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### Introduction

The widespread use of the Internet, expected changes in legislation and the constant search for new legal and illegal 'highs' has led to novel designer drugs entering the club scene<sup>1</sup>. The EMCDDA has published an online survey of sites selling 'legal highs', showing over 200 psychoactive substances being advertised online in Europe<sup>2</sup>. They appeal to a growing, lucrative market of clubbers and young professionals who seek a stimulant that is legal, safe or new<sup>3</sup>.

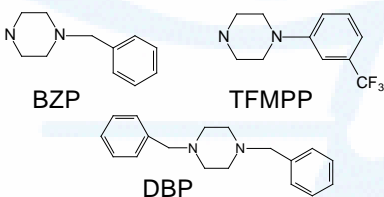
Whether legal or illegal, these products are not subject to regulation and labelling (if any) is insufficient or inaccurate. It is only through the analysis of these products that the true extent of what is being consumed is revealed. We present data from recent website and shop test purchasing and drug amnesty bins. Figure 1 shows some 'new formula' 'party pill' products.

We also illustrate how difficult it is to differentiate between legal 'party pills', real ecstasy tablets and crystalline drugs such as ketamine, MDMA and methamphetamine.



**Figure 1:** 'New formula' party pills; analysis identified BZP, TFMP and Dibenzylpiperazine (DBP) despite stating 'BZP-free'

**Figure 2:** Ecstasy-like tablets containing MDMA, BZP and TFMP (not to scale).



**Figure 3:** Structural formulas of popular piperazines, currently uncontrolled; BZP, TFMP and DBP.

### Findings – Glastonbury Festival 2008

Analysis of drug amnesty bin contents from The Glastonbury Festival in 2008 showed that 'herbal highs' are increasing in prevalence, compared to the quantity of ecstasy tablets seen. It is also apparent that many of the legal highs, when stripped of packaging, appear very similar in appearance to ecstasy tablets. The most common products found in 'herbal highs' were piperazines, with benzylpiperazine (BZP) and trifluoromethylphenylpiperazine (TFMP) often found in combination, see figure 3. A significant proportion of ecstasy-like tablets seen in the amnesty bin were found to contain MDMA, BZP and TFMP. An example of such can be seen in figure 2.



**Figure 4:**

An unusual find at Glastonbury 2008 is shown in figure 4. 10 boxes, each with 12 fish tank oxygenating 'tablets'. Each were consistent with labelling of 300mg of potassium chlorate. They were probably to be sold as ecstasy, with potential health implications.

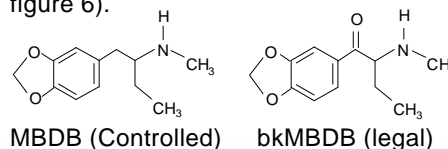
Significant quantities of crystalline powders were seen in 2008 amnesty bins and on analysis were found to be MDMA or ketamine. No crystalline methamphetamine was seen this year. Due to the variety of colours of MDMA crystals, it was not possible to distinguish between MDMA, ketamine and methamphetamine without analysis, as seen in figure 5.



**Figure 5:** A-Methamphetamine, B-MDMA and C-Ketamine. The latter two seized at Glastonbury 2008.

### Findings – Test purchasing 2008

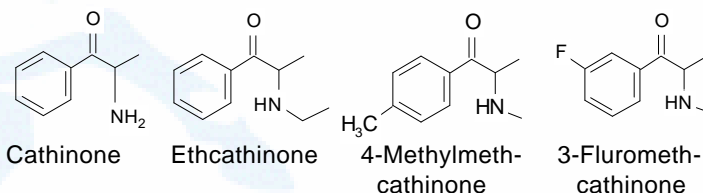
Two products, 'Dove' and 'Summer Daze', sold by London Underground online, were found to contain beta keto MBDB (2-methylamino-1-(3,4-methylenedioxyphenyl)butan-1-one) - the legal beta keto derivative of the class A related compound (see figure 6).



**Figure 6:** Legal highs containing bkMBDB, with structural relationship to MBDB.



Legal highs purchased from the BioRepublik website were found to contain combinations of ethcathinone, 4-Methyl-methcathinone, 3-fluoromethcathinone; legal derivatives of cathinone - the active compound in Khat leaves. Seven different products were purchased from the site for €99, consisting of 18 capsules in total. Coloured capsules were received in one pot, undifferentiated. Each contained two methcathinone derivatives, with one still unidentified. See figure 7 for structures.



**Figure 7:** Structures of controlled cathinone and uncontrolled derivatives found in some legal highs.

### Conclusions

This market is adapting rapidly to changes in legislation<sup>4</sup>. Many UK based websites compete to provide clubbers with an increasing array of drug choices. However, many products are sold in packaging that does not reflect their contents and are often sold to a young and vulnerable market under the guise of a 'safe alternative to illicit drugs'.

### References

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