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Editorial

The increasing abuse of amphetamine-type stimulants (ATS) which include "ice", "Ecstasy" and illicit tablets containing methamphetamine has been a worldwide phenomenon and our region is no exception. We have hence dedicated this issue of the Newsletter to the abuse of ATS in the different countries and the characterisation and profiling of these drugs as performed by the different laboratories. We are indeed happy to receive contributions from many laboratories on this topic. The Australian Federal Police Forensic Services Group has also contributed an article on the Australian Illicit Drug Intelligence Programme. Thank you for your contribution and continuing support. We hope the sharing of information through this Newsletter will be beneficial to all!

Inside this issue

Australian Illicit Drug Intelligence Program Forensic Intelligence Driven Policing

From July 1st 2002 the Australian Federal Government announced additional funding of AUD$4.7 million over the next four years to extend the National Heroin Signature Program (NHSP) to encompass Amphetamine-Type Substances (ATS) and Cocaine. The project is now known as the Australian Illicit Drug Intelligence Program (AIDIP) and remains part of the Australian Federal Government's National Illicit Drug Strategy (NIDS) 'Tough on Drugs' strategy. The project facilitators are the Australian Federal Police Forensic Services group and the Australian Government Analytical Laboratory.

The major outcome of this project so far has been to introduce and examine forensic information relating to the chemical and physical aspects of heroin seizures as a supplementary Strategic Intelligence tool. This vision is now being expanded to incorporate Amphetamine Type Substances and Cocaine. In January 2003 digital recording equipment was provided by the project to all AFP Forensic Services offices as well as other State Forensic Laboratories across Australia, to capture images of all illicit tablet types seized nationally, for inclusion into the National Illicit Tablet Database (NITD) coordinated by the Victorian Forensic Science Centre (VFSC). This data can be searched on the National Institute of Forensic Science (NIFS) website. (http://www.nifs.com.au/drugshome/drugs.html)

An overview of outcomes and developments of the project are as follows:

- Chemical and physical analytical methods referred to as Signatures performed by the Australian Federal Police (AFP) Forensic Services and Australian Forensic Drug Laboratory (AFDL) on illicit drug seizures.

- 'Acts in preparation' have been established indicating possible importations of Heroin were to be potentially cut and repressed for distribution on the Australian market. The seizure of hydraulic presses, known heroin logo dies and copied heroin trademarks have shown early signs of a potential large scale internal Australian heroin repressing business. Information Sheets depicting these seizures have been widely circulated nationally and internationally, to Police Forensic Services, Drug Laboratories and Investigators, with a view to lifting the awareness and knowledge about this type of seizure. It should be noted no detectable drugs were found on any of this equipment, the information stands on the findings of the Signature 4 component (physical aspects of drug seizures) of the project.

- Tablet appearance and logo design doesn't always determine the drug type as was a misconception in some

previous investigations. Chemical analysis has proven for example, seizures of tablets bearing the Mitsubishi Logo differed in drug type from MDMA, Methylamphetamine, MDMA/Ephedrine, Ketamine and Heroin. Here a combination of Signature 4 data and Signature's 1 and 2 (chemical information) are combined to produce Information Sheets.

- Visits to Asian Forensic Services areas and Chemical Laboratories have revealed similarities and differences in drug seizure trends. Information collected from these agencies has assisted in the prediction and direction of drug trends in Australia as has emerged with the increased interest in Amphetamine Type Substances.

- Distribution of Information Sheets outlining drug seizures of interest, depicting unusual concealment methods and heightening the Police Investigators awareness to the endless possibilities involved in Drug Importation.

- Chemical analysis performed by the Australian Forensic Drug Laboratory, through Tactical Drug Comparisons have assisted Drug Investigators in linking group criminal activity, where bulk importations have been split within a syndicate or imported through a number of ports into Australia. Valuable evidence to support conspiracy cases and link membership has been established. The availability of this service to the Investigator and the combination with the physical details of the seizure, enhance the Forensic Intelligence connection within the operation and provide an additional facit to AFP Strategic Intelligence.

- To obtain the required information to support the core values of the project, some Forensic procedures needed to be reviewed, standardised and modified. Information recording of the drug seizure logos, measurements, descriptions and weights, needed to be re-examined with a view to maintaining the ability for data collected on a national basis, to be suitable for accurate comparisons with other related/unrelated seizures. These procedural changes have impacted on Forensic Practitioners, without whose constant support our database would be of limited value.

- The project has been actively involved in the examination and operation of tablet making machines and research into tool mark impressions on tablets made by the tablet press punches. The research conducted will enhance our future ability to identify and link seized tablet presses through tool marks, logos and product mixtures.

- Planned recruitment of Forensic Science graduates and the purchase of a Fourier Transform Infrared (FTIR) Spectrometer to aid the expansion of the project, will provide more discriminating characteristics through detailed scientific examination of drug wrappings, tapes, adhesives, camouflaging materials and associated substances. This information will enhance the capacity of the Signature 4 project database, providing additional search criteria options, and possible links between seizures.

- Ongoing project developments include the purchase of a Gas Chromatograph-Mass Spectrometer (GCMS) to complement the FTIR and provide the ability to conduct research into the profiling of Amphetamine Type Stimulants, Cocaine and Methamphetamine ("Ice"). This technology will be developed in-house and located in the Forensic Services Laboratory in Sydney. The scope of this aspect of the project is to record the profiling details of drugs seized in Australia and introduce the ability to compare results at a local, national and international level.

- Heroin seizures analysed by Australian Government Analytical Laboratory (AGAL)- Australian Forensic Drug Laboratory (AFDL) 2002 -2003*

YEAR	SEIZURES	SAMPLES	SOUTH AMERICAN	SOUTH EAST ASIAN	SOUTH WEST ASIAN	MEXICAN	UNKNOWN
2002-2003	109	462	0	70.8%	6.7%	3.5%	19%

- The incidence of Paracetamol and Caffeine used as adulterants in Heroin seizures has been a significant trend over the year*

YEAR	SAMPLES	CAFFEINE	PARACETAMOL	CAFF/PARA
2002-2003	462	43	15	288

- Heroin seizures analysed by AGAL/AFDL 1997 - 2003*

YEAR	Signature 1 Samples	Signature 2 Samples	SA	SEA	SWA	MEX	UNK
1997-2003	1678	1474	2.8%	81.3%	4.3%	1.3%	10.3%

**Figures supplied by Australian Government Analytical Laboratory*

Contributed by Australian Illicit Drug Itelligence Program- Joint Drug Intelligence Team, Australian Federal Police Forensic Services Group.

Emergence of New Drug Trend in Macau

The situation of drug abuse in Macau has changed quite considerably over the past few years with the change in the type of drug-intake being the most prominent. From abuse of Heroin and Cannabis in the 90s to abuse of MDMA, "Ecstasy" and Ketamine in the New Millennium, these changes seem to be associated with not just a change in the drug culture, on the one hand, but also a change in its successive combat which has proven to be effective. Such combat includes deploying more investigators to recreational areas, putting up posters in discernible places, rectifying existing legislations and implementing new ones and incorporating trans-national co-operation.

Whatever the combat, the year 2002 still witnessed a total of 295 drug cases with Heroin-related cases decreased by 30% and Cannabis-related cases decreased by half when compare to year 2001. Although "Ecstasy" and Ketamine-related cases also decreased by about 34%, the composition of "Ecstasy" has varied quite significantly in the sense that MDMA and MDA are no longer considered to be the main constituents of "Ecstasy" tablets. Indeed, a new trend has emerged with Methamphetamine and Ketamine replacing MDMA and MDA. The following pie chart shows the change in the composition of "Ecstasy" tablets in both years 2001 and 2002.

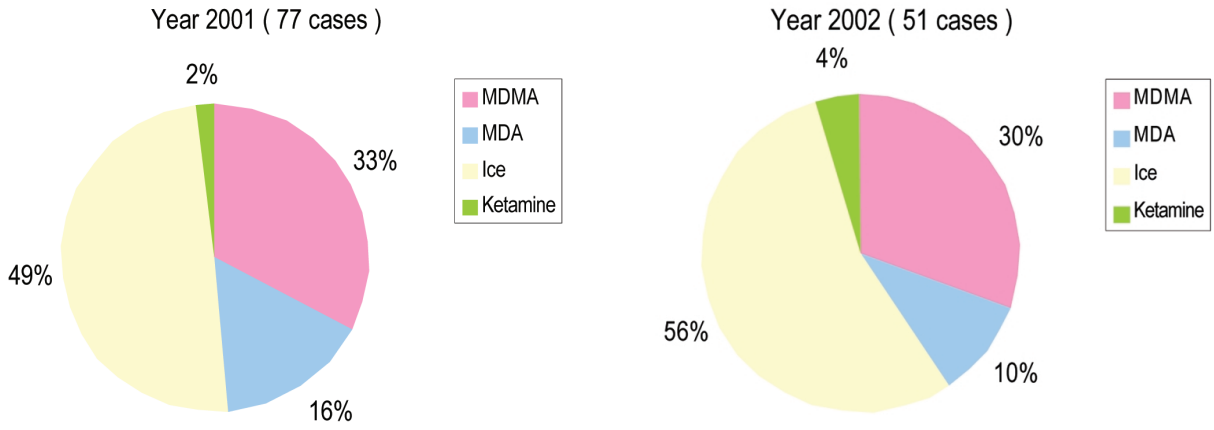
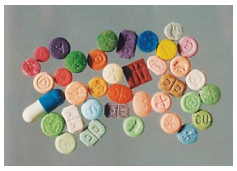


Figure 1: Percentage of drug composition in "Ecstasy" tablets in years 2001 and 2002

Interesting Encounter

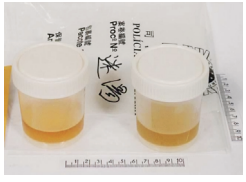
The year 2002 witnessed a number of interesting encounters. These include:



1) A variety of differently-shaped "Ecstasy" tablets have, for the first time, been come across. Shapes including square, octagon and oval are amongst the most trendy. But perhaps the most interesting is one in the form of capsule which upon analysis, was found to contain 1.46% Methamphetamine and 30.53% Ketamine.

2) The new form of "Ecstasy" tablet called "Ma" emerged in April with special feature being the smallest "Ecstasy" tablet ever encountered (dimension 6.10 x 2.94 mm). Upon analysis, this tablet was found to contain Methamphetamine and Caffeine.

3) It is not until recently that Ketamine was found to be dissolved in water and upon analysis, the aliquot was found to contain 6% of the drug.



4) In August, serving soup was found to be doped with Triazolam.

With respect to quantitative analysis of "Ecstasy" tablets, percentage of MDMA ranges between 26% - 50%; that of MDA between 31% - 38%; that of Methamphetamine between 1% - 31% and that of Ketamine between 1% - 66%.

Contributed by the Forensic Laboratory, Macau SAR

Characterisation and Profiling of Illicit Methamphetamine Tablets Abused in Singapore

Introduction

Illicit tablets containing methamphetamine made their appearance in the drug scene in late 1997. They now make up about 30% of the total number of amphetamine-type stimulants (ATS) analysed by the laboratory. These methamphetamine tablets are believed to be manufactured in the "Golden Triangle" region and smuggled into Singapore. They have multi-colours and logos and are easily confused with the "Ecstasy" tablets which are also being abused in the country.

A project on the characterisation and profiling of illicit methamphetamine tablets was initiated in 2000. About 200 samples of methamphetamine tablets, collected over a period of about 4 years from 1998 to early 2002, were used in the study. These tablets can be broadly divided into 2 groups based on the methamphetamine content and also the major components found. The first group of tablets came with few colours and only 2 logos were seen so far. The most common logo found being "WY" (see Figure 1). The methamphetamine content usually ranges from 3 to 29% and caffeine is the only other major component found. The average weight of one tablet is about 90 mg. The "WY" tablets, also known commonly by the street name "Ya-Ba", are normally being trafficked in large quantities. The second group comprises tablets with a great variety of logos and colours. Some examples are given in Figure 2. These tablets are referred to as the non-"WY" tablets. The methamphetamine content varied from 1 to about 11%. These tablets usually contained several other major components such as caffeine, diazepam, ketamine, dextromethorphan, ephedrine (or pseudoephedrine), lignocaine, midazolam, paracetamol and triprolidine. Many of these components were present at a much higher concentration than methamphetamine. Among the exhibits collected for the study, 36 were "WY" tablets and the rest were made up of non-"WY" tablets.

Figure 1: Some examples of "WY" tablets.

Result and Discussion

In order to have a better understanding of the synthetic route used in the clandestine manufacturing of methamphetamine, the optical purity of the compound in 26 samples from the first group of tablets ("WY" tablets) was determined using GC/FID fitted with a chiral column. The results show that in all samples, only the more potent *d*-methamphetamine was found indicating that either the optically pure *l*-ephedrine or *d*-pseudoephedrine was used as the precursor. This is consistent with the findings of V.Puthaviriyakorn *et. al.* which reported that methamphetamine in almost all "WY" tablets was prepared from ephedrine.[1]

An impurity profiling study was conducted on all 36 samples of the first group of tablets and selected samples of the second group of tablets which had higher methamphetamine contents (8-11%). The method of impurity profiling was based on that reported by the UNDCP Laboratory.[2] In the study, the sample extracts were first analysed by GC/MS in order to identify the impurities present and subsequently by GC to determine the peak area ratios for hierarchical cluster analysis (HCA). The impurity profiles of a total of 46 samples were studied. Some of the common impurities found were benzaldehyde, 1,2-dimethyl-3-phenylaziridine, amphetamine, N-acetylmethamphetamine, N-formylmethamphetamine, ephedrine (or pseudoephedrine), N-acetylephedrine, acetylcodeine, codeine and ethyl vanillin. Among these impurities, the presence of acetylcodeine and codeine as impurities are puzzling as they appear to be unrelated to the manufacturing process. A possible reason may be that the methamphetamine clandestine laboratories are located in or near areas where illicit opium and heroin are produced. The utensils used in the manufacturing of methamphetamine may have been contaminated by trace amounts of these compounds at the clandestine laboratories where both methamphetamine and heroin were produced.[1]

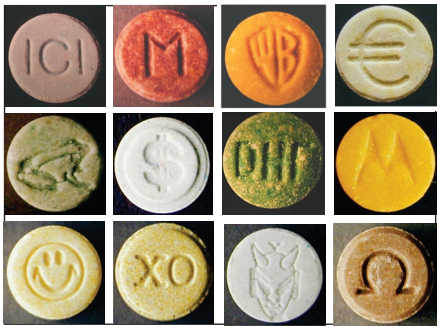


Figure 2: Some examples of non-"WY" tablets.

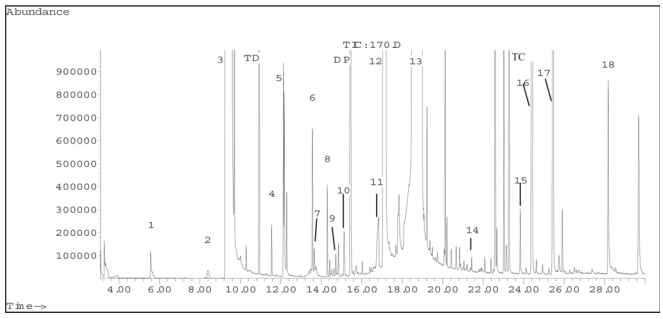


Figure 3: Impurity profile of a non-"WY" tablet - 1: N-butyl-1-butanamine, 2: amphetamine, 3: methamphetamine, 4: MDA precursor-1 (piperonal), 5: ephedrine (or pseudoephedrine), 6: MDA precursor-3 (piperonylacetone), 7: 1-(3,4-methylene-dioxyphenyl)-2-propanol, 8: MDMA, 9: N-methyl-N-(2-phenylethyl)-acetamide, 10: N-acetylmethamphetamine, 11: paracetamol, 12: ketamine isomer, 13: ketamine/caffeine, 14: stearic acid, 15: nitrazepam HY, 16: diazepam, 17: clobazam (TD, DP, TC are Internal Standards)

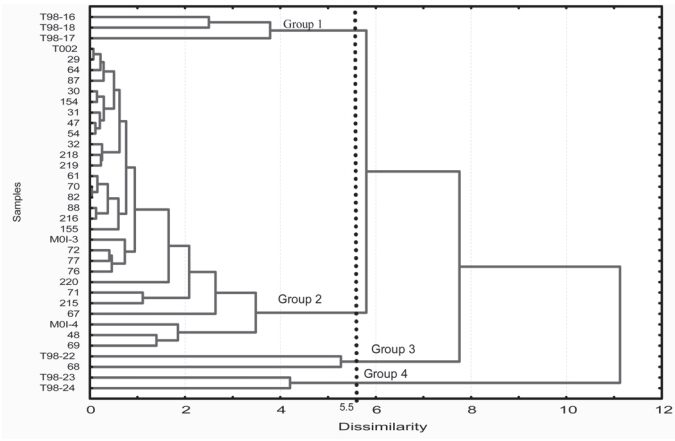


Figure 4: Dendrogram from HCA of "WY" tablets

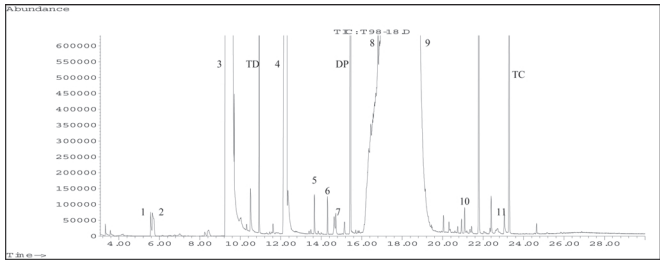


Figure 5: Impurity profile of a Group 1 tablet - 1: N-butyl-1-butanamine, 2: benzaldehyde, 3: methamphetamine, 4: ephedrine, 5: 1-(3,4-methylenedioxyphenyl)-2-propanol, 6: MDMA, 7: N-formyl-methamphetamine, 8: paracetamol, 9: caffeine, 10: bis(2-ethylhexyl)maleate, 11: oleamide

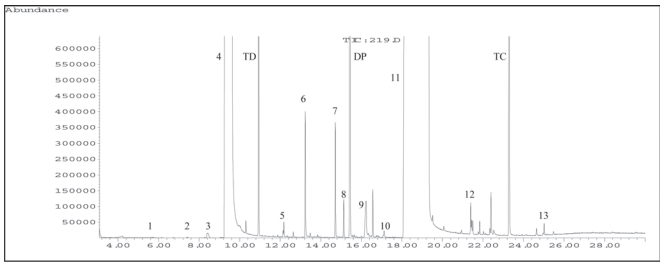


Figure 6: Impurity profile of a Group 2 tablet - 1: benzaldehyde, 2: benzylalcohol, 3: 1,2-dimethyl-3-phenylaziridine, 4: methamphetamine, 5: 3,4-dimethyl-5-phenyloxazolidine, 6: ethyl vanillin, 7: N-formylmethamphetamine, 8: N-acetylmethamphetamine, 9: paracetamol, 10: N-acetylephedrine, 11: caffeine, 12: methamphetamine dimer, 13: acetylcodeine

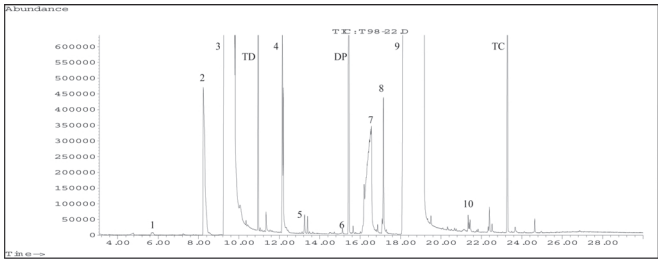


Figure 7: Impurity profile of a Group 3 tablet - 1: benzaldehyde, 2: 1,2-dimethyl-3-phenylaziridine, 3: methamphetamine, 4: ephedrine, 5: ethyl vanillin, 6: N-acetylmethamphetamine, 7: paracetamol, 8: N-acetylephedrine, 9: caffeine, 10: methamphetamine dimer

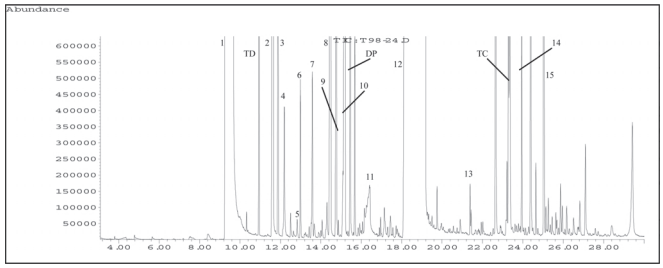


Figure 8: Impurity profile of a Group 4 tablet; 1: methamphetamine, 2: MDA precursor-1 (piperonal), 3: ethanol, 2-(2-butoxyethoxy)-acetate, 4: N-phenylacetamide, 5: p-acetyltoluidine, 6: 3', 4'-(methylenedioxy)acetophenone, 7: 3,4-methylenedioxyphenyl acetone, 8: MDA-M (methylenedioxy-hippuric acid) ME, 9: N-methyl-N-(2-phenylethyl)-acetamide, 10: N-acetylmethamphetamine, 11: paracetamol, 12: caffeine, 13: stearic acid ET, 14: codeine, 15: acetylcodeine

Among the samples from the first group of tablets ("WY" tablets), the impurity profiles of samples collected from 1998 to 1999 were more complex than those from 2000 to 2001. Most of the samples received after 2000 were also found to contain ethyl vanillin, which was probably added as a flavouring agent. As expected, the impurity profiles of the second group of tablets (non-"WY" tablets) were generally more complex than those from the first group of tablets. An example of an impurity profile of a non-"WY" tablet is given in Figure 3.

HCA was performed on all the samples from the first group of tablets ("WY" tablets). Seven prominent and commonly detected impurity peaks; namely: 1,2-dimethyl-3-phenylaziridine, amphetamine, ephedrine, N-methyl-N-(2-phenylethyl)acetamide, N-acetylmethamphetamine, acetylephedrine and acetylcodeine were selected as factors for the analysis. The peak area ratios of the respective peak to the internal standard (diphenylamine) were calculated. The data matrix obtained was analysed by HCA. The dendrogram produced from the analysis of the 36 samples of "WY" tablets is shown in Figure 4. The samples could be categorised into 4 groups at a dissimilarity index of 5.5. At this level, ephedrine in Group 1, 1,2-dimethyl-3-phenylaziridine and N-acetylephedrine in Group 3, acetylcodeine and N-acetylmethamphetamine in Group 4 were the prominent impurities while there was no prominent impurity in Group 2 (see Figures 5 - 8). It is interesting to note that samples from Groups 1, 3 and 4 were those received in earlier years while Group 2 appeared to be made up mainly of samples from 2000.

References

1. Puthaviriyakorn, V. *et.al.*, Forensic Sci., Int., 126, 105-113 (2002)

2. Remberg, B. and Stead, A. H. Bull. Narcotics, L1, 97-117 (1999)

Contributed by Centre for Forensic Sciences, HSA, Singapore

(This article was summarised from a paper presented at the 55th Annual Meeting of the American Academy of Forensic Sciences, Chicago, Illinois, USA, 17-22 February 2003)

A Purity Survey of "WY" Methamphetamine Tablets Seized in Kuala Lumpur Area, Malaysia from 1998 to 2003

Methamphetamine tablets were first submitted to The Department of Chemistry from the Kuala Lumpur area in Malaysia in 1997 and since then the quantity of methamphetamine tablets has increased several folds. Methamphetamine is commonly encountered in the crystal and in tablet form. The tablet having the inscription "WY" being the most common amongst all the methamphetamine tablets submitted and examined. This survey was to determine the purity of individual tablets and to compare the methamphetamine levels within multiple tablet submissions having the same colour from 1998 to 2003.

Unlike legitimate drug manufacturers, clandestine laboratories are not known for quality control, and therefore the percent purity/amount of methamphetamine (calculated as free base) is expected to vary widely (Table 1). The percent purity/amount of methamphetamine contained in each tablet ranged from as low as 2.0 % (1.9 mg) to 25.2 % (23.4 mg). Overall, the average methamphetamine content of the "WY" tablets was 14.2 mg and the average purity was 15.2 % (See Table 1). The average methamphetamine content of tablets varied as much as 11.7 mg from group to group over the years. The methamphetamine content also varied within each group; the brick red tablets varied in methamphetamine content as much as 23.2 mg as compared to the orange tablets of 7.2 mg. No other controlled substances were identified in any of the tablets analysed. Caffeine, a common diluent, was found in all the tablets analysed.

On comparing the individual tablets and groups of tablets of the same colour, it is noted that the methamphetamine content of the brick red group of tablets varied widely within the year as compared to the orange tablets which varied over a narrow range. Overall there is inconsistency found in the methamphetamine content and the percent purity of the "WY" tablets found within the Kuala Lumpur area, Malaysia.

Table 1 - Methamphetamine content in "WY" tablets

Inscription	Colour	Wt./tablet (mg)	Diameter (mm)	Thickness (mm)	mg Meth/ tablet	% Meth	Range % Meth	Average mg Meth per group
2003								
WY		100.0	7	3	16.0	16.0		
WY		100.0	7	3	21.0	21.0		
WY		100.0	7	3	9.0	9.0		
WY		100.0	7	3	8.2	8.2	8.1-25.0	14.8
WY		100.0	7	3	10.3	10.3		
WY		100.0	7	3	8.1	8.1		
WY		100.0	7	3	25.0	25.0		
WY		100.0	7	3	20.7	20.7		
WY	Green	91.4	7	3	9.5	10.4		10.4
2002								
WY	Orange	100.0	7	3	19.0	19.0		
WY	Orange	90.0	7	3	18.9	21.0	19.0-21.0	19.0
WY	Brick Red	98.0	7	3	19.4	19.8		
WY	Brick Red	91.8	7	3	21.3	23.2		
WY	Brick Red	97.4	7	3	7.4	7.6		
WY	Brick Red	91.7	7	3	11.2	12.2		
WY	Brick Red	93.3	7	3	1.9	2.0		
WY	Brick Red	93.5	7	3	12.1	12.9		
WY	Brick Red	97.5	7	3	18.4	18.9	2.0-25.2	13.2
WY	Brick Red	89.9	7	3	21.4	23.8		
WY	Brick Red	90.7	7	3	21.2	23.4		
WY	Brick Red	89.1	7	3	8.0	9.0		
WY	Brick Red	93.3	7	3	3.4	3.6		
WY	Brick Red	93.5	7	3	11.9	12.7		
WY	Brick Red	93.3	7	3	3.4	3.6		
WY	Brick Red	92.8	7	3	23.4	25.2		
WY	Green	85.0	7	3	20.4	24.0		
WY	Green	100.0	7	3	14.6	14.6		
WY	Green	85.0	7	3	4.0	4.7	4.1-24.0	9.2
WY	Green	85.0	7	3	3.6	4.2		
WY	Green	85.0	7	3	3.5	4.1		
WY	White	90.0	7	3	16.7	18.5	18.5	18.5

Inscription	Colour	Wt./tablet (mg)	Diameter (mm)	Thickness (mm)	mg Meth/ tablet	% Meth	Range % Meth	Average mg Meth per group
2001								
WY	Brown	91.5	7	3	11.0	12.0		
WY	Brown	92.0	7	3	11.0	12.0		
WY	Brown	93.3	7	3	11.2	12.0	11.1- 12.0	10.9
WY	Brown	92.5	7	3	10.3	11.1		
WY	Brick Red	95.2	7	3	18.6	19.5		
WY	Brick Red	99.7	7	3	19.1	19.2		
WY	Brick Red	91.5	7	3	17.7	19.3	11.7-19.5	16.9
WY	Brick Red	91.0	7	3	17.3	19.0		
WY	Brick Red	100.8	7	3	11.8	11.7		
2000								
WY	Orange	93.8	7	3	13.2	14.1		
WY	Orange	92.0	7	3	14.8	16.1		
WY	Orange	93.5	7	3	15.6	16.7		
WY	Orange	92.5	7	3	14.5	15.7		
WY	Orange	93.3	7	3	15.0	16.1	14.1-19.7	15.9
WY	Orange	89.6	7	3	17.7	19.7		
WY	Orange	90.0	7	3	17.6	19.5		
WY	Orange	91.3	7	3	18.0	19.7		
WY	Orange	87.3	7	3	16.8	19.3		
WY	Brick Red	92.1	7	3	11.5	12.5		11.5
1999								
WY	Orange	91.2	7	3	19.4	21.3		19.4
1998								
WY	Orange	90.4	7	3	16.1	17.8		16.1
WY	Brown	90.2	7	3	20.9	23.2		20.9

Contributed by the Department of Chemistry, Malaysia

New Drug in Lao PDR

In early 2003, our forensic laboratory received two new types of Amphetamine-Type Stimulants (ATS). One has the marking "888" while the other is marked with "R".

So far, the 6 cases of "888" tablets we have encountered are all orange in colour while the "R" tablets come in colours of orange or green. Both types of tablets are round in shape and have a diameter of 6 mm and thickness of 2 mm.

Chemical analysis carried out by the laboratory revealed that both types of tablets contain Methamphetamine.

"888" logo

"R" logo

Contributed by Food and Drug Quality Control Center, Lao PDR

Abuse of Amphetamine-Type Stimulants in Hong Kong

Amphetamine-type stimulants (ATS) prevailing in Hong Kong can be grouped into three categories, namely (i) crystalline methamphetamine (or 'ice'), (ii) tablets containing methamphetamine, and (iii) "Ecstasy" tablets containing MDMA and/or its analogues. The seizure of methamphetamine (MA) can be dated back to as early as 1976 when this substance was first controlled as a dangerous drug. At that time, methamphetamine was almost entirely encountered in the form of crystals, though the term 'ice' was not yet known. Seizure of methamphetamine was relatively insignificant until the early 1990s when it started to gain popularity in Hong Kong. In local terms, the tablets in categories (ii) and (iii) are generally referred to as "Fing Tau Yuen" (meaning Shake Head Pills). The statistical figures of seizures of the above three categories for the past 10 years are shown below:

	Category (i) 'ice'		Category (ii) MA tablets		Category (iii) Ecstasy tablets	
Year	*Number of cases*	*Amount (kg)*	*Number of cases*	*Amount (tablets)*	*Number of cases*	*Amount (tablets)*
1993	96	1.8	0	0	7	28
1994	98	133	0	0	2	2
1995	219	15	0	0	8	27
1996	569	46	2	196	39	14,406
1997	653	73	19	3,461	67	49,613
1998	647	232	4	13	27	282
1999	595	102	21	1,111	150	21,202
2000	586	87	255	7,879	1,215	378,621
2001	649	63	928	49,208	1,183	170,243
2002	397	71	386	34,440	726	48,840

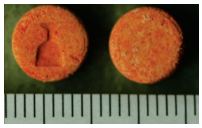
(i) 'Ice'

Crystalline methamphetamine ('ice') that is abused locally takes the form of the hydrochloride salt with high purity. 'Ice' is smuggled from the Mainland to Hong Kong and is mainly for local consumption. Drug traffickers have adopted ever-changing smuggling methods, from the commonest body packing, to hiding inside chocolate, cake and foodstuff, and even storing liquid 'ice' in shampoo bottles, eye-drop bottles and jerry cans.

In daily street level seizures, 'ice' is usually contained in plastic bags or tinfoil packets. The most common route of administration is by inhalation. It is usually consumed by heating and vaporizing the crystals on a strip of tinfoil, sucking the vapour through a hookah device filled with liquid (usually fruit juice) to cool it off or add flavour, with attached pipes, tubing or drinking straws as conduits for inhalation. Two typical 'ice' inhaling devices seized locally are shown above.

(ii) Methamphetamine tablets

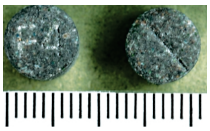
Methamphetamine (MA) tablets started to appear in the street in 1996 and have rapidly gained popularity since then. The tablets are usually embossed with different logos and/or markings. Chemical analysis has revealed that these MA tablets are made of a concoction of drugs. Some recent examples of MA tablets are as shown below.



MA, Ketamine, Caffeine, Diazepam, Phenobarbitone

MA, Estazolam

MA,Ketamine, Paracetamol, Piperonal



MA, Ketamine, Caffeine, Dimethylamphetamine

(iii) 'Ecstasy'

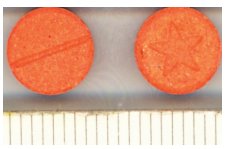
The term 'Ecstasy' originally referred to 3,4-methylenedioxymethamphetamine (MDMA), a member of a chemical group called the phenethylamines. Today, the term is loosely used to describe the street products taking the form of tablets or capsules containing predominantly active ingredients derived from phenethylamines (including MA, MDA and MDEA). (Please note that 'Ecstasy' tablets described in this section do not include MA tablets which are separately reported in the preceding section). The first seizure of 'Ecstasy' tablets occurred in 1993 and since 1996, the problem of 'Ecstasy' abuse has rapidly escalated. 'Ecstasy' tablets seized locally came mainly from the Netherlands and other European countries. The main way of taking 'Ecstasy' is by oral ingestion.

'Ecstasy' tablets seized in the early days were found to be relatively pure and most contained MDMA as the only psychotropic ingredient. In recent years, MDMA tablets have been found to contain various adulterants including ketamine and caffeine. Like MA tablets, 'Ecstasy' tablets are usually round with various colours and logos/markings. Some recent examples of 'Ecstasy' tablets are shown below.

MDMA

MDMA, MDA, MA

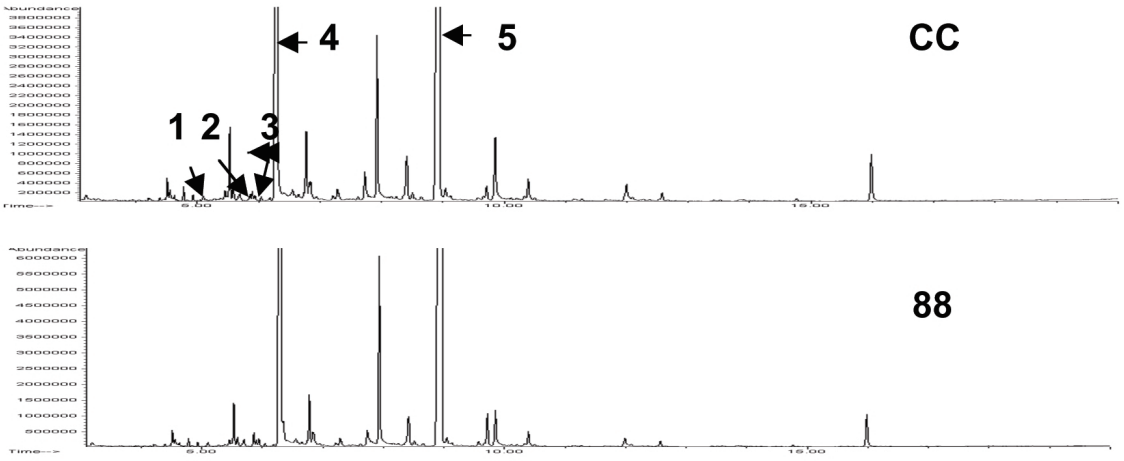
MDMA



MDA

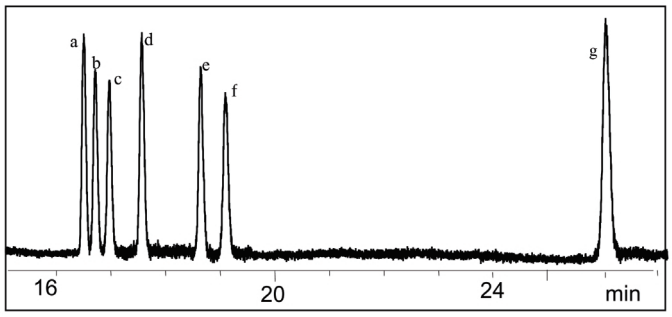
Profiling of Amphetamine-Type Stimulants (ATS)

In the year 2000, for drug intelligence purposes, the Government Laboratory began to collect digital images of ATS tablets submitted for analysis. The collection is based on the physical features and chemical compositions of the tablets and at present, it contains more than 300 records (about 100 new records are gathered each year). Digital images of ATS tablets are updated and disseminated to law enforcement departments regularly. In addition, a study on the chemical profiling was performed on MDMA tablets seized in Hong Kong. The work involved the determination of the nature and composition of the active ingredient(s), adulterant(s), synthetic impurities and salts of crystallization of MDMA (e.g. phosphate salt of MDMA). The study correlated tablets with similar chemical profiles, whether or not they bore similar physical appearances and aimed at determining a common origin between samples. The following GC-MS total ion chromatograms illustrate one of the findings for the correlation between two types of MDMA tablets - one with "CC" marking and the other "88" marking.



Representative total ion chromatogram profiles for (i) rectangular tablets with logo "CC"; and (ii) circular tablets with logo "88". 1) piperonal, 2) 3,4-methylenedioxyphenylpropan-2-ol, 3) 3,4-methylenedioxypropan-2-one, 4) MDMA, 5) ketamine.

Apart from this, the Government Laboratory has developed a method for the enantiomeric separation of methamphetamine, ephedrine and pseudoephedrine by capillary zone electrophoresis (CZE) with b-cyclodextrin as a chiral selector. Good enantiomeric resolution was attained for each analyte under our optimized conditions: 15 mM b-cyclodextrin, 300 mM NaH_2PO_4 at pH 2.5 with an uncoated capillary (64.5 cm x 50 µm), applied potential at 20 kV and temperature at 30°C, UV detection at a fixed wavelength (200 nm) was employed using a diode array detector. Using phentermine as an internal standard, migration times for all analytes are reproducible within 0.1% for intra-day and 0.6% for inter-day runs. The enantiomeric compositions of the seized materials provide information on possible precursors used in their manufacture and the chemical process involved.



Representative electropherogram on CZE separation of a) (-)-pseudoephedrine, b) (+)-ephedrine, c) (-)-ephedrine, d) (+)-pseudoephedrine, e) (-)-MA, f) (+)-MA, g) phentermine (internal standard) under optimized condition.

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