = 93)

- Binary and ternary combinations of sugars were observed – this could be useful information in differentiating between seizures.
- In several instances, the diluent was the only distinguishing feature in otherwise identical tablets.
- A significant proportion of the ecstasy tablets and cocaine samples had no sugar diluents present at all ($^1/_4$ and $^1/_3$ respectively).



Analysis of an ecstasy tablet containing lactose by HPAE-PAD

6. CONCLUSIONS

- Ketamine use amongst "clubbers" appears to have declined from 2003/4, whilst MDMA, cannabis and cocaine remain prevalent.
- Amnesty bin analysis can be a successful early warning system for new designer drugs, e.g MDHOET.
- This study suggests that the analysis of diluents in illicit drugs by HPAE-PAD may provide useful information.
- A larger study needs to be carried out to determine exactly how useful this information is and how it can be applied to forensic science.

REFERENCES

1. R. Webster in partnership with Release. Safer Clubbing: Guidance for licensing authorities, club managers and promoters. (2002) Home Office, London.
2. J.D. Ramsey, M.A. Butcher, M.F. Murphy, T. Lee, A. Johnston, D.W. Holt. A new method to monitor drugs at dance venues. *BMJ.* 323 (2001) 603.
3. J. Gomez, A. Rodriguez. An evaluation of the results of a drug sample analysis. *Bull Narc.* 41:1 (1989) 121-126.
4. P.J. Gomm, R.J. Hughes. Examination of illictly produced tablets and capsules. In T.A. Gough, ed. Analysis of Drugs of Abuse (1991) John Wiley & Sons Ltd., Chichester.
5. Al. Shulgin, A. Shulgin. Pihkal: A Chemical Love Story. (1991) Transform Press, California.
6. S.L. Kenyon, J.D. Ramsey, T. Lee, A. Johnston, D.W. Holt. Analysis for identification in amnesty bin samples from dance venues. *Ther Drug Monit.* (2005) In press.