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To cite this article: Stephen L. Thornton, Michael A. Darracq, Hallam M. Gugelmann & Patil Armenian (2019) Surface internet marketplace presence and availability of NPS sold as research chemicals: a snapshot study, Toxicology Communications, 3:1, 67-74, DOI: [10.1080/24734306.2019.1648067](https://doi.org/10.1080/24734306.2019.1648067)

To link to this article: <https://doi.org/10.1080/24734306.2019.1648067>



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Published online: 12 Aug 2019.



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## Surface internet marketplace presence and availability of NPS sold as research chemicals: a snapshot study

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### ABSTRACT

**Background:** The misuse and abuse of novel psychoactive substances (NPS) are facilitated by their sale as “research chemicals” (RC) on the internet. **Methods:** Prospective observational study of the first 12 consecutive working websites from the Google search “RC Buy.” Inventory was taken of single substance RCs weekly from 6 June 2016 to 22 December 2016 and tabulated. **Results:** During the study period, three RC internet vendors (RCIV) became inactive. There was a mean of 54 RCs per site (range 11–146, SD 33) for a total of 651. The two most common types of RC for sale were synthetic cathinones (83) and synthetic cannabinoids (82). Least common were LSD analogs (5). A total of 79 new RCs were added to RCIVs, most often synthetic cathinones (25). A total of 41 RCs were no longer sold, most often synthetic cannabinoids (16). Of 302 unique RCs identified, 50 (16.6%) were DEA Schedule I. Of five RCs designated DEA schedule I during the study period, availability did not change after scheduling. **Conclusions:** A large, varied and dynamic inventory of NPS, some DEA schedule I, are sold on the surface internet under the guise of “RCs.” The number of RCs for sale increased during the study period, showing this mode of drug trade is accelerating and not relegated to the darknet.

### KEYWORDS

Research chemicals; novel psychoactive substances; internet; surface web; synthetic cathinones; synthetic cannabinoids



## Introduction

Novel psychoactive substances (NPS) are designer drugs which are structural or functional analogs of already controlled substances created to enhance the user experience or generate other effects desired by users or suppliers. They mimic the entactogenic, psychedelical, and sympathomimetic effects of legally controlled and restricted substances, thus exploiting loopholes in drug control legislation [1]. Between 2008 and 2015, 102 countries and territories reported 644 new NPS to the United Nations with 75 new substances reported in 2015 alone. These include synthetic cathinones, phenethylamines, cannabinoids, opioids, and sedatives [2].

Use of NPS is prevalent worldwide. In the United Kingdom, among young adults 16–24 years old, the prevalence of NPS use was 2.8%, while 61% of adults ages 16–59 reported use of an “herbal smoking mixture” [2]. In the United States (US), lifetime NPS use among the 12–34 year olds was 1.2% in 2013,

with 1% of US twelfth graders reporting NPS use with predominantly stimulant effects (i.e. “bath salts”). Calls to US poison control centers related to synthetic cannabinoid related problems doubled between 2014 and 2015 (3682 and 7789 respectively) [2,3].

Misuse and abuse of NPS are facilitated by the ready availability of these substances on the internet, where they are often marketed as “research chemicals” (RCs). A frequent assumption is that darknet marketplaces are responsible for illicit drug commerce on the internet. However, surface internet NPS stores abound. A surface web search with a mainstream search engine for “RCs buy” revealed 10.5 million results, which included psychoactive substance vendors [4]. Although this is a broad search term that also encompasses legitimate laboratory chemical suppliers, a simple viewing of each homepage makes it clear who the target consumer is. Despite widespread availability in the United States (US), scientific

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publications are limited regarding the patterns of NPS types sold through the surface internet and their legal status. Snapshot studies of internet availability of NPS as “legal highs” has been described in Europe and Australia [5,6]. Specifically, the EMCDDA (European Monitoring Center for Drugs and Drug Addiction) has demonstrated the complexity of internet monitoring of sales and product in this dynamic environment [6]. Our primary study objective was to characterize the available web inventory in a select group of internet vendors selling NPS to US customers over a 24 week period and identifying US Drug Enforcement Administration (DEA) scheduled compounds. A secondary study objective was to characterize the web vendors including website registration and shipping locations.

## Methods

This was an IRB exempt prospective observational study. We identified RC internet vendors (RCIVs) using the Google search term “Research Chemical Buy” performed 1 week prior to the study start date [4]. The first 12 consecutive working psychoactive substance vendor sites were included in the study. Those with a broken URL, closed permanently, for “body building compounds only,” or legitimate chemical laboratory supply companies (i.e. Toronto Chemical, Honeywell) were excluded. Only surface web vendors were included in this study, because these would be the most accessible to the general public and not require the need for additional specialized knowledge or web browsers. In addition, all of the websites inventoried in this study accepted traditional financial transactions, including bank transfers and credit cards, in addition to cryptocurrency such as Bitcoin.

We determined RCIV domain name registration and administration information by using ICANN WHOIS searches for .com, .biz, and .net top level domains (TLD) (<https://whois.icann.org>) and EURID.EU for .eu TLDs (<https://whois.eurid.eu>). Registrant information is not available for .to TLDs since the Kingdom of Tonga does not maintain a public WHOIS database for its TLD. Shipping information was obtained from the information listed on each website, when accessible.

Each author was assigned three RCIVs. The websites were then accessed and inventory taken of all single substance, non-brand name RCs every week for 24 weeks from 6 June 2016 to 22 November 2016. We recorded both newly listed RCs and discontinued

RCs, and noted if the RCs being sold were in-stock or out-of-stock. For study purposes, newly listed RCs were those that appeared on the websites that week and discontinued RCs were those that had been removed from the websites that week. Out-of-stock RCs were included in analysis as they were still present on RCIV sites and occasionally became back in-stock during the study period. When an RC was present multiple times on a single website, it was counted only once. When an RC was present on multiple websites, it was recorded as a separate data point for each internet vendor. We inventoried only those products labeled as a single substance and did not record blends and mixtures. All inventoried RCs were compared and a list of unique RCs was compiled. Each RC was classified into one of the following 13 NPS types: synthetic cathinone, synthetic cannabinoid, benzodiazepine, opioid, arylcyclohexylamines, tryptamine, LSD analogs, 2C, aminoindanes, benzofurans, phenidate derivative, amphetamine, and other (Appendix). We determined the United States DEA classification of each RC using the DEA Orangebook [7]. An RC was documented as being a DEA controlled substance if it was scheduled before or during the study period.

## Results

The first 12 identified working RC internet vendor site information is presented in Table 1. China was an outgoing shipping location for 8/10 RCIVs with this information available. Of the 12 RCIVs included in the study, three sites became nonfunctional during the study period but were included in the final analysis. On average, websites were active for 20 weeks (range 2–24, SD 8). The mean number of RCs per site was 54 (range 11–146, SD 33) for a total of 651 total RCs inventoried. There was at least one example of all 13 NPS types identified. Many NPS were listed on multiple websites. For instance, NM-2201, a synthetic cannabinoid, was present at 10 RCIVs. After analysis, 302 unique RCs were identified. Table 2 lists both the total and unique RCs by NPS type.

A total of 79 new NPS were added to website inventories during the study period (Table 3). Synthetic cathinones were the most common newly listed NPS ( $n=25$ ) followed by the synthetic cathinones ( $n=18$ ) and benzodiazepines ( $n=8$ ). 41 NPS were removed from the websites during the study period. Synthetic cannabinoids were the most common NPS to disappear ( $n=16$ ). Of the 302 unique RCs identified, 62 (20%) were DEA scheduled substances (50 DEA Schedule I, 11 other

**Table 1.** Research chemical internet vendors (RCIV) included in study.

RCIV	Registrar	Registrant	Admin	Ship from	Additional Comments
1	USA	China	New Zealand	China	
2	USA	China	China	China	
3	UK	Unknown	Unknown	Spain, Netherlands	Billing done in Asia with Chinese Yuen
4	China	Panama	Panama	China	Anonymous private hosting company in Panama
5	Russia	UK	UK	China, Hong Kong	
6	USA	USA	USA	China	Website no longer available 8/2/16
7	USA	USA	USA	USA	Website no longer available 9/20/16
8	USA	USA	USA	China	Anonymous private hosting company in USA
9	Canada	Canada	Canada	Unknown	Anonymous private hosting company in Canada
10	USA	Hong Kong	Hong Kong	Unknown	Switched from anonymous private hosting in Panama to hosting in Hong Kong after study period end; email address for admin associated with 9 RCIV's
11	Germany	USA	Denmark	China, EU, USA, Russia	Website no longer available 6/21/16
12	Unknown	USA	Unknown	Austria, England, Netherlands, China, Spain	Website TLD is the country code for Tonga

**Table 2.** Research chemicals inventoried on vendor Websites.

NPS type	Total RCs	Unique RCs
Synthetic Cathinone	196	83
Synthetic Cannabinoid	166	82
Opioid	12	9
Benzodiazepine	45	16
LSD-like	11	5
2C	26	16
Aminoindane	15	6
Amphetamine	19	12
Phenidate derivative	24	8
Arylcyclohexamine	32	14
Benzofuran	25	9
Tryptamine	18	9
Other	62	40

**Table 3.** NPS types added/removed from RCIVs during study period.

NPS type	Added	Removed
Synthetic Cathinone	25	3
Synthetic Cannabinoid	18	16
Opioid	0	0
Benzodiazepine	8	2
LSD-like	7	0
2C	1	2
Aminoindane	0	6
Amphetamine	2	2
Phenidate derivative	4	2
Arylcyclohexamine	3	3
Benzofuran	1	2
Tryptamine	5	1
Other	5	2
<b>Total</b>	<b>79</b>	<b>41</b>

DEA schedule). Synthetic cannabinoids were the most commonly identified NPS to be DEA schedule I ( $n=16$ ), followed by synthetic cathinones ( $n=14$ ). Table 4 lists the NPS type and number of DEA schedule I substances identified. The other DEA scheduled substances included methamphetamine and codeine (schedule II); ketamine (schedule III); modafinil, alprazolam, diazepam, nitrazepam, zaleplon,

**Table 4.** DEA schedule I substances.

NPS type	Total RCs	Unique RCs
Synthetic Cathinone	34	14
Synthetic Cannabinoid	36	16
Opioid	9	6
Benzodiazepine	0	0
LSD-like	0	0
2C	18	11
Aminoindane	0	0
Amphetamine	1	1
Phenidate derivative	0	0
Arylcyclohexamine	0	0
Benzofuran	0	0
Tryptamine	5	3
Other	5	2
<b>Total</b>	<b>79</b>	<b>41</b>

zolpidem, and zopiclone (schedule IV); and pregabalin (schedule V).

Of the five RCs designated as DEA schedule I during the study period, availability did not change after scheduling. U-47700 was sold and in-stock at four RCIVs, including one website which stopped working prior to the scheduling date. AB-FUBINACA was sold on three RCIVs, but only in-stock on one website. 5F-PB-22 was sold on four RCIVs, but only in-stock on one website. PB-22 was sold on one RCIV and listed as out-of-stock the entire study period. Furanylfentanyl was sold on one RCIV and in stock the entire study period.

## Discussion

The purpose of this study was to investigate the availability and nature of NPS, including DEA scheduled compounds, over a 24-week period using the surface internet. NPS sold on the surface web under the guise of "RCs" were readily available for purchase during

the entire study period. Three-hundred-two (302) unique NPS were identified, with the net addition of 38 new NPS over the study interval. Although there was some weekly variability in RC availability in the present study, the overall number of NPS increased, which may indicate either continued or accelerating interest in online RC commerce. However, this represents a small snapshot of the potential availability as only a few websites were chosen for inclusion in this study. Instability existed in the online drug marketplace, as one fourth of the websites (3/12) disappeared during the study period and the availability of individual NPS was often short-lived with many substances only being available for 4 weeks or less.

This pattern of availability and instability is consistent with previous descriptions describing darknet NPS availability. Wadsworth et al. described the availability of 256 unique NPS over a 12-month period (seven snapshots) using the Tor web browser to access the darknet [8]. The individual NPS and vendors did not remain the same over the 12 months, as only 24% of the total number of NPS and 4% of vendors appeared in all seven snapshots. Twenty-one (21) percent of NPS and 45% of vendors appeared only once. Wadsworth et al. speculated that the variability in available NPS mirrored changes in popularity as a result of changes in legality, ease of access, or similarities with traditional drugs [8]. Additionally, it is possible that substances were removed due to limited availability of individual substances to vendors, a mismatch between popularity and availability, or negative comments about a particular product [9]. We believe that similar factors explain the variability in RC availability in our study.

Somewhat surprisingly, several DEA scheduled compounds remained for sale over the study interval. Sixty-one (61) unique NPS identified were DEA scheduled substances and five new NPS were scheduled during the study interval. However, DEA scheduling notices did not seem to alter availability. This argues against explanations offered by Wadsworth et al. for patterns of variability in NPS appearing in the marketplace [8]. Methamphetamine, codeine, ketamine, alprazolam, diazepam, nitrazepam, modafinil, pregabalin, zopiclone, zolpidem, and zaleplon (all DEA scheduled substances) were available for sale over the entire study interval. Their availability despite DEA scheduling likely reflects that these compounds remain popular among users, are readily available to vendors, or generate web traffic leading to purchase of other RCs.

In our study, Synthetic cannabinoids and synthetic cathinones represented the bulk of RC for sale on the surface web. While the overall number of synthetic cannabinoids remained relatively stable with two new compounds entering the market during the study period, synthetic cathinones increased, with 22 new cathinones added during the study period. Benzodiazepines, LSD-like compounds and tryptamines also were a growing sector of the surface web market, while multiple aminoindanes were removed from RCIV sites. This pattern is somewhat different than that previously observed for NPS on the darknet, where synthetic cathinones and phenylethylamines represented the most common “new” NPS added [8,10]. Similar patterns of specific NPS type accessibility are observed in published literature describing emerging NPS use, abuse, and availability [11]. Reasons for observed differences between the present and past studies are unknown, but may reflect the dynamic nature of NPS popularity and use/abuse as previously described or differences in the particular RCIVs queried in the present study. Unlike other studies probing darknet marketplaces, our study examined surface websites which may have different vendors and different clientele.

Most RCIVs had at least one shipping location in China (8/12), although almost all had site hosting and administration listed in other countries. In addition, one website (#3), which was hosted in and appeared to ship from countries in Europe, had all billing transactions performed in Chinese Yuen, possibly indicating that it is in fact, located in China. One third of the RCIVs had anonymous private hosting and another had a TLD for the Kingdom of Tonga, where host locations/names are not openly published. These may represent evasive measures by RC vendors to avoid persecution by law enforcement officials. Chinese drug manufacturing and shipment to North America and Europe is one of the main methods by which synthetic cannabinoids, synthetic cathinones, and synthetic opioids have entered the mainstream drug markets [12]. This is facilitated by poor monitoring and regulation of the pharmaceutical and chemical industry in China. The United States government is actively looking at methods by which to curb drug trafficking from China, including monitoring incoming mail packages more closely [13].

When discussing illicit drug procurement via the internet, many assume that these substances are only sold in the dark corners of the internet, via encrypted browsers accessing darknet marketplaces and with cryptocurrencies such as Bitcoin. That would make it



so that a consumer who is not technologically savvy would never be able to buy drugs on the internet, which is simply not the case. The present study unequivocally shows that psychoactive drugs of all classes are sold on surface websites utilizing traditional financial transactions such as credit cards and bank transfers. Although all the RCIVs accepted various cryptocurrencies, they also all accepted bank transfers. Therefore, an ordinary person with very little tech skills can buy scheduled or soon-to-be scheduled DEA substances online.

### Limitations

This study characterized the RCs available for sale on 12 websites, which only represent a small portion of the available internet vendors. Representative drugs were not bought and tested for purity. However, a prior pilot study by our group ordering compounds from eight RCIVs demonstrated that not only do some vendors ship to the United States, but most of the substances were what they were advertised as [14]. It is possible that the substances are mislabeled either as analogs or are completely different compounds [15]. However, as most of the sites remained active during the 6-month study period, it is assumed that they are, indeed, selling psychoactive substances whose effects are consistent with those sought by end-user consumers. It has been previously described that NPS are available for purchase on the darknet [16]. As our study objective was to examine surface internet commerce, it did not include darknet sites, thus somewhat limiting its generalizability.

### Conclusion

A wide variety of NPS, including many DEA schedule I substances, were sold under the term “Research Chemicals” on websites surveyed in this study. The overall number of RCs available for sale increased during the study period, with synthetic cathinones representing the largest growth. Monitoring of surface internet vendors selling NPS is crucial in understanding drug trade in this technologically advanced world.

### Disclosure statement

No potential conflict of interest was reported by the authors.

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## Appendix: Individual substances sold by RCIVs

Research chemical	NPS type*	DEA Schedule**
1P-Eth-LAD	LSD	N
1P-LSD	LSD	N
2 Aminoindane	AI	N
2-AI	AI	N
2-AIMP	SCT	N
2-FA	AM	N
2-FMA	AM	N
2-Methylamphetamine	AM	N
2-MMC	SCT	N
2-NMC	OT	N
2-PTC (RMDMA)	AM	N
25B-NBOMe	2C	I (pre)
25C-NBOMe	2C	I (pre)
25D-NBOMe	2C	I (pre)
25I-NBOMe	2C	I (pre)
2C-B-FLY	2C	N
2C-C	2C	I (pre)
2C-D	2C	I (pre)
2C-E	2C	I (pre)
2C-I	2C	I (pre)
2C-P	2C	I (pre)
2C-T-2	2C	I (pre)
2C-T-4	2C	I (pre)
2C-T-7	2C	I (pre)
2NE1	SCN	N
3-CBP	SCT	N
3-CEC	SCT	N
3-CMC	SCT	N
3-FA	AM	N
3-FMC	SCT	N
3-FPM	OT	N
3-MEC	SCT	I (pre)
3-MeO-PCP	AC	N
3-MMC	SCT	N
3,4-CTMP	PH	N
3,4-DFPCT	OT	N
3,4-DMMC	SCT	N
3C-E	2C	N
3C-P	AM	N
4-AcO-DMT	TR	N
4-BMC	SCT	N
4-CAB	OT	N
4-CEC	SCT	N
4-CIC	SCT	N
4-CI-PHP	SCT	N
4-CI-PVP	SCT	N
4-CMC	SCT	N
4-CPC	SCT	N
4-CPrC	SCT	N
4-CPVP	SCT	N
4-EEC	SCT	N
4-EFMC	SCT	N
4-EMC	SCT	I (pre)
4-F-MPH	PH	N
4-FA	AM	N
4-fluoroisobutyrfentanyl	OP	N
4-FMA	AM	N
4-FMC	SCT	I (pre)
4-HO-MIPT	TR	N
4-iso-butyrfentanyl	OP	N

(continued)

## Continued.

Research chemical	NPS type*	DEA Schedule**
4-MEC	SCT	I (pre)
4-MEO-PCP	AC	N
4-MePPP	SCT	N
4-Methyl-aET	TR	N
4-methylpentadone(4-mpd)	SCT	N
4-Methylmethylphenidate	PH	N
4-MPH	OT	N
4F-Ethylphenidate	PH	N
4F-PHP	SCT	N
4F-PV10	SCT	N
4F-PV8	SCT	N
4F-PV9	SCT	N
4F-PVP	SCT	N
5-APB	BF	N
5-APDB	BF	N
5-EAPB	BF	N
5-IAI	AI	N
5-MAPB	BF	N
5-MAPDB	AM	N
5-MeO-DALT	TR	N
5-MeO-DIBF	BF	N
5-MeO-DIPT	TR	I (pre)
5-MeO-DMT	TR	I (pre)
5-MeO-Methylone	SCT	N
5-MeO-MIPT	TR	N
5-Methyl-Ethylone	SCT	N
5-Methyl-MDA	OT	N
5-PPDI	SCT	N
5C-AKB48	SCN	N
5F-AB-PINACA	SCN	N
5F-ADB	SCN	N
5F-AEB	SCN	N
5F-AKB48	SCN	N
5F-AMB	SCN	N
5F-AMB-R	SCN	N
5F-CUMYL-PINACA	SCN	N
5F-MDMB-2201	SCN	N
5F-MDMB-PINACA	SCN	N
5F-MN-18	SCN	N
5F-MN-24	SCN	N
5F-NPB-22	SCN	N
5F-PB22	SCN	I (during)
5F-PCN	SCN	N
5F-SDB-005	SCN	N
5F-SDB-006	SCN	N
5F-UR144	SCN	I (pre)
6-APB	BF	N
6-APDB	BF	N
6-EAPB	BF	N
6-MAPB	BF	N
a-Methyltryptamine	TR	I (pre)
a-PBP	SCT	N
a-PHP	SCT	N
a-PHPP	SCT	N
a-PPP	SCT	N
a-PVP	SCT	I (pre)
a-PVT	SCT	N
AB-001	SCN	N
AB-CHMINACA	SCN	I (pre)

(continued)

Continued.

Research chemical	NPS type*	DEA Schedule**
AB-FUBINACA	SCN	I (during)
AB-PINACA	SCN	I (pre)
Acetildenafil	OT	N
Acetylfentanyl	OP	I (pre)
ADB-CHMINACA	SCN	N
ADB-FUBINACA	SCN	N
Adrafinil	OT	N
AH-7921 (labelled MT-45)	OP	I (pre)
AKB48	SCN	I (pre)
AL-LAD	LSD	N
ALD-52	LSD	N
Allylescaline	OT	N
Alprazolam	BD	4
AM-1220	SCN	N
AM-1248	SCN	N
AM-2201	SCN	I (pre)
AM-2233	SCN	N
AM-694	SCN	I (pre)
AMB-FUBINACA	SCN	N
APP-PINACA	SCN	N
AZ-037	SCN	N
BB-22	SCN	N
Benzocaine	OT	N
BK-2CB	2C	N
BK-EBDP	SCT	N
BK-ethyl-K	SCT	N
BK-MBDB	SCT	I (pre)
Buphedrone	SCT	N
Bupirone	OT	N
Butylone	SCT	I (pre)
Butyryl fentanyl	OP	I (pre)
C-liquids (5F-MDMB-PINACA)	SCN	N
C-Tropan	OT	N
C30-NBOMe	2C	N
CB-13	SCN	N
Clonazepam	BD	N
Cloniprazepam	BD	N
Codeine	OP	2
CUMYL-FUBINACA	SCN	N
CUMYL-PINACA (labeled ADB-FUBINACA)	SCN	N
Deschloroetizolam	BD	N
Deschloroketamine	AC	N
Diazepam	BD	4
Dibutylone	SCT	I (pre)
Diclazepam	BD	N
Diethylone	SCT	N
Dimethocaine	OT	N
Dimethylone	SCT	N
Dimethylphenidate	PH	N
Diphenidine	AC	N
DMAA	OT	N
DOC	AM	N
EG-018	SCN	N
EG-2201	SCN	N
Ephedrine	OT	N
Ephenidine	AC	N
Ephylone	SCT	N
Escaline	OT	N
ETH-LAD	LSD	N
Ethcathinone	SCT	N
Ethyl-Hexedrone	SCT	N
Ethylone	SCT	N
Ethylphenidate	PH	N
Etizolam	BD	N
F-PV9	SCT	N
FAB-144	SCN	N
FDU-PB22	SCN	N
Flephedrone	SCT	I (pre)
Flubromazepam	BD	N
Flubromazolam	BD	N
Flunitrazolam	BD	N

(continued)

Continued.

Research chemical	NPS type*	DEA Schedule**
Fluorococaine	OT	N
FU-AEB	SCN	N
FUB-144	SCN	N
FUB-AEB	SCN	N
FUB-AKB48	SCN	N
FUB-AMB	SCN	N
FUB-PB-22	SCN	N
FUBIMINA	SCN	N
Furanyl Fentanyl	OP	I (during)
HDEP-28	OT	N
HEX-EN	SCT	N
IPO-33	SCN	N
IPPD	PH	N
JTE-907	SCN	N
JWH-018	SCN	I (pre)
JWH-210	SCN	N
JWH-250	SCN	I (pre)
Ketamine	AC	3
KS	AC	N
Lidocaine	OT	N
LY2183240	SCN	N
MAB-CHMINACA	SCN	I (pre)
MAM-2201	SCN	N
MDAI	AI	N
MDMA	AM	I (pre)
MDMB-CHMCZCA	SCN	N
MDMB-CHMINACA	SCN	N
MDMBF	SCN	N
MDPHP	SCT	N
MDPPP	SCT	N
MDPV	SCT	I (pre)
Meclonazepam	BD	N
Medhylone	SCT	N
MeO-PV8	SCT	N
MeO-PV9	SCT	N
Mephedrone	SCT	I (pre)
Methamnetamine	OT	N
Methamphetamine	AM	2
Methedrone	SCT	N
Methiopropamine	OT	N
Methoxetamine	AC	N
Methoxphenidine	AC	N
Methylone	SCT	I (pre)
Metizolam	BD	N
Mexedrone	SCT	N
Mextasy	SCT	N
MMB-2010	OT	N
MMB-2201	SCN	N
MMB-CHMICA	SCN	N
MMB-CHMINACA	SCN	N
MMB-F	SCN	N
MMBC	SCN	N
MN-018	SCN	N
MN-24	SCN	N
Modafinidz	OT	N
Modafinil	OT	4
MPA	OT	N
MPHP	SCT	N
MT-45	OP	N
n-ethyl-hexedrone	SCT	N
N-Ethyl-Ketamine (N-E-K)	AC	N
N-Ethyl-Pentedrone	SCT	N
N-Ethyl-norketamine	AC	N
N-Methyl-2AI	AI	N
Nexecaine	SCT	N
Nifoxipam	BD	N
NITRACAINE	OT	N
Nitrazepam	BD	4
NM-2201	SCN	N
NM2AI	AI	N
NPP,N-Phenethyl-4-piperidinone	OP***	N

(continued)



Continued.

Research chemical	NPS type*	DEA Schedule**
O-PCE	AC	N
PB-22	SCN	I (during)
Pentedrone	SCT	I (pre)
Pentylone	SCT	I (pre)
Phenazepam	BD	N
Phenzacaine	OT	N
Pregabalin	OT	5
Promethazine	OT	N
PROSCALINE	OT	N
PV4	SCT	N
PV8	SCT	N
PV9	SCT	N
PX-1	SCN	N
PX-2 (5F APP-PINACA)	SCN	N
Pyrazolam	BD	N
RCS-4	SCN	I (pre)
RTI-111	OT	N
SDB-005	SCN	N
SDB-006	SCN	N
SGT-263	SCT	N
Sildenafil	OT	N
STS-135	SCN	N
SUB-AKB48	SCN	N
Synthacaine	OT	N
Tadalafil	OT	N
TH-A-PVP	SCT	N
TH-PBP	SCT	N
TH-PHP	SCT	N
TH-PVP	SCT	N
Thiopropamine	OT	N
Thirtylone	SCT	N
THJ-018	SCN	N
THJ-2201	SCN	I (pre)
Trifluoroketamine	AC	N
Truvada	OT	N
U-47700	OP	I (during)
UR-144	SCN	I (pre)
Zaleplon	OT	4
Zolpidem	OT	4
Zopiclone	OT	N

\*2C: 2C class of psychedelic phenethylamine; AC: arylcyclohexamine; Al: aminoindane; AM: amphetamine; BD: benzodiazepine; BF: benzofuran; LSD: LSD-like; OP: opioid; OT: other; PH: phenidate derivative; SCN: synthetic cannabinoid; SCT: synthetic cathinone; TR: tryptamine.

\*\*US DEA Schedule listed if it is a scheduled compound, with "Pre" designation if scheduled prior to study period, and "During" if scheduled during study period. N designates that the compound is not scheduled by the DEA.

\*\*\*NPP,N-Phenethyl-4-piperidinone is a precursor used in fentanyl manufacture.