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QUALITY AND PURITY OF ILLICIT DRUGS, NEW PSYCHOACTIVE SUBSTANCES DETECTED IN SLOVENIA AND AWARENESS

Report for the year 2014

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and at the web pages of the European project RESPONSE, coordinated by NFL:

<http://www.policija.si/index.php/component/content/article/174-splono/77783-response> (Slovenian)

<http://www.policija.si/eng/index.php/generalpolicedirectorate/1669> (English)

The main part of this document will be included in the Slovenian national report on the drug situation, which is edited and issued yearly by NIJZ (National Institute of Public Health) in Slovenian and English languages. Slovenian national report is forwarded to the European Monitoring Centre on Drugs and Drug Addiction (EMCDDA), within the framework of the REITOX system.

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Quality and purity of illicit drugs - foreword

Data on the quality or purity of drugs are available only for certain seized drugs. In 2014, the sampling, analyses- chemical characterisations and statistical evaluations of results were carried out by the Chemistry department of the National Forensic Laboratory (hereinafter “NFL”), which has carried out regular annual monitoring since 2006 (since 1995 for heroin mixtures). NFL informs domestic stakeholders and ministries and is actively involved in the preparation of the Report on the Drug Situation of the Republic of Slovenia. Analytical results provided by NFL always represent a significant part of the reports delivered by the Republic of Slovenia to international institutions (UNODC and EMCDDA) and to EUROPOL via the national ENU contact point, where relevant. The Chemical Examination Section is also an active member of ENFSI-DWG (European Network of Forensic Science Institutes – Drugs Working Group), which is vital for a quick exchange of analytical data that are a prerequisite for the detection and forensic identification – chemical characterization of new compounds, especially with regard to the ‘explosion’ of new psychoactive substances on the market.

The NFL performs qualitative (identification) and a limited scope of quantitative (concentration of active compounds) tests of practically all drug samples (including precursors and new psychoactive substances (hereinafter “NPS”)) related to the investigation of criminal acts, and of the samples seized in prisons and at customs as well as of samples for anonymous testing brought to NGOs by addicted persons believing they may contain unusual substances and/or when experiencing unexpected effects during use. Collection points for samples for anonymous testing can currently only be found in Ljubljana, but the network is expected to spread throughout Slovenia. A part of that programme and sample monitoring will be/are partly financed by the EU Prevention and Fight against Crime programme within the scope of 2 international projects, i.e. RESPONSE 2015-2017, which is coordinated by Slovenia (NFL), and I-SEE 2015-2017, which is coordinated by Italy.

Quantitative analyses are performed primarily for monitoring purposes and, less frequently, at the request of clients (the police, prosecution, courts of law). Sampling is carried out according to pre-set criteria within the scope of routine tests of the material received. The samples collected for the past year are quantitatively evaluated in the first months of the following year.

Quantitative monitoring includes only samples of weight exceeding the set bottom limit value (in 2014, 0.1g for heroin, cocaine, amphetamine and other amphetamine-type compounds, and 10g for cannabis and hashish). In 2014, sampling for quantitative analyses was carried out within a shorter period, i.e. from January to September 2014, due to the rationalisation of work. The number of samples for analysis within the scope of one case may also be reduced, i.e. when a large number of similar samples are involved. In such cases, the number of samples for analysis is determined statistically, i.e. based on the hypergeometric sampling method. Similarity is estimated with respect to the weight of the seized material, texture, colour, type of drug and the results of preliminary tests and qualitative analyses

Qualitative and quantitative chemical tests are performed using different methods of analysis, primarily GC-MS and HPLC, and, in 2014, also HPLC-TOF, NMR and some other techniques due to a large increase in NPS cases.

Heroin mixtures

In 2014, monitoring included 264 samples from 72 cases (of the total net weight of approximately 3kg).

All samples contained heroin in base form, typical accompanying opium-derived heroin compounds, and cutting agents paracetamol and caffeine.

The average concentration of heroin (calculated for the population of 264 samples) amounted to 10.8% (*Figure 1*). The highest measured content in 2014 amounted to 60.4%, while the lowest amounted to 0.9%. The low average heroin content (compared to the period preceding 2011) is most likely the result of a lack of heroin on account of a still low opium yield in Afghanistan (UNODC 2011, UNODC 2012).

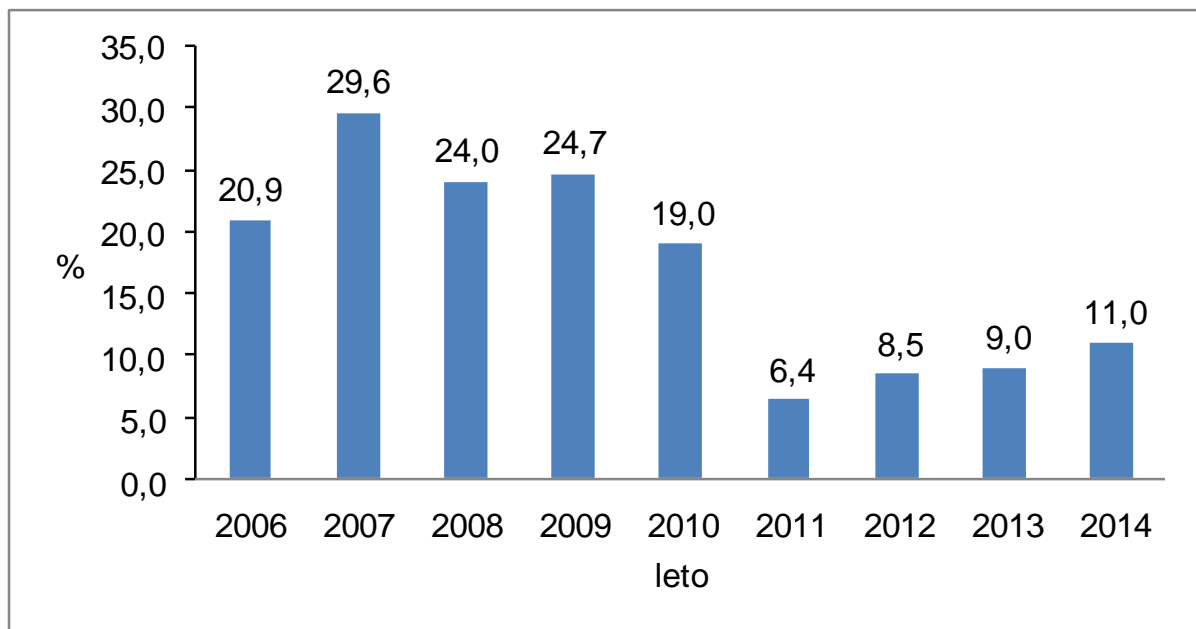


Figure 1: Average heroin concentrations in the 2006-2014 period

A detailed analysis showing the relationship between heroin concentration and the net weight of seized samples is shown in Figure 2 (*Figure 2*). The Figure shows that the largest group of the

samples tested comprises the so-called 'street heroin samples' weighing up to 1g (210 samples). This group consists of approximately 80% of samples containing between 0.9 and 16% of heroin with an average heroin content of 8% (*Figure 2*).

The group of samples of net weight exceeding 100g (7 samples), which may be labelled as 'wholesale samples', shows a slightly different concentration profile (*Figure 2*). Approximately 50% of samples from the group of samples weighing between 100 and 500g contain around 12% of heroin (median), while the average heroin content amounts to approximately 24%. In 2014, there were two major heroin seizures with samples weighing over 500g and containing 59% of heroin on average.

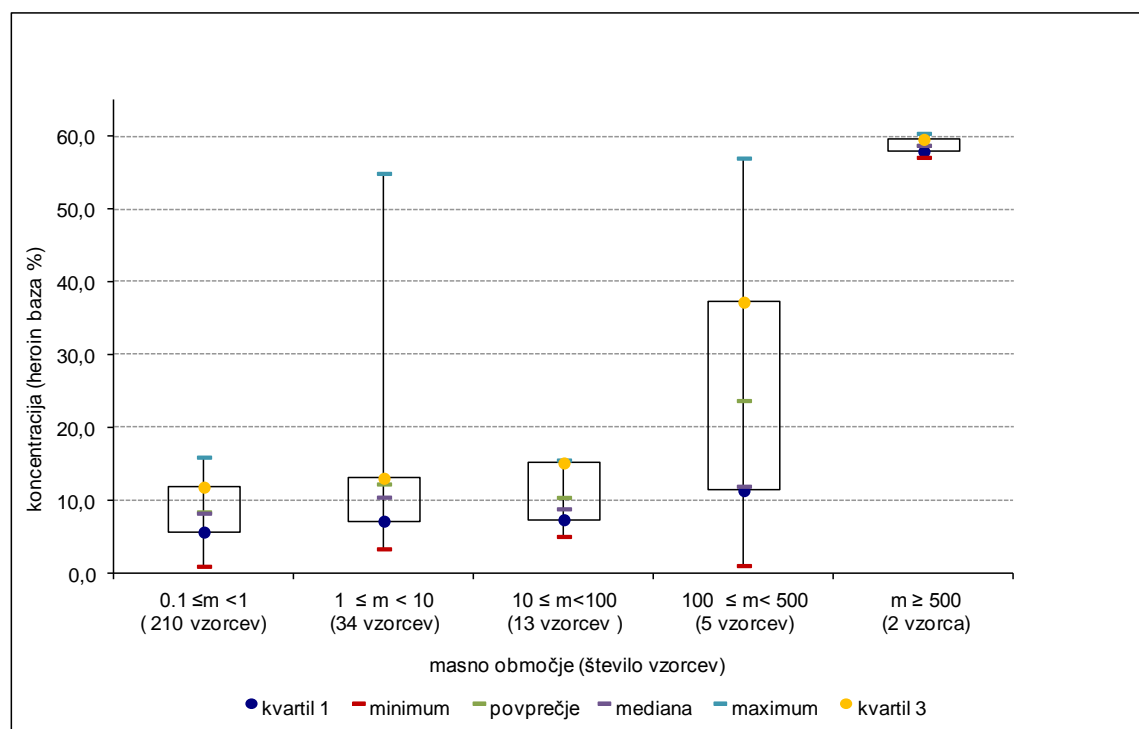


Figure 2: Heroin concentration in relation to net sample weight for 2014

Cocaine mixtures

Monitoring included 251 samples from 48 seizures. The total net weight of the samples included in monitoring roughly amounted to 168kg. All samples contained cocaine in the form of hydrochloride. The average cocaine content was around 50% (*Figure 3*). The minimum cocaine content amounted to 39% and the maximum amounted to 77%.

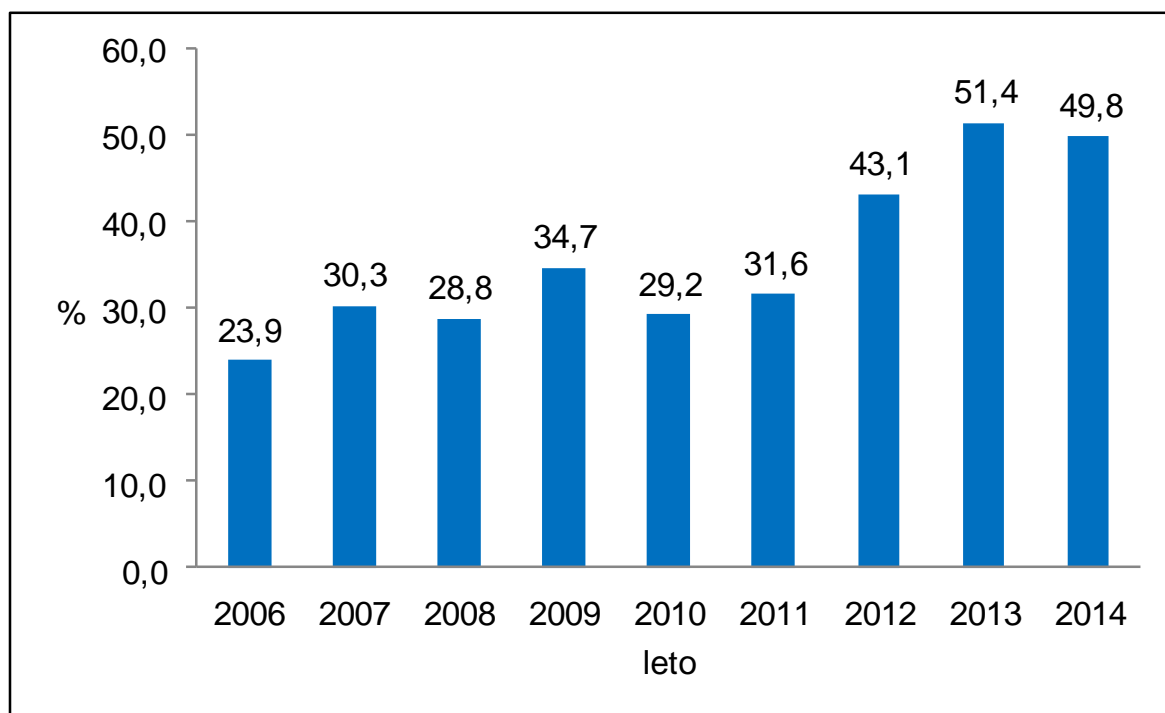


Figure 3: Average cocaine concentrations in the 2006-2014 period

The most common cutting agents detected in cocaine were levamisole and lidocaine, similar as in previous years.

A detailed analysis showing the relationship between cocaine concentration and the net weight of seized samples is shown in Figure (*Figure 4*). As evident, the largest group of the samples tested in 2014 contained samples weighing over 500g, which may be labelled as 'wholesale samples', as a result of two major cocaine seizures; in the first case, 62 samples were seized and, in the second, 97 samples were seized weighing over 500g. The average cocaine content

in samples from that group amounted to 65%, while the average cocaine content in samples weighing up to 1g ('street cocaine samples') amounted to 47% (Figure 4).

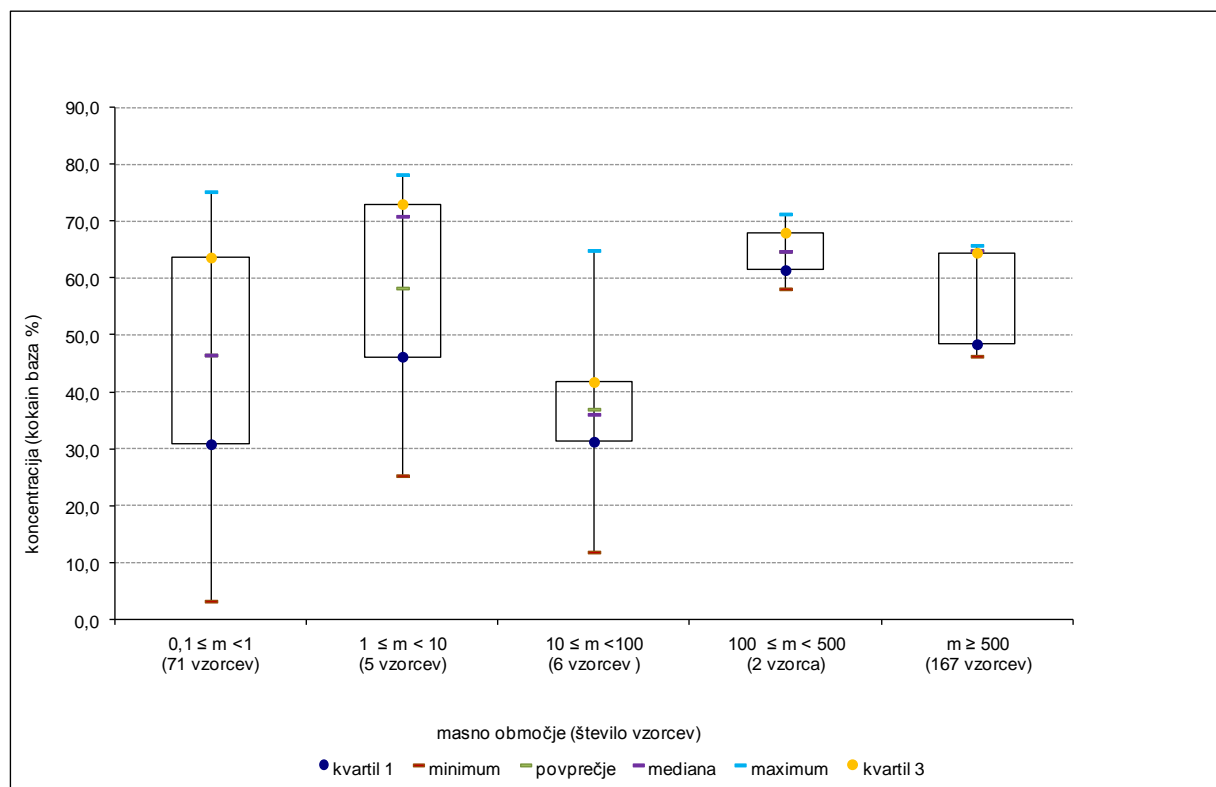


Figure 4: Cocaine concentrations in relation to sample weight for 2014

Cannabis and Cannabis Products

Monitoring included 486 samples of cannabis from 131 cases, 7 of which were hashish samples from 6 cases.

The average concentrations (*Figure 5*) of total THC in plant material were similar to those of previous years (average value of 8.6%, minimum value of 0.22% and maximum value of 23.6%). Compared to previous years, the average concentration of total THC in hashish samples was slightly higher (average value of 11.6%, minimum value of 1.3% and maximum value of 23.6%).

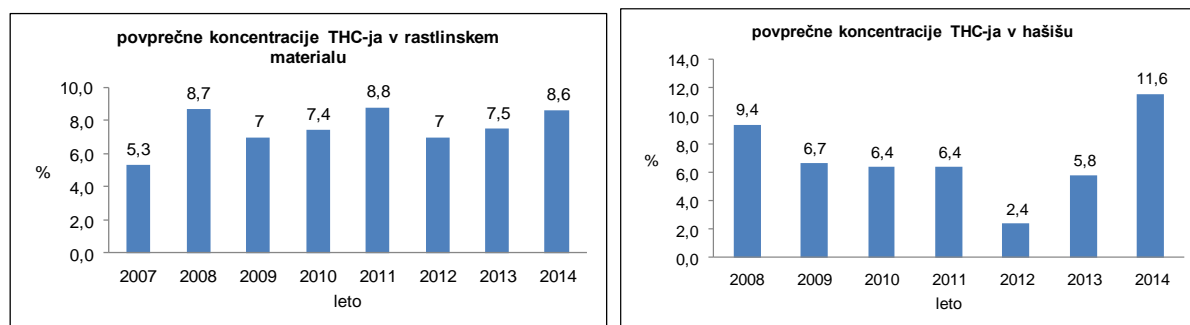


Figure 5: Average concentrations of total THC in cannabis (marijuana and hashish) samples seized in the 2006-2014 period

Amphetamine-type stimulants (ATS)

Most of the samples seized in 2014 contained amphetamine. Seizures of 3,4-methylenedioxy-N-methamphetamine (MDMA) and methamphetamine were rare.

The average content of amphetamine in 178 samples from 34 cases amounted to 12% and was the highest in recent years (*Figure 6*). The minimum amphetamine content amounted to 1.2% and the maximum amounted to 70.6%.

The average content measured in 44 seized samples containing MDMA from 9 cases amounted to 73.5%, with the minimum content of 26.7% and the maximum content of 80.2% of the compound.

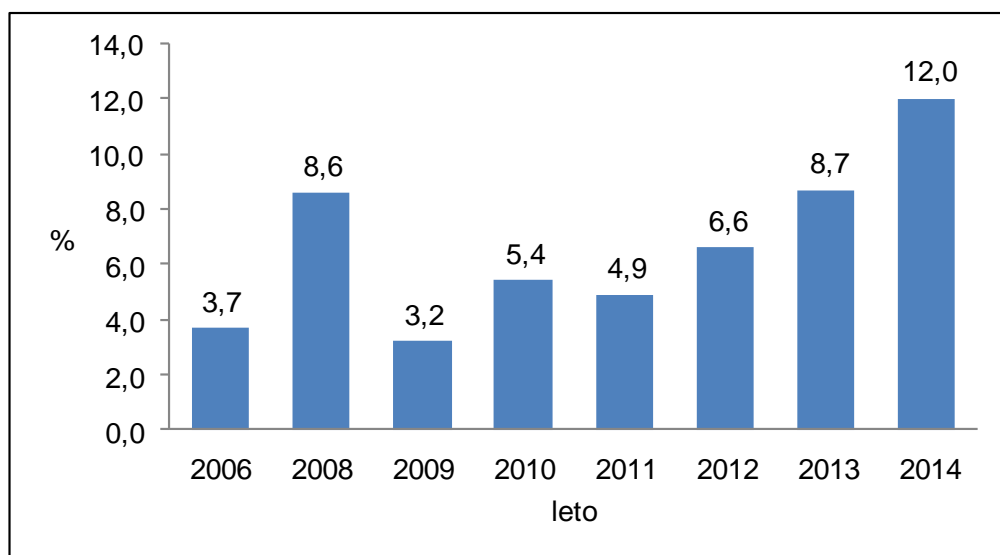


Figure 6: Average concentrations of amphetamine in the 2006-2014 period (no data is available for 2007)

A detailed analysis showing the relationship between amphetamine content and net weight of seized samples is shown in Figure (*Figure 7*).

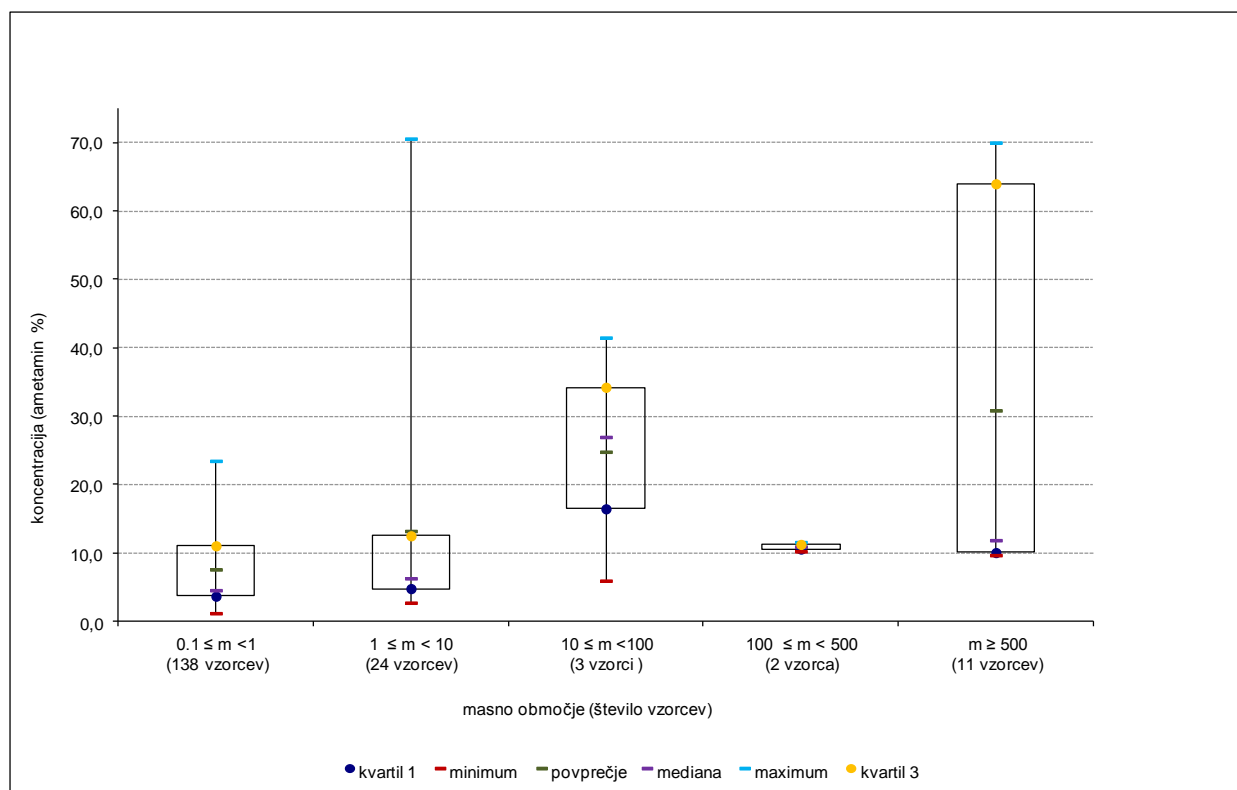


Figure 7: Amphetamine concentrations in samples classified by weight for 2014

In 2014, the police seized 29 new types of ecstasy pills (in view of the logo or active substance) in Slovenia. 60% of the pills contained MDMA, while other types of pills contained other substances (Figure 8). The estimated average weight of MDMA in the pills amounted to roughly 85mg per pill. The contents of other active components were not quantified.

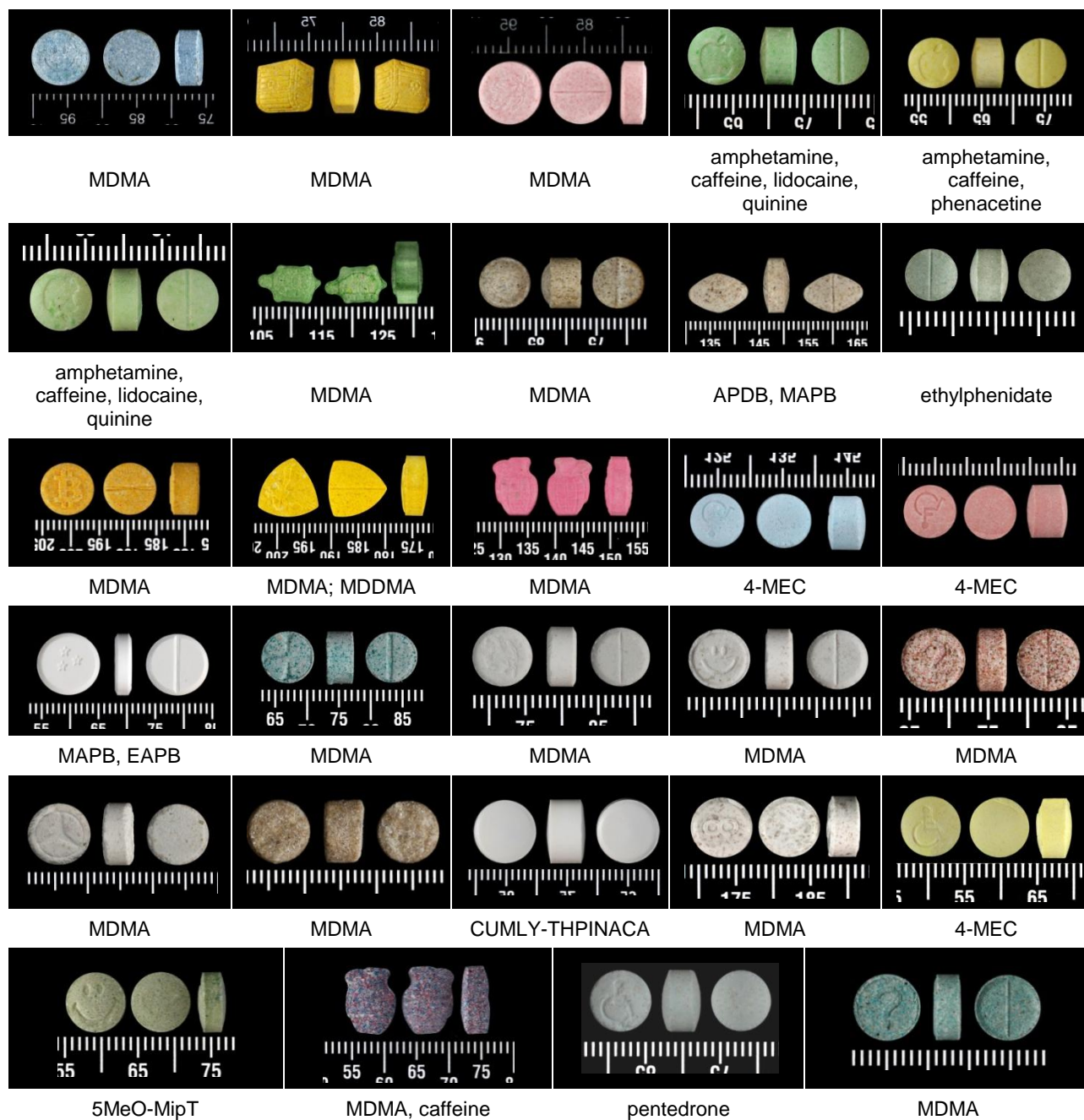


Figure 8: Different types of pills seized in Slovenia in 2014

New psychoactive substances

Overview

There were 59 different NPS detected and identified, with 38 compounds detected and identified for the first time in Slovenia and 9 completely new at the global scale (Klemenc 2015b, Klemenc and Gostič 2015). The Slovenian EWS, EMCDDA and in some cases also EUROPOL were promptly informed of the substances detected in Slovenia for the first time. A review of the NPS identified at NFL in 2014 was sent to the Slovenian EWS and EMCDDA in February 2015.¹

Minor quantities of samples (up to several grams) were seized in police procedures involving natural persons in the field and some samples were seized in prisons. Larger quantities were detected in routine customs checks of shipments and during investigation of trafficking and production case.

Raise the awareness

Within the scope of the Slovenian Early Warning (EWS-SI) around 50 samples were received for anonymous testing. Some contained classic drugs (amphetamine, heroin mixtures and similar) and some also contained NPS. Furthermore, 32 forensically interesting samples bought by an unknown user over the Internet were sent for anonymous testing. Unfortunately, the quantities were very small (up to app. 20mg), which is why the identification of certain positional isomers using NMR was not possible. The Table (Table 1) shows that 6 of the 32 samples (almost 20%) were wrongly declared. ***This means that users can never be sure of what they would really get when they order and buy online. About a 20% share of 'wrongly advertised' substances pose a serious risk for NPS users.***

¹ The data were published in the Early-warning system final reporting form, Slovenia, period covered: January 2014 to December 2014, reported in February 2015 (EWS-SI, 2015). The basis for the disclosure of these data was the Council Decision 2005/387/JHA of 10 May 2005 on the information exchange, risk-assessment and control of new psychoactive substances (UL L 127/32, 20. 5. 2005).

Table 1: Samples for anonymous testing and test results. In samples labelled with an asterisk (*), differences were found between the active substance declared (on the website) and that identified in NFL.

Sample label	Active compound (as declared)	Active compound (identified at NFL)	Sample label	Active compound (as declared)	Active compound (identified at NFL)
1*	25I-NBOH	25I-NBF and 25I-NBOMe	17	ethcathinone	ethcathinone
2*	alfa-MT (AMT)	two positional isomers APB and AMT	18	4-FA	4-FA
3	Pentylone	pentylone	19	5-APB	5-APB (or positional isomers of the compound)
4	Ethylone	ethylone	20	3-MMC	3-MMC
5	4-MEC	4-MEC	21	3,4-CTMP	3,4-CTMP
6*	AM-2201	JWH 122 and vitamin E	22	2C-D	2 C-D
7*	25C-NBOH	2 C-C	23	5-MeO-DALT	5-MeO-DALT
8	3-FMC	3-FMC	24	bk-MDMA	bk-MDMA
9	5-EAPB	5-EAPB	25	PB-22	PB-22 and vitamin E
10	MPA	MPA	26	3-MMC	3-MMC
11	N-Me-2AI	N-Me-2AI	27	2-FA	2-FA

Sample label	Active compound (as declared)	Active compound (identified at NFL)	Sample label	Active compound (as declared)	Active compound (identified at NFL)
12	2 C-E	2 C-E	28	2-DPMP	2-DPMP
13*	N-Me-2AI	pentedrone	29	5-MAPB	5-MAPB
14	2 C-C	2 C-C	30	α -PVP	α -PVP
15*	25B-NBOH	2 C-C and 25I-NBOMe	31*	ethylphenidate	ethcathinone as the main component and ethylphenidate as trace
16	<i>JWH-122</i>	JWH-122 and vitamin E	32	6-APB	6-APB (or positional isomers of the compound) (contaminated sample)

Trafficking and manufacturing- case study

The largest quantities of NPS were seized while dealing with (several correlated events or cases of) organised international trafficking and manufacturing of products containing synthetic cannabinoids by legal entities. Police and customs activities lasted several months (from August 2014 and continuing well into 2015). The substances and items were seized in Slovenia, i.e. at the place of manufacturing in Ljubljana, and, in relation to this, during the control of suspicious shipments and accompanying documents from abroad (mostly from China, New Zealand and Australia) at the Ljubljana Airport (3 times) and the Port of Koper cargo terminal (once). Some details were presented at the 15th Annual Meeting Reitox Early Warning System Network at EMCDDA in Portugal (Klemenc 2015c). Furthermore, EMCDDA and EUROPOL were informed of the findings in a separate report, which is not public (Klemenc 2015a).

Forensic findings strongly support the hypothesis that the amendment of the legislation in New Zealand (see OPSRA websites) caused profound changes there and in Slovenia as well. As

believed by forensic experts, at least one of the known New Zealand companies moved the production of Spice (Lewin et al. 2015), Social Tonic pills and the so-called C-Liquids, along with around 1500kg of already made spice products, to Slovenia, from where it intended to organise distribution throughout Europe, also through global Internet sales. Some products (e.g. Kronic Pineapple Express, Mad Dog and C-Liquids) that were found at the place of production in Ljubljana were also easily found for sale on the Internet, i.e. on several websites.

Furthermore, a document was found at the place of production in Ljubljana describing the procedure to prepare active herbal blends, which is in fact very simple: the basic active substance is always a concentrate of a synthetic cannabinoid dissolved in a large amount of acetone; the solution is then poured over finely crushed plant material and everything is then mixed in a mixing machine (Figure 10). Acetone, which is a highly volatile substance, then evaporates, and the impregnated plant material is completely dried on air. Synthetic colorants and/or aromas may be added to the material. Along the information in the seized "Production manual" (a part of it is shown in Figure (Figure 16)), 100 to 1000g of a concentrate dissolved in around 10l of acetone is sufficient for the preparation of 20 to 25kg of the herbal product impregnated by synthetic cannabinoids (herbal incenses, herbal highs, spice). The quantity of the synthetic cannabinoids used (in concentrated form) is adjusted depending on the type of active compound and the desired final concentration of the cannabinoid substance per gram of final herbal product. During the case investigation, almost 50kg of synthetic cannabinoids in pure form were seized. Such quantity could be sufficient for the preparation of 1250 kg to 12500 kg of herbal blends - spice. Furthermore, approximately 1500kg of already prepared Spice was seized along with 30l of C-Liquids (details are provided below). It is roughly estimated that the financial gains to be realised through the sale of this material may be measured in millions of euro according to the prices of such products on the Internet.

In this 'case', a wide range of materials was seized. In 2014, the following was seized:

- different synthetic cannabinoids in pure form (concentrates): approximately 24kg in powder form and approximately 12l of liquids – see the example in Figure 9. The material was sent from China, while the safety data sheets were sent from New Zealand;
- active compounds dimethocaine (m ≈ 20kg) and synthetic caffeine (m ≈ 4kg) in pure form (sent from China);

- crushed plant material, impregnated with synthetic cannabinoids of different types (*Figure 17*);
- herbal incense, roughly totalling at 60kg. The manufacture was carried out in Ljubljana. An example of laboratory samples is shown in *Figure 15*
- liquid smoking blends – the so-called C-Liquids, which contained the CUMYL-5F-PINACA compound, dissolved in propylene glycol and plant glycerine, with the addition of different aromas. Around 10,000 bottles containing 3 ml of the blend were seized in total. The estimated total volume of the material amounted to approximately 30l. The manufacture was carried out in Ljubljana – see the *Figure* with an example of laboratory samples (*Figure 15*);
- pills containing the active component CUMYL-THPINACA (625 pills). The pills were sent from China (and seized at the airport), while the packaging for the Social Tonic pills was found in Ljubljana. The labels on the packaging revealed that the product was produced by a company from New Zealand.

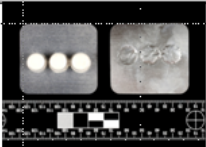
Furthermore, the following was seized:

- instruments for the manufacture of Spice (mixing machine (*Figure 10*), scales, tubs, etc.) and packaging machines;
- non-impregnated crushed plant material Marshmellow, Damiana, Natural (estimated amount \approx 1000kg), sent from the Netherlands, Australia, Bulgaria;
- various solvents (acetone, propylene glycol, plant glycerol) purchased in Slovenia;
- Tasty Puff aromas (>350kg) and food colourants (>150kg) supplied from abroad;
- empty, but printed bags for packaging plant products (approximately 150kg – supplied from China);
- packaging for Social Tonic pills (at production premises in Ljubljana);
- formulas – instructions for the preparation of products (seized at production premises in Ljubljana);
- other.

In addition to the above listed, another 1500kg of plant material impregnated with synthetic cannabinoids (material sent from China, with accompanying documents from New Zealand) was seized at the Port of Koper in 2015 (within the scope of the same investigation) and, later on, another 12kg of the concentrate of the new CUMYL-5F-P7AICA synthetic cannabinoid was seized at the Ljubljana Airport in 2 separate shipments coming from China.

Details on the material seized are shown in Tables (Table 2 to Table 4), while the chemical structures and chemical classification of the compounds are shown in Figure (Figure 17).

Table 2: The substances seized at the Ljubljana Airport (the shipment came from China, while the accompanying documents came from New Zealand)

SUBSTANCES SEIZED AT THE AIRPORT LJUBLJANA (2014)					
Concentrates (pure substances)	Description	Quantity	Unit		Additional remarks
CUMYL-BICA	white powder	1645	g		3x packages (plastic bags), label: "indole-5a"
CUMYL-PICA	white powder	1269	g		2x packages (plastic bags); label: "STG-56, Indole-5b"
CUMYL-PINACA	yellowish liquid	11150	ml		13 x one-liter bottle; label: "SGT-24"
CUMYL-5F-PICA	white powder	1160	g		4x packages (plastic bags); label: "49"
CUMYL-THPINACA	white powder	3257	g		7x packages (plastic bags); label: "5F"
ADB-CHMICA	light brown	916	g		2x packages (plastic bags), label: "L-SW"
PB-22	pale white	93	g		1x package (plastic bag); label: "PB22"
Pills	Description	Quantity	Unit		Additional remarks
CUMYL-THPINACA	white	651	piece		no logo or labels 217 blisters; 3 pills/blister diameter: 10.2 mm thickness: 6.1 mm

Source: Klemenc, S. 2015b.

Table 3: The substances seized at the place of manufacture (in Ljubljana)

SUBSTANCES SEIZED AT THE PRODUCTION SITE				
Concentrates of cannabinoids	Description	Quantity	Unit	Additional remarks
5F-ABICA	white powder	15	g	
AB-CHMINACA	white powder	4	g	
AB-FUBINACA	white powder	25	g	
ADAMANTYL-THPINACA	white	746	g	
ADB-CHMICA	light brown	2447	g	4 packages
AKB 48 + 5F-PB22	light brownish	15	g	
FUB-AKB48, AKB48 N-(4-fluorobenzyl) analogue	yellowish	101	g	
THJ 2201	white	15	g	
CUMYL-5F-PINACA	yellowish liquid	215	ml	3 plastic bottles (all opened previously) - originally labeled: 1-(5-fluoropentyl)-N-(2-phenylpropane-2-yl)-1H-indazole-3-carboxamide (SGT-25)
Liquid preparations (C-liquids)		volume (ml)		
CUMYL-5F-PINACA (preparation)	no colour, clear	2774*	ml	* laboratory sample + around 10000 x 3 ml=30l (bottles on the spot)
Herbal highs – active ingredients	Description	Quantity	Unit	Additional remarks
CUMYL-5F-PINACA (SGT-25)	Crushed plant material	15729*	g	* in bigger alu-plastic bags + herbal incenses (active ingredient SGT-25) in small bags - estimated number approximately 7000 to 10000 pkg. (of different net weights declared: 3.5g or 2g or 1.5g, total estimated weight around (30000g)
ADB-CHMICA	Crushed plant material	6680	g	
ADAMANTYL-THPINACA	Crushed plant material	2009	g	
FUB-AKB48, AKB48 N-(4-fluorobenzyl) analogue	Crushed plant material	101	g	
CUMYL-5F-PINACA+ ADB CHMICA + ADAMANTYL-THPINACA	Crushed plant material	2068	g	
CUMYL-5F-PINACA + ADB-CHMICA	Crushed plant material	2121	g	
CUMYL-5F-PINACA + ADAMANTYL-THPINACA	Crushed plant material	49	g	

Source: Klemenc 2015b.

Table 4: The substances seized at the Port of Koper

Seizure in Koper port (customs terminal end of 2014 and 2015)				
Herbal highs (active ingredients)	Description	Quantity	Unit	Additional remarks
CUMYL-PINACA	different colours and aromas	761415	g	32x packages (aluminum-plastic bags), label: "GIG" 28x packages (aluminum-plastic bags); label: "GIGGLE" 115x packages (aluminum-plastic bags); label: "Social Tonic, SGT-24" 152x packages (aluminum-plastic bags; label "DIABLO" 59x packages (aluminum-plastic bags); label: "ST"
PB-22		699829	g	155x packages (aluminum-plastic bags); label: "RED X" 195x packages (aluminum-plastic bag); label: "RAD"

Source: Klemenc 2015b.



Figure 9: Liquid and solid concentrates – pure substances (some examples)



Figure 10: Mixing machine for the preparation of herbal incenses impregnated with synthetic cannabinoids, found at production premises in Ljubljana



Figure 11: Machine for packaging herbal blends and bags for the Kronic product, found in production premises in Ljubljana



Figure 12: Box containing the Kronic Pineapple Express product (active compound Cumyl-5F-PINACA)

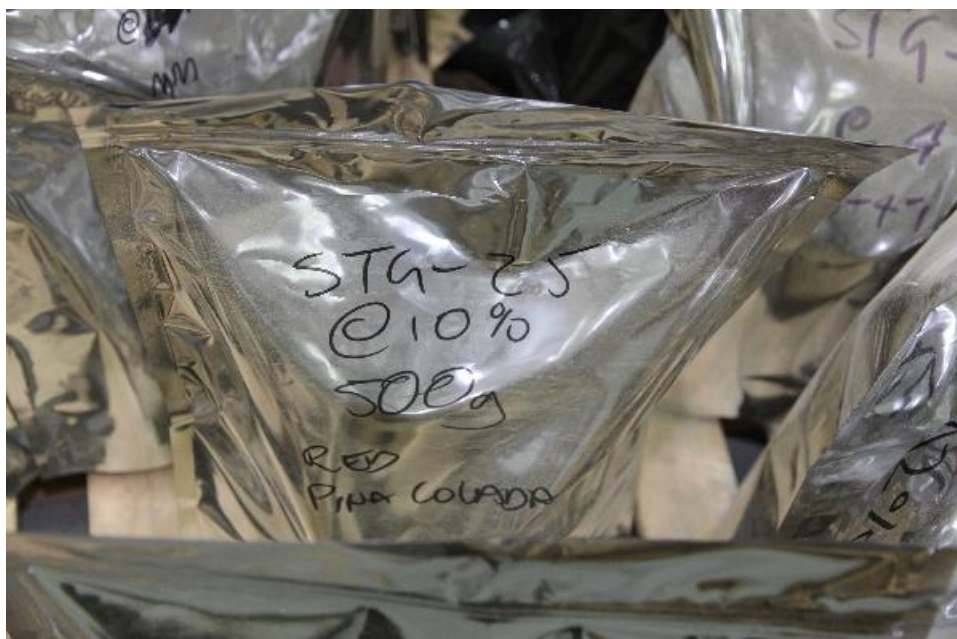


Figure 13: An example of a large bag containing the RED PINA COLADA herbal blend – active compound Cumyl-5F-PINACA

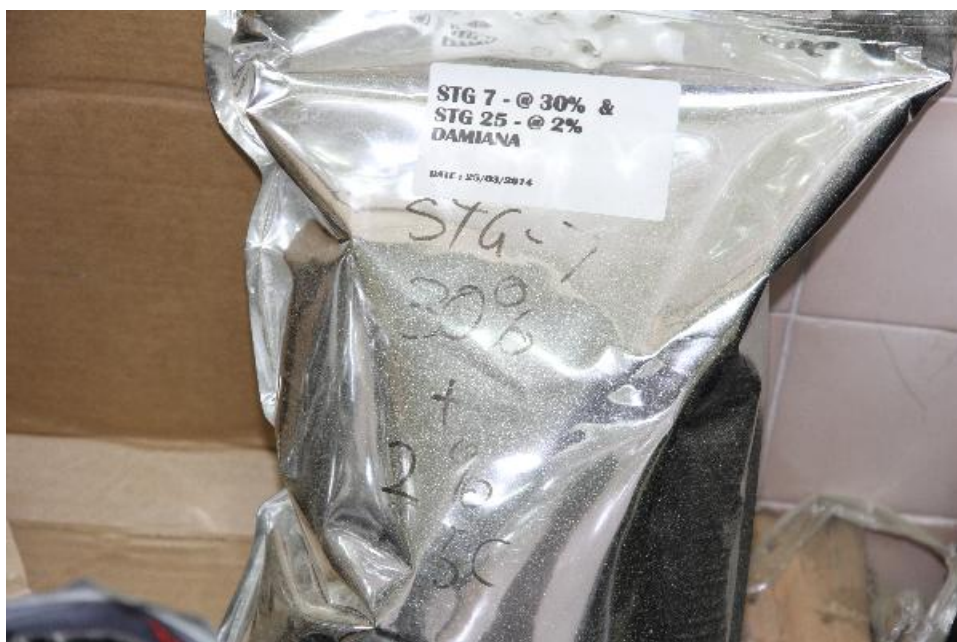


Figure 14: An example of a large bag containing herbal blends – the active components identified were Cumyl-5F-PINACA and ADB-CHMICA; the plant base material was Damiana plant.



Figure 15: Impregnated plant material from different aluminium plastic bags and C-Liquids (different colours of caps for different aromas) – the Figure shows laboratory samples.

Source: Ministry of Internal Affairs, General Police Directorate, National Forensic Laboratory

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Seizure in Koper port (cus)			
Herbal highs (active ingredients)	Description	Quantity	Unit
CUMYL-PINACA	different colours and aromas	761415	g
PB-22		699829	g

Master Manufacturing document draft

List of ingredients according to products.

Social Tonic – 125g of SGT-24 + 10l of acetone + 20kg of damiana + 5kg of Marshmellow

Giggle – 125g of SGT-24 + 10l of acetone + 0.75L of grape flavour + 0.75L of blueberry flavour + Blue colouring (check weight). + 20kg of damiana + 5kg of Marshmellow

Diablo – 125g of SGT-24 + 10l of acetone + 1.5L of Chumpy Chocolate + Red colouring + Yellow Colouring + Blue colouring (again check weight) + 20kg of damiana + 5kg of Marshmellow

RedX – 1kg of PB-22 + 10L of acetone + 20kg of damiana

Radiation – 800g of PB-22 + 10L of acetone + 20kg of damiana

Figure 16: Five different products with 2 active substances (laboratory samples – an illustration of the 1500kg of material seized at the Port of Koper – the material was sent from China, the accompanying documents came from New Zealand, while the manufacturing instruction was seized at production premises in Ljubljana)

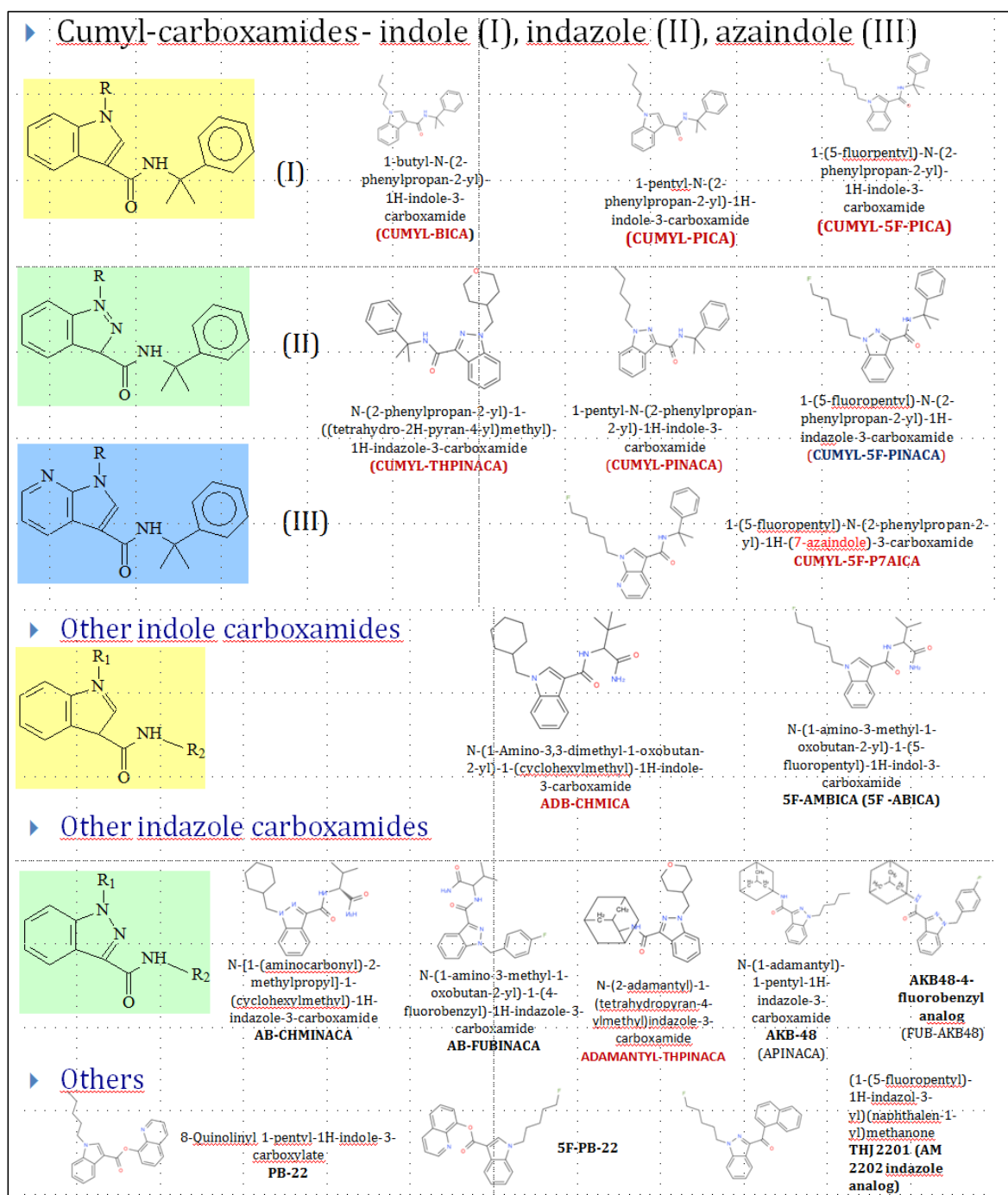


Figure 17: The synthetic cannabinoids identified within the scope of the "Slovenia-New Zealand-China" case investigation

Source: Klemenc 2015a.

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