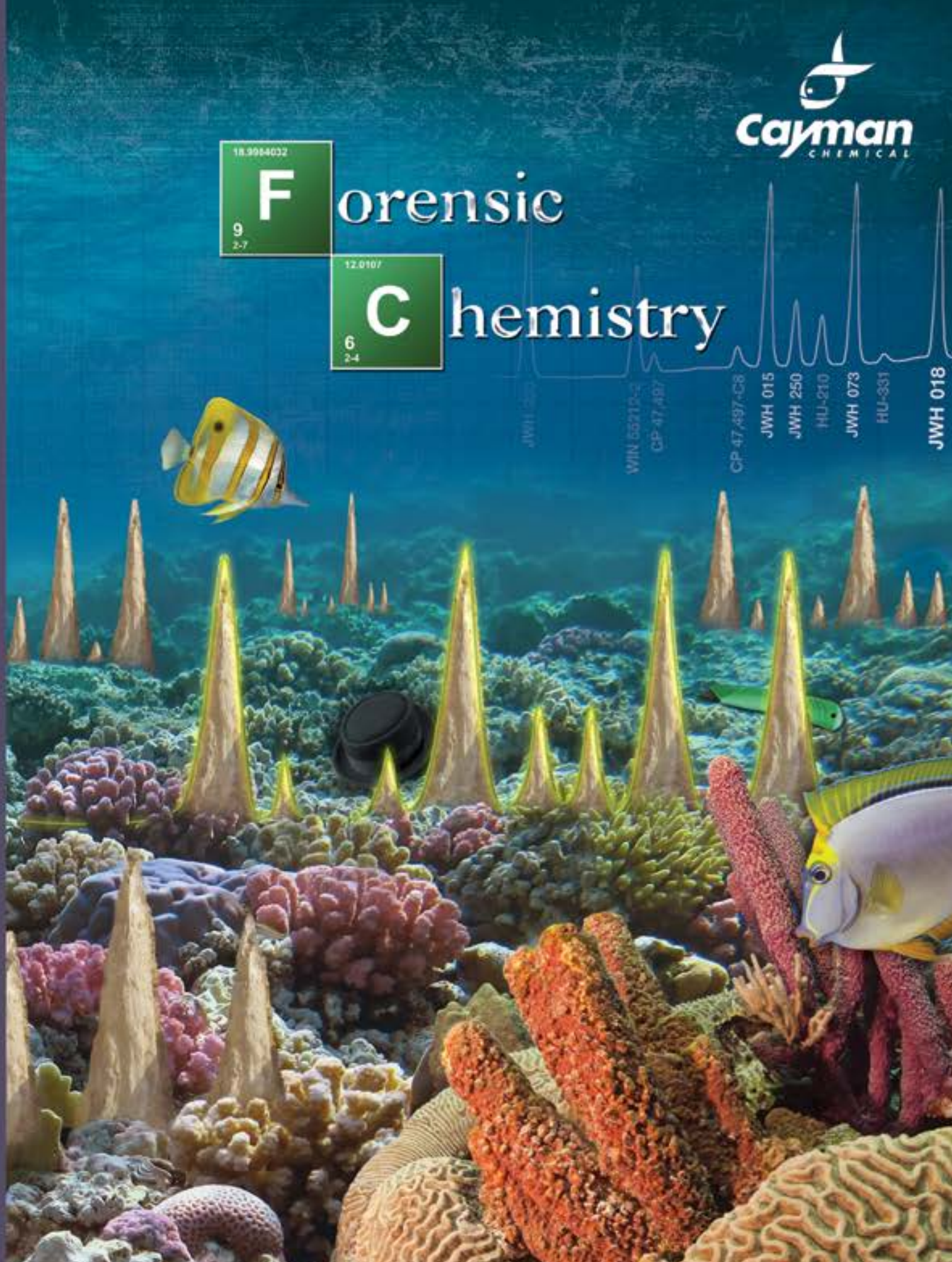
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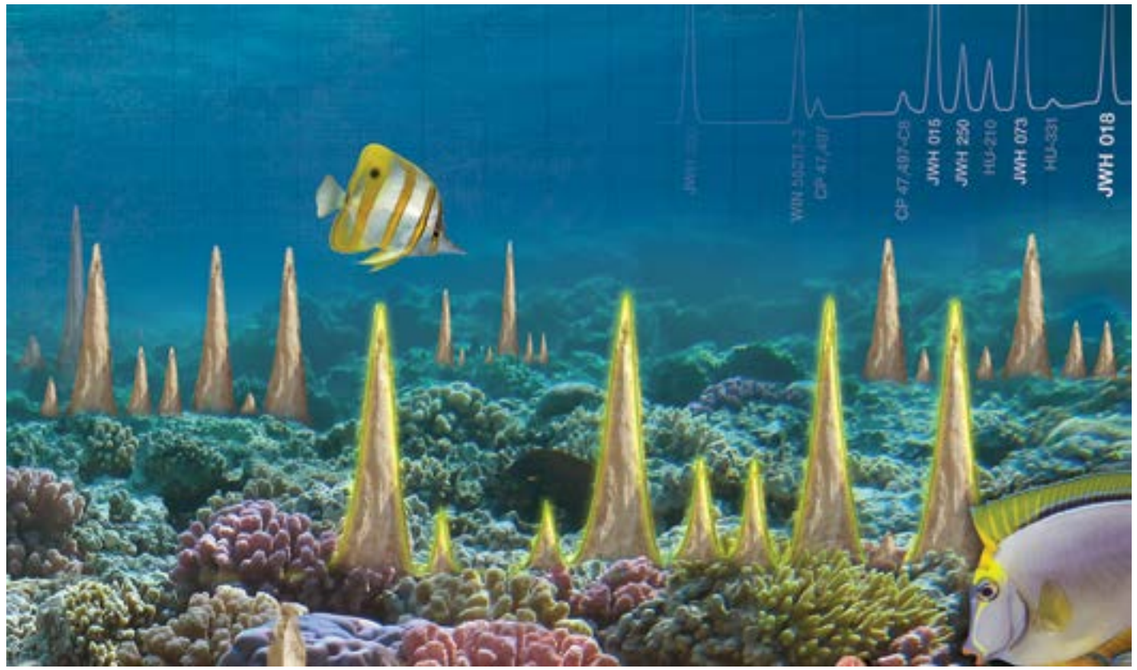
HU-210
JWH 073
HU-331
JWH 018

**Olivia L. May, Ph.D.**
**&**
**Kirk M. Maxey, M.D.**

Introduction to

# Forensic Chemistry



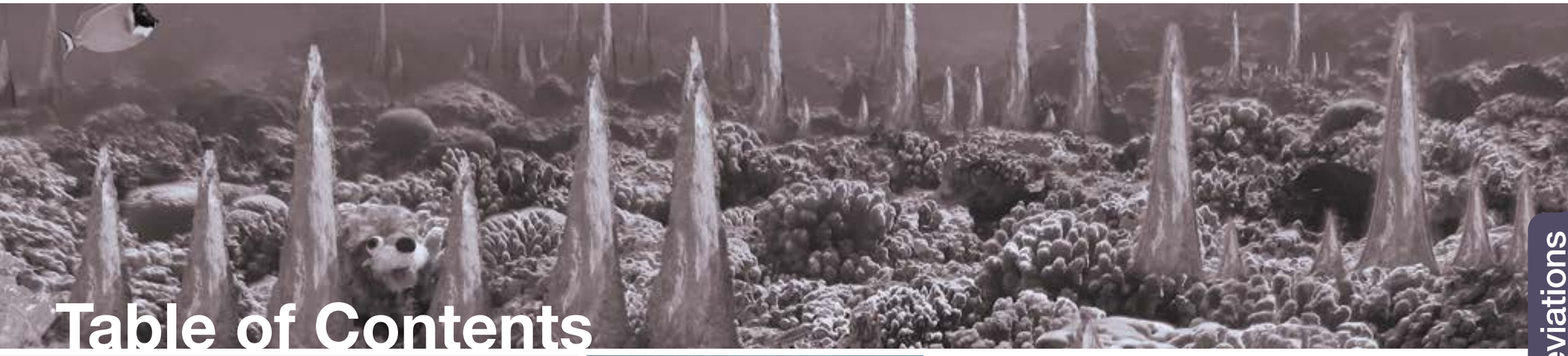

The use of synthetic designer drugs targeting cannabinoids (referred to as "spice") has exploded in the last few years. There were more than 6,000 calls to Poison Control Centers in 2011 reporting symptoms atypical of natural marijuana use, and it was reported that one in nine high school seniors admitted to trying synthetic cannabinoids (CBs) in 2011.[1] "Spice" consists of any dried, leafy plant material laced with synthetic chemicals including the JWH, AM, CP, HU, RCS, and UR-families of CB analogs. More than 200 distinct chemical species have appeared in these mixtures.[2] Little is known of the pharmacokinetics, metabolism, or even toxicology associated with their consumption, making it incredibly difficult for medical providers to treat acute symptoms. Cayman scientists were first alerted to the issue in 2009 when a bulk request for the potent central $CB_1$ agonist CP 47,497 was received from an unknown, off-shore customer. Our subsequent investigations and collaborations with law enforcement agencies revealed an elaborate network of shadowy bulk suppliers, manufacturers (cooks), and distributors racing to stay ahead of formal DEA listings of banned substances.

This Forensic Chemistry mini-catalog is devoted to showcasing our collection of synthetic CB reference standards. These include all of the main families of abused compounds as well as their metabolites, isomers, and deuterated forms.* Throughout these pages you will also find a wide variety of cathinones (bath salts), phenethylamines, amphetamines, indanes, and tryptamines. The JWH Metabolite ELISA, designed by our scientists to quickly detect synthetic CB metabolites in human urine, is also featured. Cayman's forensic product line is continually evolving. The most current availability will always be listed at www.caymanchem.com/forensics. We are dedicated to working with the forensic and academic communities to identify emerging new drugs and to quickly make authentic reference standards available. Please contact our sales department (sales@caymanchem.com) for your custom requests and to share your new product ideas.

1. Johnston, L.D., O.M.P., Bachman, J.G., and Schulenberg, J.E. (2011) Marijuana use continues to rise among U.S. teens, while alcohol use hits historical lows. *Univ. Michigan News Serv.*, www.monitoringthefuture.org

2. *Variously named Master Puff, Kryptonite, Colorado Chronic, Bazinga, Pandora Platinum, Flawless, Berry Twist, Purple Dank, Ice, Kush, Baha Blast, Slow Motion Potion, Baked, Destiny, Buddha's Belly, Paralyzing Passion Fruit, Hot Hawaiian, Daisy, Supaman Black, Supaman Silver, Hush, King, Extreme potpourri, Funkey Monkey, Jamaican potpourri, Deadman, Venom, BC, Bliss-blueberry, Bliss-strawberry, Passion, Juiced, MJ, K2, K3, Black Mamba, Mr. Smiley, Wyoming Sky, Texas Sky, Deadman Walking, Smiley Dog, Red velvet, Blindman, Naked Lady, Red Magic, Green Buddha, Grape Ape, Nuke, High Times, Dark Lotus, Headee Confetti, Karma-Bubble gum, Oz potpourri, XXL2 Tropic Hypnotic, Bocomo True Gold, Pandora Morpheus, Bocomo Kind, Spush, Chili, Wildcat, Bocomo Blue Lotus, Flame Boy, Cloud 10X, Metamorphosis, California 10X, Green Grass, Jungle Boogie, California 7X, Dirty Blonde, Crazy Lab Monkey Evolution, Purple Dragon, Code Red, High Volt, FUBAR, Mind Eraser, M@ary Joy, Paco,*

**Cayman Chemical is DEA compliant and is licensed to sell schedule I cannabinoids to authorized researchers and forensic scientists.*



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## abbreviations

| | |
|---|---|
| **AEA** | **Arachidonoyl Ethanolamine; Anandamide** |
| **AMT** | **α-Methyltryptamine** |
| **BZP** | **Benzylpiperazine** |
| **CB** | **Cannabinoid** |
| **CYP** | **Cytochrome P450** |
| **$EC_{50}$** | **50% Effective Concentration** |
| **$ED_{50}$** | **50% Effective Dose** |
| **FAAH** | **Fatty Acid Amide Hydrolase** |
| **GC** | **Gas Chromatography** |
| **GTPγS** | **Guanosine 5′-O-(gamma-thio) triphosphate** |
| **$IC_{50}$** | **50% Inhibitory Concentration** |
| **$K_i$** | **Dissociation Constant** |
| **MAGL** | **Monoacylglycerol Lipase** |
| **MDA** | **3,4-Methylenedioxyamphetamine** |
| **MDMA** | **3,4-Methylenedioxy-N-methylamphetamine** |
| **MS** | **Mass Spectrometry** |
| **LC** | **Liquid Chromatography** |
| **$pEC_{50}$** | **Negative logarithm of the $EC_{50}$ value** |
| **$pK_i$** | **Negative logarithm of the $K_i$ value** |
| **PMA** | ***para*-Methoxyamphetamine** |
| **THC** | **Tetrahydrocannabinol** |

vol. 17
Fc

Thomas G. Brock, Ph.D.

# Synthetic Cannabinoids: From JWH 018 to Marinol®

Marijuana (*Cannabis* spp.) is usually marketed as dried leaves and buds. These plant parts are rich in chemicals, with over 60 compounds which are unique to this genus and thus are called 'cannabinoids' (CB). Many, including cannabidiol and cannabigerol, have diverse, pronounced physiological effects in mammalian systems.[1,2] One CB in particular, $\Delta^9$-tetrahydrocannabinol (THC), has drawn interest because of its psychoactive and analgesic effects. The remarkable mixture of CBs and other phytochemicals in marijuana has driven its use throughout the world for medical, recreational, and spiritual purposes for five millennia.[3]

## The Pursuit of Synthetic CBs

Legal, commercial, and medical issues support the development of synthetic CBs. In the United States, the FDA, which supervises the approval of new drugs, must evaluate each active compound with its associated inactive ingredients, which may, for example, affect pharmacokinetics. As may be expected, different varieties of *Cannabis* have unique ratios of CBs and other chemicals, and, like distinct formulations of prescription drugs, have discrete physiological effects. Marijuana simply cannot be evaluated as a drug by the FDA. Botanical preparations may, in FDA parlance, be called 'dietary supplements' and may claim to offer health benefits, but they must also explicitly disclaim ability to treat or prevent disease.

While inhaling the smoke of marijuana has negative respiratory effects and many purported benefits of cannabis are anecdotal or less effective than existing therapies, it is clear that marijuana and THC analogs affect pain, nausea, appetite, immunity, memory, and mood.[4] Although medications or treatments exist for each of these conditions, there is significant room for improvement and each represents a huge commercial market. The challenge is developing an FDA-approvable formulation using an active compound or compounds from marijuana, or their analogs. The search skyrocketed after the elucidation of the molecular structure and actions of THC.

The primary receptors targeted by THC are $G_i$ protein-coupled receptors known as $CB_1$ and $CB_2$. As with other $G_i$-linked receptors, the activation of $CB_1$ or $CB_2$ typically blocks the activation of adenylate cyclase, preventing signaling through cyclic AMP. Significantly, $CB_1$ and $CB_2$ differ in their distribution, so they subserve distinct roles. $CB_1$ is predominantly localized in the central nervous system (CNS) and has critical actions in suppressing neuronal signaling, particularly that related to mood, stress, appetite, and memory.[5] The receptor was the first one described to be involved in retrograde neuronal signaling: it is localized, within neuronal junctions, on the presynapse. Its activation can produce a reduction in the release of neurotransmitters. Normally, signaling through the synapse by neurotransmitters can result in the synthesis of natural endocannabinoids, with their subsequent secretion into the synapse, leading to retrograde signaling back to terminate neurotransmitter release. $CB_2$, on the other hand, is primarily found on immune cells, both throughout the peripheral vascular system and in the CNS. Activation of this $G_i$-linked receptor profoundly suppresses immune cell function and pain.[5] It is important to note that, beyond these generalizations, there is some overlap in the distributions and actions of the two receptors. $CB_1$ can be found peripherally and $CB_2$ has neuronal sites and both are involved in nociception.[1]

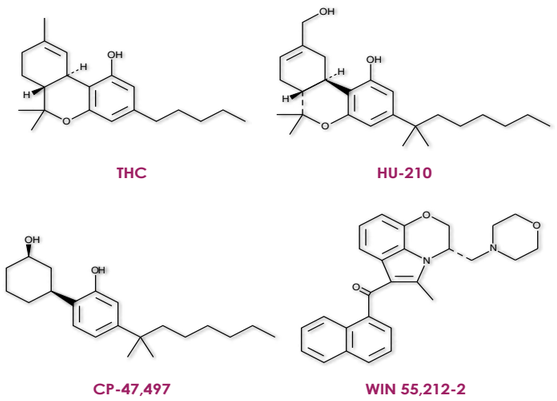


**Figure 1. THC, THC analogs, and a cannabimimetic**

## Synthetic THC Analogs and Synthetic Cannabinoids

The first THC analogs, including HU-210 and CP 47,497 (Figure 2), were developed in the 1980s. Their introduction allowed characterization of the localization and types of responses evoked by THC analogs and, subsequently in the early 1990s, the discovery of $CB_1$ and $CB_2$. Cannabimimetic actions of CP-47,497 included analgesic, motor depressant, anticonvulsant, and hypothermic effects, as well as increased vocalization in dogs.[6] An independent search for novel antinociceptive compounds, based on known NSAIDs, introduced the structurally distinct (aminoalkyl)indoles, like WIN 55,212-2.[7] Surprisingly, WIN 55,212-2 binds both $CB_1$ and $CB_2$ ($K_i$ = 1.9 and 0.28 nM, respectively) with higher affinities than does THC ($K_i$ = 41 and 36 nM, respectively). This breakthrough molecule led John W. Huffman, working at Clemson University, to conclude after some modeling that "a simple alkyl chain could replace the aminoalkyl group" (personal communication). The investigation of hundreds of related "JWH compounds", characterized primarily by their binding affinities for CB receptors, ensued.

JWH 018 is the prototypical JWH compound (Figure 2). Its high potency ($CB_1$:$K_i$ = 9.0 nM, $CB_2$:$K_i$ = 2.94 nM) and non-THC structure made it a desirable component of many Spice/K2-type herbal blends.[8,9] Typically, these herbal samples, commonly promoted as 'incense' and 'not for human consumption', contain multiple synthetic CBs (*e.g.,* JWH 018, JWH 073, or a C8 homolog of CP 47,497), natural endocannabinoids (*e.g.,* oleamide), as well as other substances (*e.g.,* eucalyptol, α-tocopherol).[8,10,11] In an effort to develop generic legislation to control all synthetic CBs, the Advisory Council on the Misuse of Drugs (ACMD; United Kingdom) developed a structural classification of JWH compounds.[12] The Group 1 naphthoylindoles are typified by JWH 018 and includes 73 other compounds. The related Group 2 naphthylmethylindoles contain 9 compounds (*e.g.,* JWH 175 ($CB_1$:$K_i$ = 22 nM)).[13] Several of the 32 known naphthoylpyrroles (Group 3) are potent CB receptor agonists (JWH 147: $CB_1$:$K_i$ = 11 nM, $CB_2$:$K_i$ = 7.1 nM)[14] and therefore have a high abuse potential. The Group 4 napthylmethylindenes have 3 members, like JWH 176 ($CB_1$:$K_i$ = 26 nM).[13] Finally, the Group 5 phenylacetylindoles cover 28 synthetic CBs, like JWH 203 ($CB_1$:$K_i$ = 8 nM, $CB_2$:$K_i$ = 7 nM)[15], some of which have been detected in blends.[16-19]

THC analogs, like HU-210 and CP 47,497, and certain first-generation synthetic CBs, like JWH 018 and JWH 073, have largely been regulated worldwide. They have been replaced by similarly potent JWH compounds, including naphthoylindoles (*e.g.,* JWH 081, JWH 122, JWH 200, JWH 210, JWH 398) and phenylacetylindoles (*e.g.,* JWH 203, JWH 250, JWH 251).[16,20,21] In addition, AM2201 (Figure 3), an "AM-type" compounds described in a patent by Alexandros Makriyannis, has emerged.[22] This patent also introduced benzoylindoles, like AM679. Also common is UR-144, developed by scientists at Abbott, who included a tetramethylcyclopropyl group to confer selectivity for the $CB_2$ receptor.[23] While selective for $CB_2$, this

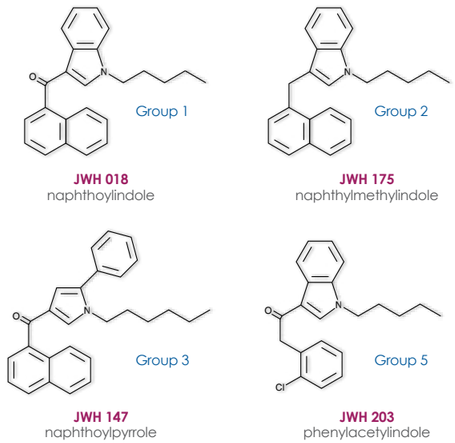


**Figure 2. Examples of four major classes of JWH compounds**

compound still binds $CB_1$ effectively ($K_i$ = 150 nM), presumably explaining its popularity. Both the Makriyannis patent and the Abbott report describe dozens of additional compounds which are candidates for abuse.

Several additional synthetic CBs are structurally distinctive. The replacement of the indole core of the JWH CBs with a benzimidazole core, as in AZ-11713908 (Figure 3), gives significant $CB_2$ selectivity.[24,25] A series of compounds using a quinolone core also have high affinities for CB receptors, as well as effectiveness *in vivo*.[26,27] The addition of an adamantylamino group to a quinolone base, as in SER-601, confers selectivity for $CB_2$ over $CB_1$ ($CB_2$:$K_i$ = 6.3 nM, $CB_1$:$K_i$ = 1220 nM).[27] The adamantylamino group also appears on newer synthetic CBs, replacing the naphthyl groups of JWH 018 and AM2201 to generate 2NE1 and STS-135, respectively. The combination of a tetramethylcyclopropyl group and a thiazolylidene base gives A-836,339, which, although $CB_2$-selective ($CB_1$:$K_i$ = 270 nM, $CB_2$:$K_i$ = 0.64 nM), activates CNS $CB_1$ *in vivo* at higher doses.[28] The combination of neuronal pain suppression *via* $CB_2$ with milder psychoactive effects through $CB_1$ distinguishes A-836,339 from the synthetic cannabinoids with higher affinities for $CB_1$.

## An Eye to the Future

Marijuana provides clinical benefits, including reducing neuropathic pain and muscle spasticity.[29] Efforts to provide an FDA-approvable marijuana has led to the development (and approval) of Marinol® (active ingredient: dronabinol, *aka* $\Delta^9$-THC), which can be legally prescribed to reduce nausea and vomiting or increase appetite. The potential side effects of Marinol®, aside from feeling "high", are listed as: seizure, paranoia, tachycardia (fast heart rate), fainting, unusual thoughts or behavior, mood changes, dizziness, drowsiness, anxiety, confusion, nausea, and vomiting. Attempts at 'taming THC' include mixing it with other CBs, like cannabidiol, or, more recently, terpenoids.[2] The idea is that certain combinations will benefit from an entourage effect.

The American Association of Poison Control Centers received 6,959 calls about exposures to synthetic CBs in 2011. Adverse effects of synthetic CB exposures, compiled from the National Poison Data System in 2010, were tachycardia, agitation/irritability, vomiting, drowsiness/lethargy, confusion, nausea, hallucination/delusion, hypertension, dizziness, and chest pain.[30] In short, the side effects of synthetic CBs parallel those of Marinol®. According to websites like erowid.org and drugs-forum.com, users are experimenting with mixtures to provide the ideal entourage effect. Forensic screeners and toxicologists should expect an increase in blends of CBs and, perhaps, terpenoids, in the future.

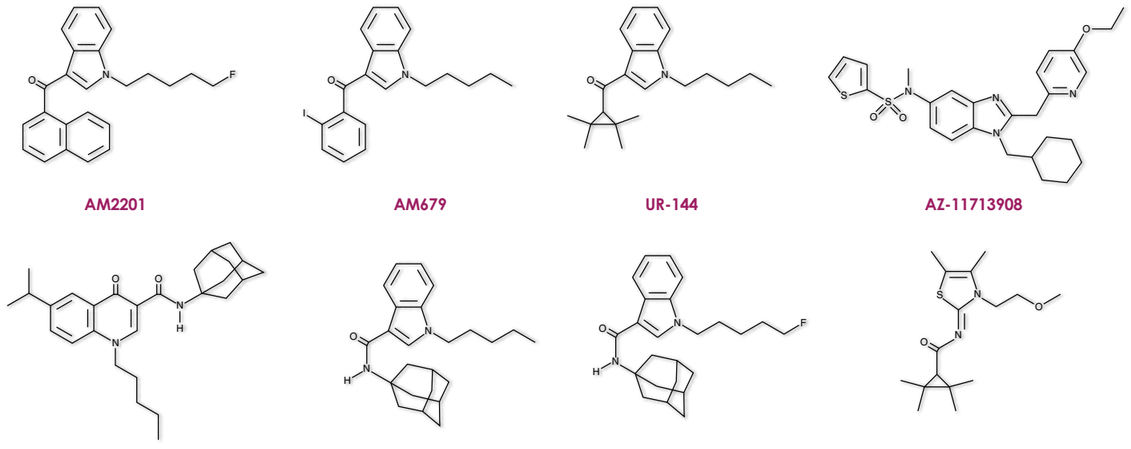


**Figure 3. Structures of some non JWH-type synthetic CBs**

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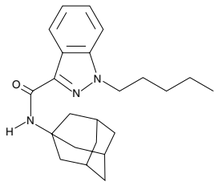
# Synthetic Cannabinoids
# AKB Series

## AKB48 — 11566

*[1345973-53-6] APINACA*
**MF:** $C_{23}H_{31}N_3O$ **FW:** 365.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A pentyl indazole that mimics synthetic CBs that may be sold for recreational use; intended for research and forensic applications

1 mg
5 mg
10 mg

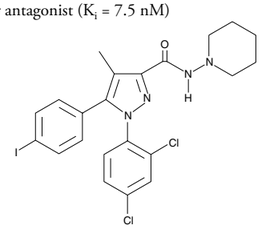


# AM Series

## AM251 — 71670

*[183232-66-8]*
**MF:** $C_{22}H_{21}Cl_2IN_4O$ **FW:** 555.2 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** A selective $CB_1$ receptor antagonist ($K_i$ = 7.5 nM)

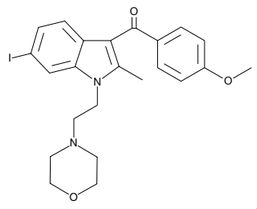
5 mg
10 mg
50 mg
100 mg



## AM630 — 10006974

*[164178-33-0] Iodopravadoline*
**MF:** $C_{23}H_{25}IN_2O_3$ **FW:** 504.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A selective $CB_2$ receptor antagonist that binds to $CB_1$ and $CB_2$ receptors with $K_i$ values of 5.2 µM and 31.2 nM, respectively; behaves as an inverse agonist at $CB_2$ receptors and as a weak partial agonist at $CB_1$ receptors

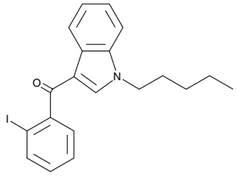
5 mg
10 mg
50 mg
100 mg



## AM679 — 11504

*[335160-91-3]*
**MF:** $C_{20}H_{20}INO$ **FW:** 417.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent synthetic CB with $K_i$ values of 13.5 and 49.5 nM for the $CB_1$ and $CB_2$ receptors, respectively; intended for research and forensic applications

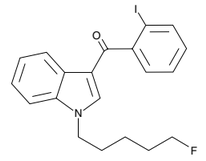
5 mg
10 mg
25 mg



## AM694 — 10567

*[335161-03-0]*
**MF:** $C_{20}H_{19}FINO$ **FW:** 435.3 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent synthetic CB with $K_i$ values of 0.08 and 1.44 nM for the $CB_1$ and $CB_2$ receptors, respectively

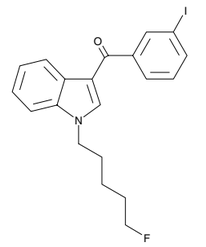
5 mg
10 mg
25 mg



## AM694 3-iodo isomer — 10870

**MF:** $C_{20}H_{19}FINO$ **FW:** 435.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An analog of AM694; intended for forensic applications

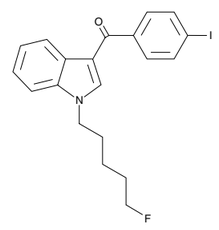
1 mg
5 mg
10 mg



## AM694 4-iodo isomer — 10869

**MF:** $C_{20}H_{19}FINO$ **FW:** 435.3 **Purity:** ≥97%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An analog of AM694; intended for forensic applications

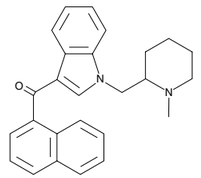
1 mg
5 mg
10 mg



## AM1220 — 9001055

*[137642-54-7]*
**MF:** $C_{26}H_{26}N_2O$ **FW:** 382.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent synthetic CB with preference for the central $CB_1$ receptor ($K_i$ = 3.88 nM) over the $CB_2$ receptor ($K_i$ = 73.4 nM)

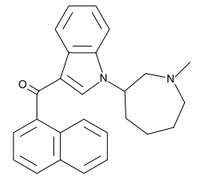
5 mg
10 mg
25 mg



## AM1220 azepane isomer — 11583

**MF:** $C_{26}H_{26}N_2O$ **FW:** 382.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An isomer of AM1220 in which the piperidine group has been replaced with azepane; intended for forensic and research applications

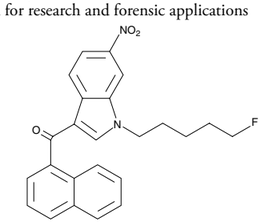
1 mg
5 mg
10 mg



## AM1235 — 9001094

*[335161-27-8]*
**MF:** $C_{24}H_{21}FN_2O_3$ **FW:** 404.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent synthetic CB with $K_i$ values of 1.5 and 20.4 nM for the $CB_1$ and $CB_2$ receptors, respectively; intended for research and forensic applications

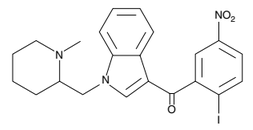
1 mg
5 mg
10 mg



## AM1241 — 10010118

*[444912-48-5]*
**MF:** $C_{22}H_{22}IN_3O_3$ **FW:** 503.3 **Purity:** ≥97%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** $CB_2$ receptor agonist with a $K_i$ value of 2 nM and greater than 100-fold selectivity over the $CB_1$ receptor

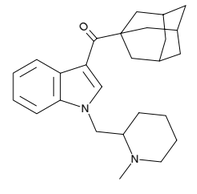
1 mg
5 mg
10 mg
25 mg



## AM1248 — 11282

*[335160-66-2]*
**MF:** $C_{26}H_{34}N_2O$ **FW:** 390.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An adamantoylindole derivative with an N-methylpiperidin-2-ylmethyl substitution at the indole 1-position that reportedly acts as a moderately potent agonist for both the $CB_1$ and $CB_2$ receptors ($K_i$s = 11.9 and 4.8 nM, respectively)

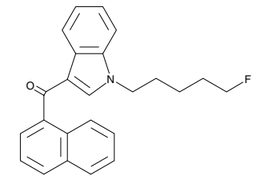
5 mg
10 mg
25 mg



## AM2201 — 10707

*[335161-24-5]*
**MF:** $C_{24}H_{22}FNO$ **FW:** 359.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** A potent synthetic CB with $K_i$ values of 1.0 and 2.6 nM for the $CB_1$ and $CB_2$ receptors, respectively

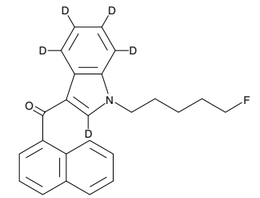
5 mg
10 mg
25 mg



## AM2201-$d_5$ — 10706

**MF:** $C_{24}H_{17}D_5FNO$ **FW:** 364.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_5$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of AM2201 by GC- or LC-MS

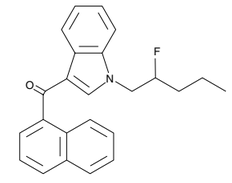
500 µg
1 mg
5 mg



## AM2201 N-(2-fluoropentyl) isomer — 9001031

**MF:** $C_{24}H_{22}FNO$ **FW:** 359.4 **Purity:** ≥95%
A solution in acetonitrile **Stability:** ≥1 year at -20°C
**Summary:** Differs structurally from AM2201 by having a fluoro atom at the 2 postion rather than the 5 position of the pentyl chain; intended for forensic applications

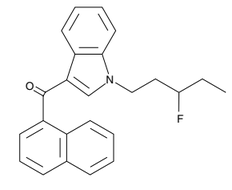
100 µg
500 µg
1 mg



## AM2201 N-(3-fluoropentyl) isomer — 9001030

**MF:** $C_{24}H_{22}FNO$ **FW:** 359.4 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs structurally from AM2201 by having a fluoro atom at the 3 position rather than the 5 position of the pentyl chain; intended for forensic applications

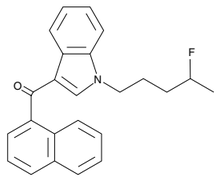
100 µg
500 µg
1 mg



## AM2201 N-(4-fluoropentyl) isomer 9001029

**MF:** $C_{24}H_{22}FNO$ **FW:** 359.4 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A derivative of AM2201, a potent synthetic CB with $K_i$ values of 1.0 and 2.6 nM for the $CB_1$ and $CB_2$ receptors, respectively

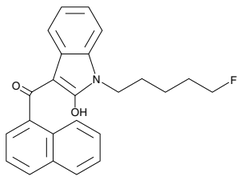
100 µg
500 µg
1 mg



## AM2201 2-hydroxyindole metabolite 11194

**MF:** $C_{24}H_{22}FNO_2$ **FW:** 375.4 **Purity:** ≥98%
A solution in acetonitrile **Stability:** ≥1 year at -20°C
**Summary:** A potential monohydroxylated urinary metabolite of AM2201, a potent synthetic cannabinoid ($K_i$s = 1.0 and 2.6 nM for the $CB_1$ and $CB_2$ receptors, respectively)

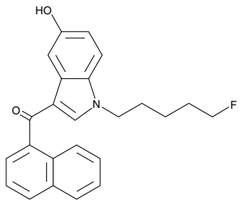
1 mg
5 mg
10 mg



## AM2201 5-hydroxyindole metabolite 11196

**MF:** $C_{24}H_{22}FNO_2$ **FW:** 375.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An expected phase I metabolite of AM2201, detectable in serum or as a glucuronidated derivative in urine

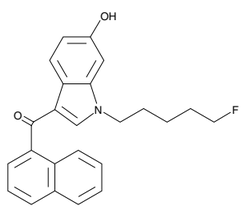
1 mg
5 mg
10 mg



## AM2201 6-hydroxyindole metabolite 11192

**MF:** $C_{24}H_{22}FNO_2$ **FW:** 375.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An expected metabolite of AM2201 generated during phase I metabolism, detectable in blood and urine; intended for forensic applications

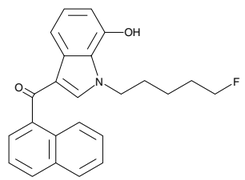
1 mg
5 mg
10 mg



## AM2201 7-hydroxyindole metabolite 11193

**MF:** $C_{24}H_{22}FNO_2$ **FW:** 375.4 **Purity:** ≥98%
A solution in acetonitrile **Stability:** ≥1 year at -20°C
**Summary:** An expected minor monohydroxylated urinary metabolite of AM2201, a potent synthetic cannabinoid ($K_i$s = 1.0 and 2.6 nM for the $CB_1$ and $CB_2$ receptors, respectively)

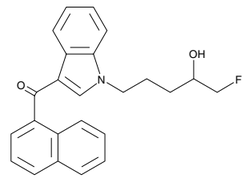
1 mg
5 mg
10 mg



## AM2201 N-(4-hydroxypentyl) metabolite 10203

**MF:** $C_{24}H_{22}FNO_2$ **FW:** 375.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** An expected urinary metabolite of AM2201

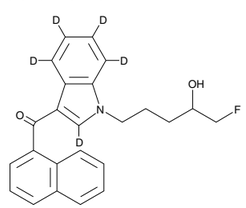
100 µg
500 µg
1 mg



## AM2201 N-(4-hydroxypentyl) metabolite-$d_5$ 11457

**MF:** $C_{24}H_{17}D_5FNO_2$ **FW:** 380.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_5$); ≤1% $d_0$
A solution in methanol **Stability:** ≥2 years at -20°C
**Summary:** An internal standard for the quantification of AM2201 N-(4-hydroxypentyl) metabolite by GC- or LC-MS

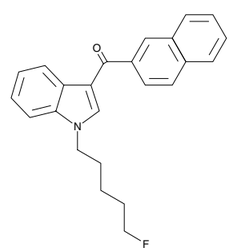
100 µg
500 µg
1 mg



## AM2201 2'-naphthyl isomer 10862

**MF:** $C_{24}H_{22}FNO$ **FW:** 359.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from AM2201 by having the naphthyl group attached at the 2' position

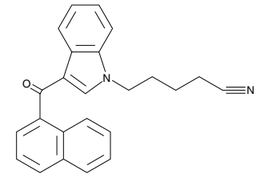
1 mg
5 mg
10 mg



## AM2232 11503

*[335161-19-8]*
**MF:** $C_{24}H_{20}N_2O$ **FW:** 352.4 **Purity:** ≥95%
A solution in acetonitrile **Stability:** ≥1 year at -20°C
**Summary:** A potent synthetic CB with $K_i$ values of 0.28 and 1.48 nM for the $CB_1$ and $CB_2$ receptors, respectively; intended for research and forensic applications

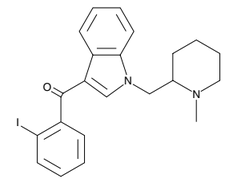
5 mg
10 mg
25 mg



## AM2233 11008

*[444912-75-8]*
**MF:** $C_{22}H_{23}IN_2O$ **FW:** 458.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A full agonist of the $CB_1$ receptor ($K_i$ = 2.8 nM); the (R)-enantiomer exhibits a $K_i$ value of 0.2 nM and has ~8-fold higher affinity for $CB_1$ compared to WIN 55,212-2 ($K_i$ = 1.6 nM); intended for forensic applications

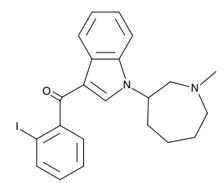
1 mg
5 mg
10 mg
25 mg



## AM2233 azepane isomer 11584

**MF:** $C_{22}H_{23}IN_2O$ **FW:** 458.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An isomer of AM2233 in which the piperidine group has been replaced with azepane; intended for forensic and research applications

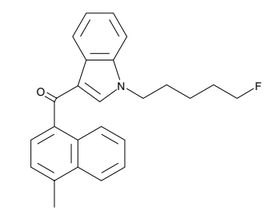
1 mg
5 mg
10 mg



## MAM2201 9001219

*[1354631-24-5] AM2201 4-methylnaphthyl analog, JWH 122 N-(5-fluoropentyl) analog*
**MF:** $C_{25}H_{24}FNO$ **FW:** 373.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An analog of AM2201 that is methylated at the 4 position of the naphthyl group; intended for research and forensic purposes

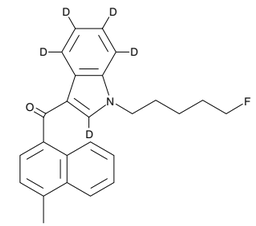
1 mg
5 mg
10 mg



## MAM2201-$d_5$ 11619

*AM2201 4-methylnaphthyl analog-$d_5$, JWH 122 N-(5-fluoropentyl) analog-$d_5$*
**MF:** $C_{25}H_{19}D_5FNO$ **FW:** 378.5 **Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_5$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of MAM2201 by GC- or LC-MS

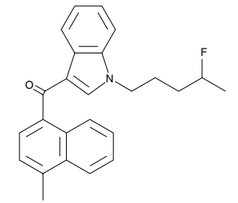
500 µg
1 mg
5 mg



## MAM2201 N-(4-fluoropentyl) isomer 11782

**MF:** $C_{25}H_{24}FNO$ **FW:** 373.5 **Purity:** ≥95%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A derivative of MAM2201, a synthetic cannabinoid structurally related to AM2201 and JWH 122, two compounds which display high affinities for both CB receptors

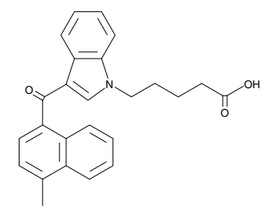
100 µg
500 µg
1 mg



## MAM2201 N-pentanoic acid metabolite 11779

*JWH 122 N-pentanoic acid metabolite*
**MF:** $C_{25}H_{23}NO_3$ **FW:** 385.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potential phase 1 metabolite of MAM2201 or JWH 122; intended for forensic and research applications

1 mg
5 mg
10 mg

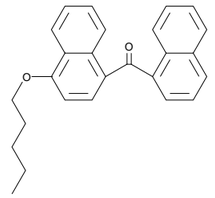


# CB Series

## CB-13 10010398

*[432047-72-8] CRA-13*
**MF:** $C_{26}H_{24}O_2$ **FW:** 368.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A dual agonist of the $CB_1$ ($IC_{50}$ = 15 nM) and $CB_2$ ($IC_{50}$ = 98 nM) receptors; potently blocks $CB_1$-dependent neuropathic mechanical hyperalgesia in rats, shows limited brain penetration, and exhibits good oral bioavailability

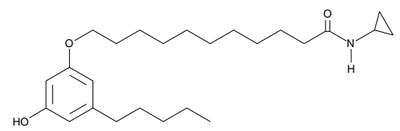
5 mg
10 mg
25 mg
50 mg



## CB-25 10010116

*[869376-63-6]*
**MF:** $C_{25}H_{41}NO_3$ **FW:** 403.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A stable analog of Δ⁹-THC; exhibits high affinity for the $CB_1$ and $CB_2$ receptors with $K_i$ values of 5.2 and 13 nM, respectively, also it behaves as an inverse agonist for the $CB_1$ receptor as assessed in a cyclic AMP functional assay

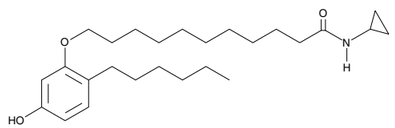
1 mg
5 mg
10 mg
50 mg



## CB-52 10010117

*[869376-90-9]*
**MF:** $C_{26}H_{43}NO_3$ **FW:** 417.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A stable analog of Δ⁹-THC and AEA; exhibits high-affinity for the $CB_1$ and $CB_2$ receptors ($K_i$ = 210 and 30 nM, respectively); behaves primarily as a $CB_1$ receptor partial agonist and a $CB_2$ receptor neutral antagonist *in vitro*

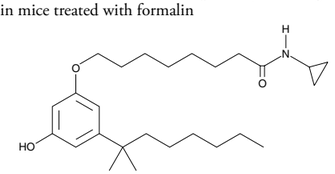
1 mg
5 mg
10 mg
50 mg



## CB-86 13289

*[1150586-64-3]*
**MF:** $C_{26}H_{43}NO_3$ **FW:** 417.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
**Summary:** A partial agonist for the $CB_1$ receptor and a neutral antagonist for the $CB_2$ receptor with $K_i$ values of 5.6 and 7.9 nM, respectively; at 1 mg/kg, exhibits antinociceptive effects in mice treated with formalin

1 mg
5 mg
10 mg
50 mg

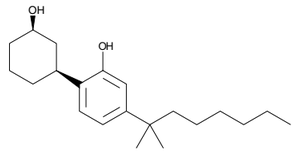


# CP Series

## (±)-CP 47,497 10913

*[70434-82-1]*
**MF:** $C_{21}H_{34}O_2$ **FW:** 318.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A cannabimimetic compound that binds the $CB_1$ receptor with a $K_i$ value of 2.2 nM

5 mg
10 mg
25 mg

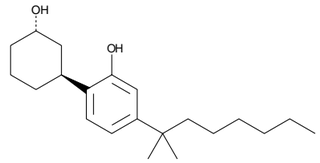


•Also Available: **(±)-CP 47,497 (solution)** (16851)
*DEA-exempt formulation*

## (±)-*epi* CP 47,497 10919

*3-trans CP 47,497*
**MF:** $C_{21}H_{34}O_2$ **FW:** 318.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An epimer of (±)-CP 47,497; intended to be used as an analytical standard

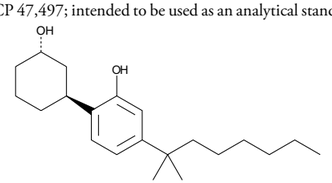
5 mg
10 mg
25 mg



## (±)-*epi* CP 47,497 (solution) 13801

*3-trans CP 47,497*
**MF:** $C_{21}H_{34}O_2$ **FW:** 318.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥2 years at -20°C
**Summary:** An epimer of (±)-CP 47,497; intended to be used as an analytical standard

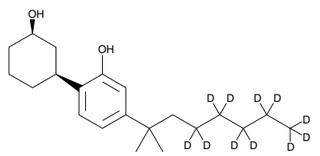
5 mg
10 mg
25 mg



## (±)-CP 47,497-$d_{11}$ (solution) 10687

**MF:** $C_{21}H_{23}D_{11}O_2$ **FW:** 329.6 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_{11}$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of (±)-CP 47,497 by GC- or LC-MS

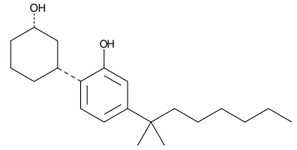
100 µg
500 µg
1 mg



## (+)-CP 47,497 10910

*[134308-14-8]*
**MF:** $C_{21}H_{34}O_2$ **FW:** 318.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A bicyclic CB analog with potent analgesic activity; comparable or more potent than Δ⁹-THC in analgesic motor depressant, anticonvulsant, and hypothermic effects; avidly binds the $CB_1$ receptor ($K_i$ = 4.15 nM)

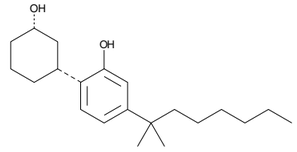
1 mg
5 mg
10 mg



## (+)-CP 47,497 (solution) 13219

*[134308-14-8]*
**MF:** $C_{21}H_{34}O_2$ **FW:** 318.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥2 years at -20°C
**Summary:** A bicyclic CB analog with potent analgesic activity; comparable or more potent than Δ⁹-THC in analgesic motor depressant, anticonvulsant, and hypothermic effects; avidly binds the $CB_1$ receptor ($K_i$ = 4.15 nM)

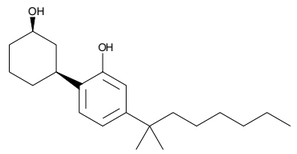
5 mg
10 mg
25 mg



## (-)-CP 47,497 10917

*[114753-51-4]*
**MF:** $C_{21}H_{34}O_2$ **FW:** 318.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A bicyclic CB analog with potent analgesic activity; comparable or more potent than Δ⁹-THC in analgesic motor depressant, anticonvulsant, and hypothermic effects; avidly binds the $CB_1$ receptor ($K_i$ = 2.1 nM)

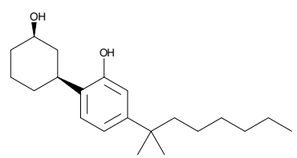
1 mg
5 mg
10 mg



## (-)-CP 47,497 (solution) 13218

*[114753-51-4]*
**MF:** $C_{21}H_{34}O_2$ **FW:** 318.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥2 years at -20°C
**Summary:** A bicyclic CB analog with potent analgesic activity; comparable or more potent than Δ⁹-THC in analgesic motor depressant, anticonvulsant, and hypothermic effects; avidly binds the $CB_1$ receptor ($K_i$ = 2.1 nM)

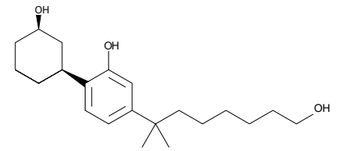
5 mg
10 mg
25 mg



## (±)-CP 47,497-C7-hydroxy metabolite 9000774

**MF:** $C_{21}H_{34}O_3$ **FW:** 334.5 **Purity:** ≥95%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A potential metabolite of CP 47,497; intended for forensic purposes

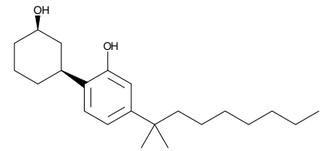
100 µg
500 µg
1 mg



## (±)-CP 47,497-C8-homolog 10908

*[70434-92-3] Cannabicyclohexanol, CAY10596*
**MF:** $C_{22}H_{36}O_2$ **FW:** 332.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A bicyclic CB analog that avidly binds the $CB_1$ receptor ($K_i$ = 0.83 nM) and shows high antinociceptive activity; ten-fold more potent than Δ⁹-THC in analgesic, motor depressant, anticonvulsant, and hypothermic effects in mice

5 mg
10 mg
25 mg

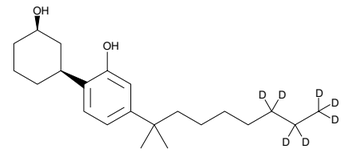


•Also Available: **(±)-CP 47,497-C8-homolog (solution)** (13216)
*DEA-exempt formulation*

## (±)-CP 47,497-C8-homolog-$d_7$ (solution) 10686

*Cannabicyclohexanol-$d_7$*
**MF:** $C_{22}H_{29}D_7O_2$ **FW:** 339.6 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_7$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of (±)-CP 47,497-C8-homolog by GC- or LC-MS

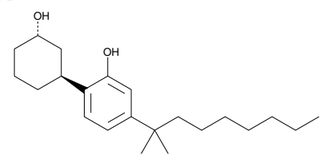
100 µg
500 µg
1 mg



## (±)3-*epi* CP 47,497-C8-homolog 10918

**MF:** $C_{22}H_{36}O_2$ **FW:** 332.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** A by-product generated in the synthesis of (+)-CP 47,497-C8-homolog; for use as an analytical standard

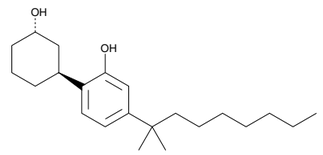
5 mg
10 mg
25 mg



## (±)3-*epi* CP 47,497-C8-homolog (solution) 13802

**MF:** $C_{22}H_{36}O_2$ **FW:** 332.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A by-product generated in the synthesis of (+)-CP 47,497-C8-homolog; for use as an analytical standard

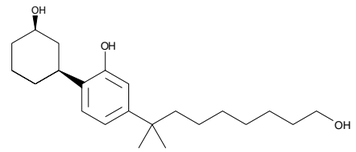
5 mg
10 mg
25 mg



## CP 47,497-C8-homolog C-8-hydroxy metabolite 9000773

**MF:** $C_{22}H_{36}O_3$ **FW:** 348.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A potential metabolite of CP 47,497-C8-homolog; intended for forensic purposes

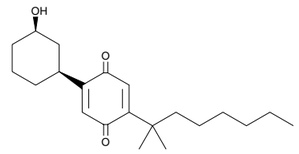
100 µg
500 µg
1 mg



## CP 47,497-para-quinone analog 10889

**MF:** $C_{21}H_{32}O_3$ **FW:** 332.5 **Purity:** ≥90%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A potential metabolite of CP 47,497

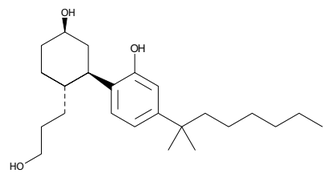
500 µg
1 mg
5 mg



## (±)-CP 55,940 13241

*[83003-12-7]*
**MF:** $C_{24}H_{40}O_3$ **FW:** 376.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** One of the first bicyclic mimetics of $\Delta^9$-THC found to have superior analgesic properties; 20- to 100-fold more effective than $\Delta^9$-THC in altering the reactions to thermal, mechanical, and chemical pain in mice; used to characterize the capacity of novel cannabimimetics to bind the $CB_1$ receptor in rat brain preparations

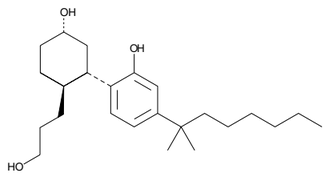
5 mg
10 mg
25 mg
50 mg



## (+)-CP 55,940 13608

**MF:** $C_{24}H_{40}O_3$ **FW:** 376.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An enantiomer purified from the (±)-CP 55,940 racemic mixture; the functional characteristics of this isomer have not been studied

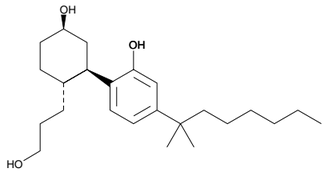
1 mg
5 mg
10 mg
25 mg



## (-)-CP 55,940 90084

*[83002-04-4]*
**MF:** $C_{24}H_{40}O_3$ **FW:** 376.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent, non-selective CB receptor agonist with $K_i$ values of 0.58 and 0.69 nM for human recombinant $CB_1$ and $CB_2$, respectively

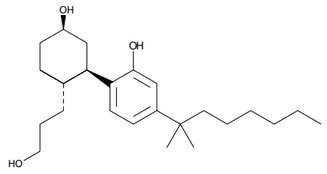
1 mg
5 mg
10 mg
25 mg



## (±)5-*epi* CP 55,940 13803

**MF:** $C_{24}H_{40}O_3$ **FW:** 376.6 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
**Summary:** A by-product generated in the synthesis of (±)-CP 55,940; intended to be used as an analytical standard

5 mg
10 mg
25 mg

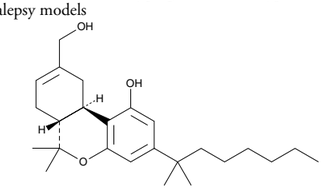


# HU Series

## HU-210 (DEA Schedule I Regulated Compound) 90082

*[112830-95-2]*
**MF:** $C_{25}H_{38}O_3$ **FW:** 386.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A synthetic agonist analog of $\Delta^9$-THC, which is the primary psychoactive component of marijuana; a potent $CB_1$ and $CB_2$ receptor agonist that binds to neuroblastoma cell membrane $CB_1$ receptors with about the same affinity as CP 55,940; demonstrates $ED_{50}$ values of 5-20 µg/kg in mouse hypothermia, analgesia, hypoactivity, and catalepsy models

1 mg
5 mg
10 mg
25 mg

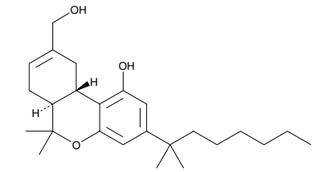


•Also Available: **HU-210 (solution)** (90083)
*DEA-exempt formulation*

## HU-211 10006350

*[112924-45-5] Dexanabinol*
**MF:** $C_{25}H_{38}O_3$ **FW:** 386.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A synthetic terpene-based CB devoid of $CB_1$ and $CB_2$ receptor agonist activity; exhibits neuroprotective, antioxidant, and anti-inflammatory properties

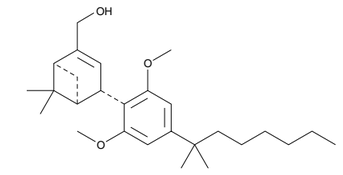
1 mg
5 mg
10 mg
25 mg



## HU-308 90086

*[256934-39-1]*
**MF:** $C_{27}H_{42}O_3$ **FW:** 414.6 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
**Summary:** A potent, selective agonist for the $CB_2$ receptor ($K_i$ = ~20 nM compared to that of $CB_1$:$K_i$ = >10 µM); elicits hypotensive, analgesic, and anti-inflammatory activity, but none of the behavioral tetrad of psychomotor responses characteristic of the phenolic components of hemp, such as $\Delta^9$-THC when administered to whole animals

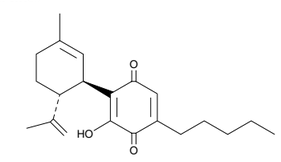
1 mg
5 mg
10 mg
25 mg



## HU-331 10005673

*[137252-25-6]*
**MF:** $C_{21}H_{28}O_3$ **FW:** 328.5 **Purity:** ≥95%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
**Summary:** A hydroxylquinone CB analog that exhibits potent antineoplastic activity on a variety of human cancer cell lines

1 mg
5 mg
10 mg
25 mg

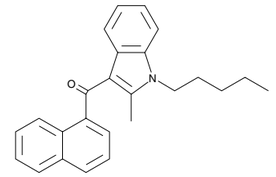


# JWH Series

## JWH 007 10266

*[155471-10-6]*
**MF:** $C_{25}H_{25}NO$ **FW:** 355.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A potent CB receptor agonist that avidly binds to both $CB_1$ and $CB_2$ ($K_i$ = 9.5 and 2.9 nM, respectively); performs comparably to $\Delta^9$-THC in mouse studies on spontaneous activity, antinociception, hypothermia, and catalepsy

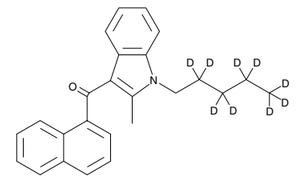
5 mg
10 mg
25 mg



## JWH 007-$d_9$ 10486

**MF:** $C_{25}H_{16}D_9NO$ **FW:** 364.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_9$); ≤1% $d_0$
A solution in methyl acetate **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 007 by GC- or LC-MS

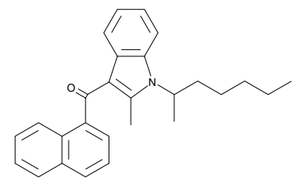
500 µg
1 mg
5 mg



## JWH 011 9001058

*[155471-13-9] JWH 004 1-methylhexyl analog*
**MF:** $C_{27}H_{29}NO$ **FW:** 383.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A synthetic CB that is analogous to the N-hexyl JWH 004, which has high affinities for both central $CB_1$ and peripheral $CB_2$ receptors ($K_i$ = 48 and 4.02 nM, respectively)

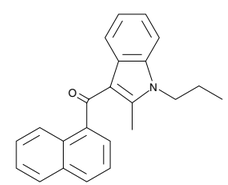
1 mg
5 mg
10 mg



## JWH 015 10009018

*[155471-08-2]*
**MF:** $C_{23}H_{21}NO$ **FW:** 327.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A selective $CB_2$ receptor agonist with $K_i$ values of 13.8 and 383 nM for human recombinant $CB_2$ and $CB_1$ receptors, respectively

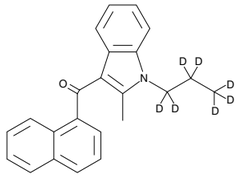
5 mg
10 mg
25 mg



## JWH 015-$d_7$ 10660

**MF:** $C_{23}H_{14}D_7NO$ **FW:** 334.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_7$); ≤1% $d_0$
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An internal standard for the quantification of JWH 015 by GC- or LC-MS

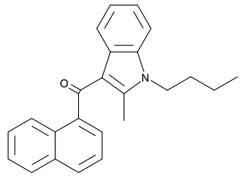
500 µg
1 mg
5 mg



## JWH 016 10849

*[155471-09-3]*
**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥95%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A cannabimimetic indole that potently activates both CB receptors, with $K_i$ values of 22.0 and 4.29 nM for $CB_1$ and $CB_2$, respectively

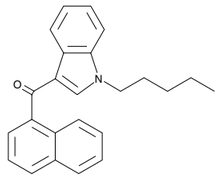
5 mg
10 mg
25 mg



## JWH 018 10900

*[209414-07-3] AM678*
**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A selective agonist of the $CB_2$ receptor with $K_i$ values of 9.0 and 2.94 nM for $CB_1$ and $CB_2$, respectively

5 mg
10 mg
25 mg

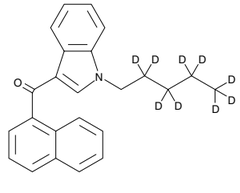


•Also Available: **JWH 018 (solution)** (13169)
*DEA-exempt formulation*

## JWH 018-$d_9$ (solution) 13824

*AM678*
**MF:** $C_{24}H_{14}D_9NO$ **FW:** 350.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_9$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 018 by GC- or LC-MS

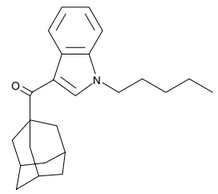
500 µg
1 mg
5 mg



## JWH 018 adamantyl analog 9000799

*AB-001*
**MF:** $C_{24}H_{31}NO$ **FW:** 349.5 **Purity:** ≥97%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An analog of JWH 018, a mildly selective agonist of the peripheral cannabinoid receptor, where the naphthalene ring is substituted with an adamantyl group

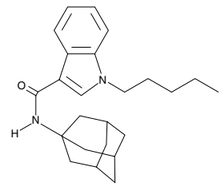
1 mg
5 mg
10 mg



## JWH 018 adamantyl carboxamide 9001193

*[1345973-50-3] APICA, 2NE1*
**MF:** $C_{24}H_{32}N_2O$ **FW:** 364.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A structural analog of JWH 018 where the naphthalenyl-methanone portion has been replaced by adamantyl carboxamide; may retain high affinity for the $CB_2$ receptor with reduced affinity for the $CB_1$ receptor; intended for research and forensic applications

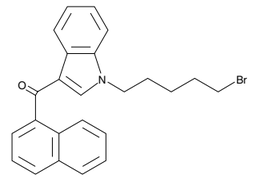
1 mg
5 mg
10 mg



## JWH 018 N-(5-bromopentyl) analog 11047

**MF:** $C_{24}H_{22}BrNO$ **FW:** 420.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 018 by having bromine added at the 5 position of the pentyl chain; intended for forensic and research applications

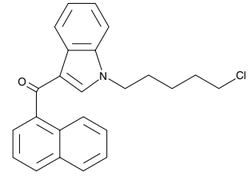
1 mg
5 mg
10 mg



## JWH 018 N-(5-chloropentyl) analog 10521

**MF:** $C_{24}H_{22}ClNO$ **FW:** 375.9 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 018 by having chlorine added to the 5 position of the pentyl chain; intended for forensic and research applications

1 mg
5 mg
10 mg



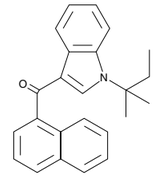




## JWH 018 N-(1,1-dimethylpropyl) isomer 9001000

**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs from JWH 018 structurally by having a 1,1-dimethylpropyl group, rather than a pentyl chain, extending from the indole group; intended for forensic purposes

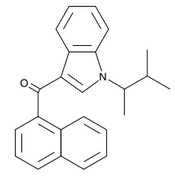
1 mg
5 mg
10 mg



## JWH 018 N-(1,2-dimethylpropyl) isomer 9001003

**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs from JWH 018 structurally by having a 1,2-dimethylpropyl group, rather than a pentyl chain, extending from the indole group; intended for forensic purposes

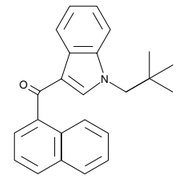
1 mg
5 mg
10 mg



## JWH 018 N-(2,2-dimethylpropyl) isomer 9001001

**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs from JWH 018 structurally by having a 2,2-dimethylpropyl group, rather than a pentyl chain, extending from the indole group

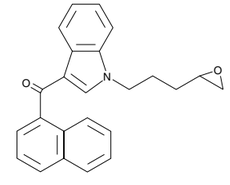
1 mg
5 mg
10 mg



## JWH 018 N-(4,5-epoxypentyl) analog 11075

*JWH 018 epoxide*
**MF:** $C_{24}H_{21}NO_2$ **FW:** 355.4 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An analog of JWH 018 distinguished by a terminal epoxide group on the alkyl chain

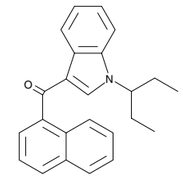
1 mg
5 mg
10 mg



## JWH 018 N-(1-ethylpropyl) isomer 11585

**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An isomer of JWH 018, differing by having an ethylpropyl group in place of the crucial pentyl chain; intended for research and forensic applications

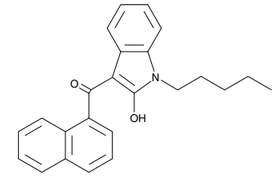
1 mg
5 mg
10 mg



## JWH 018 2-hydroxyindole metabolite 9000844

**MF:** $C_{24}H_{23}NO_2$ **FW:** 357.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potential monohydroxylated urinary metabolite of JWH 018

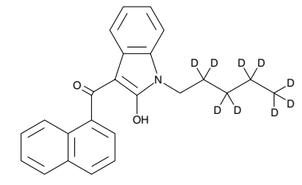
1 mg
5 mg
10 mg



## JWH 018 2-hydroxyindole metabolite-$d_9$ 10711

**MF:** $C_{24}H_{14}D_9NO_2$ **FW:** 366.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_9$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 018 2-hydroxyindole metabolite by GC- or LC-MS

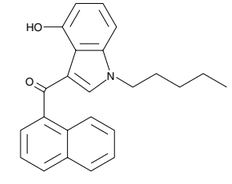
100 µg
500 µg
1 mg



## JWH 018 4-hydroxyindole metabolite 9000851

**MF:** $C_{24}H_{23}NO_2$ **FW:** 357.4 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
**Summary:** A major urinary metabolite of JWH 018

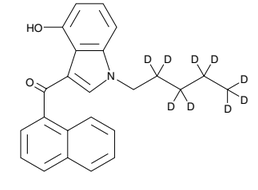
1 mg
5 mg
10 mg



## JWH 018 4-hydroxyindole metabolite-$d_9$ 10712

**MF:** $C_{24}H_{14}D_9NO_2$ **FW:** 366.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_9$); ≤1% $d_0$
A solution in ethanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 018 4-hydroxyindole metabolite by GC- or LC-MS

100 µg
500 µg
1 mg



vol. 17
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Thomas G. Brock, Ph.D.

# Today's Designer Drugs and Recreational Drugs of Abuse

In the past, the war on drugs was traditional warfare, a battle against easily recognizable foes, like heroin, cocaine, and marijuana. Their detection by crime labs was relatively straightforward, scientists could evaluate their actions and toxicology, and even the public knew what they should look and act like. Today, the enemy is much more elusive. Some drugs are chemical variations on old compounds, legal largely by design. Many are unrecognizable by name, except to the well-informed. Some appear under the guise of dietary supplements, while others are hidden in everyday products, like bath salts, plant foods, or foot powders (Figure 1). The rapid innovation in the design of drugs of abuse challenges legal systems to keep apace, while the blending of novel compounds tests the skills of forensic scientists. Research laboratories don't have the money or manpower to evaluate the physiological or neurological properties of most designer drugs, so most of the testing is done by the curious public and reported through online drug forums. The following is an overview of some of the major designer and recreational drugs that are currently of concern.


**Figure 1. Some party pills, dietary supplements, and plant food samples**

## Phenethylamines and Tryptamines

Phenethylamines (or phenylethylamines) were popularized in the 1990s by Dr. Alexander Shulgin and Ann Shulgin in their book, PiHKAL: A Chemical Love Story, where PiHKAL stands for 'Phenethylamines I Have Known and Loved'. This book includes, among other things, synthesis procedures and dosages for over 200 psychedelic compounds. The simplest compound, phenethylamine (Figure 2), is a natural compound which is rapidly metabolized by monoamine oxidases to phenylacetic acid. Its structural similarity to the neurotransmitter dopamine (Figure 2) is readily apparent. The most commonly abused phenethylamines have methoxy groups in positions 2 and 5 of the aromatic ring plus distinct lipophilic substituents (alkyl, halogen, alkylthio, etc.) at the 4 position. The separation of the primary amine from the phenyl ring by two carbons defines these '2C' compounds. An addition at the *para* position is denoted in the name by a single letter (*e.g.,* Cl, 2C-C; ethyl, 2C-E). Phenethylamines can activate a variety of receptors, most notably the serotonin 5-$HT_{2A}$ and 5-$HT_{2C}$ receptors.[2,3] While only certain phenethylamines (*e.g.,* 2C-B) are regulated in the United States, most would be illegal under the Federal Analog Act, but only if intended for human consumption. Several, such as 2C-E and 2C-I, were popularized by PiHKAL, while other compounds, like 25I-NBOMe, have been developed more recently. They are often combined with monoamine oxidase inhibitors to reduce metabolism and prolong psychoactivity.

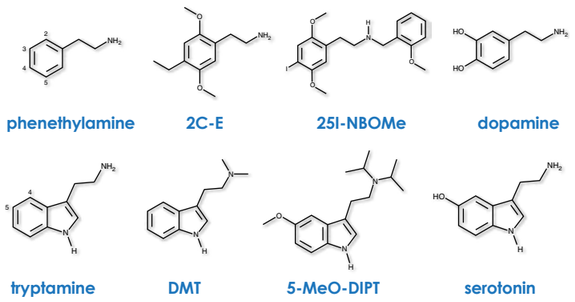



**Figure 2. Some phenethylamines (left) and tryptamines (right) compared to the neurotransmitters dopamine and serotonin (bottom)**

The Shulgins followed PiHKAL with TiHKAL: The Continuation, which includes dosages, effects, and synthetic pathways of 55 tryptamines which they knew and loved. The simplest tryptamine (or indoleamine) has two carbons separating a primary amine from an indole ring structure (Figure 2). Serotonin, or 5-hydroxytryptamine (5-HT), is a natural tryptamine that has diverse effects throughout the body. In general, tryptamines that are abused act as hallucinogens, activating 5-$HT_2$ receptors and altering the re-uptake of monoamines, like serotonin, dopamine, and norepinephrine.[4-6] Most commonly, the tryptamines differ in the number and types of amino-terminal alkyl groups and the presence of a hydroxy or methoxy group at the 4 or 5 indole position. All are metabolized by cytochrome P450 isoenzymes.[3] Some, like N,N-dimethyltryptamine (DMT), 5-MeO-DMT, and the mushroom psychedelic psilocin (4-OH-DMT), are naturally occurring compounds found in plants and animals. DMT, the prototypical tryptamine, is regulated in the US. A commonly abused designer drug is 5-methoxy-diisopropyltryptamine (5-MeO-DIPT, foxy, or foxy methoxy). Despite legislation, phenethylamines and tryptamines remain commonly abused.[7]

## Amphetamines and Cathinones

The simple addition of a methyl group to the α-carbon converts phenethylamine to amphetamine (Figure 3). The result is anything but subtle. While phenethylamines and tryptamines were known and loved, mostly as psychedelics and entactogens, amphetamines are potent psychostimulants. These drugs have value as medications, as in the use of Adderall for the treatment of attention deficit hyperactivity disorder and narcolepsy. However, amphetamines are known and abused worldwide, in spite of their proclivities for tolerance and dependence. Some of the most commonly abused amphetamines are modified on the primary amine, as in methamphetamine, or on the phenyl group, as in 3,4-methylenedioxy-N-methylamphetamine (MDMA, or ecstasy). Halogenated amphetamines, such as 4-fluoroamphetamine (4-FA), are also used recreationally. Many amphetamines profoundly increase dopamine concentrations in the CNS.[6] They can also increase serotonin and norepinephrine release and inhibit their re-uptake.[6]

Adding a β-keto group to the basic amphetamine structure gives cathinone, named after khat or qat, two great Scrabble words that refer to *Catha edulis,* a flowering plant whose leaves contain the monoamine alkaloid cathinone. The chewing of khat leaves has long been popular and commonplace in parts of Africa and the Arabian peninsula. However, recent widespread abuse of cathinones as the true designer drugs of the twenty-first century has led to the ban of the plant, as well as the compounds, in the US and other countries. The cathinone family includes a variety of β-keto analogs of

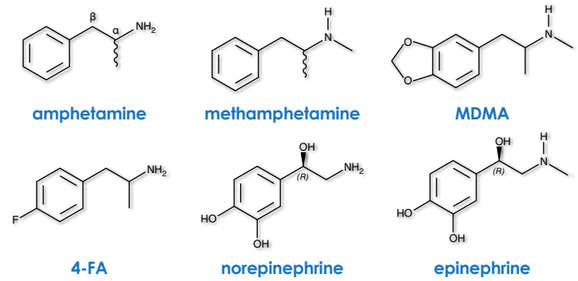
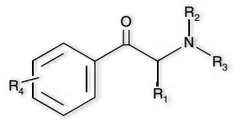



**Figure 3. The structures of some amphetamines, compared with norepinephrine and epinephrine (adrenaline)**

the amphetamines (Figure 4). Typical alterations include a variation of the α-carbon substituent ($R_1$), N-alkylation or inclusion of the nitrogen atom in a ring structure (*e.g.,* pyrrolidine) at $R_2$ and $R_3$, or an addition at the aromatic ring ($R_4$). 4-Methylmethcathinone, commonly known as mephedrone, Meow, or M-Cat, has been one of the most commonly detected products in bath salts and has been associated with sympathomimetic adverse effects (neurological CNS issues including headache, bruxism, seizures; psychiatric disturbances like anxiety, confusion, hallucinations; gastrointestinal, cardiovascular and renal problems).[8-10]

## Piperazines and Plant Products

Piperazines contain a six-membered ring with two nitrogen atoms at opposite positions in the ring (Figure 5). Interestingly, some piperazines act as anti-helmintics, anti-histamines, anti-depressants, anti-psychotics, or hardeners for epoxy resins and plastics. Other piperazines, like 1-benzylpiperazine (BZP), are used as recreational drugs, often distributed in party pills. Many mimic the actions of amphetamines, both physiologically and psychoactively, to the point that piperazines and amphetamines are indistinguishable to both



| Common Name | R1 | R2 | R3 | R4 |
|---|---|---|---|---|
| **Cathinone** | $CH_3$ | H | H | H |
| **Methcathinone (Ephedrone)** | $CH_3$ | $CH_3$ | H | H |
| **Ethcathinone** | $CH_3$ | $CH_2CH_3$ | H | H |
| **4-Methylmethcathinone (Mephedrone)** | $CH_3$ | $CH_3$ | H | 4-$CH_3$ |
| **4-Methylethcathinone** | $CH_3$ | $CH_2CH_3$ | H | 4-$CH_3$ |
| **4-Fluoromethcathinone (Flephedrone)** | $CH_3$ | $CH_3$ | H | 4-F |
| **3-Fluoromethcathinone** | $CH_3$ | $CH_3$ | H | 3-F |
| **4-Methoxymethcathinone (Methedrone)** | $CH_3$ | $CH_3$ | H | 4-$OCH_3$ |
| **Buphedrone** | $CH_2CH_3$ | $CH_3$ | H | H |
| **Methylone (bk-MDMA)** | $CH_3$ | $CH_3$ | H | 3,4-methylenedioxy |
| **Ethylone (bk-MDEA)** | $CH_3$ | $CH_2CH_3$ | H | 3,4-methylenedioxy |
| **Butylone (bk-MBDB)** | $CH_2CH_3$ | $CH_3$ | H | 3,4-methylenedioxy |
| **Pentylone** | $CH_2CH_2CH_3$ | $CH_3$ | H | 3,4-methylenedioxy |
| **MPPP** | $CH_3$ | pyrrolidinyl | | 4-$CH_3$ |
| **Pyrovalerone** | $CH_2CH_2CH_3$ | pyrrolidinyl | | 4-$CH_3$ |
| **MDPV (3,4-Methylenedioxypyrovalerone)** | $CH_2CH_2CH_3$ | pyrrolidinyl | | 3,4-methylenedioxy |

**Figure 4. Chemical structures of some common cathinones; adapted from Kikura-Hanajiri *et al.*[17]**

animal and human subjects.[6,11] Piperazines that are currently abused can be divided into two sub-classes, the benzylpiperazines, which includes BZP and its derivatives, and the phenylpiperazines, like 1-(*m*-trifluoromethylphenyl) piperazine (TFMPP).[12,13]

*Salvia divinorum* is a plant from the mint family whose growth range is limited to the cloud forests of Oaxaca, Mexico. Its leaves have long been used by shamans of the area to evoke altered states of consciousness. The primary psychoactive compound in salvia is salvinorin A (Figure 5), a diterpenoid which acts as a potent agonist of κ opioid and dopamine $D_2$ receptors.[14-16] Salvia is commonly claimed to be in herbal mixtures sold online, as it remains legal in many countries and is restricted in only a few states in the U.S.[17,18]

From the other side of the world comes *Mitragyna speciosa,* a tree that is phylogenetically related to coffee and jasmine and indigenous to Southeast Asia. The leaves of *Mitragyna* are commonly known as kratom and used for medicinal purposes, namely as a mild stimulant at lower doses and as a sedative at higher levels, as well as a substitute for opium. The leaves contain several biologically-active alkaloids, including mitragynine (Figure 5). This compound activates noradrenergic, serotonergic, and opioid receptors, with a higher affinity for the μ-opioid receptor over the δ or κ receptors.[19,20] 7-Hydroxymitragynine is a natural derivative of mitragynine that is less abundant in the mitragyna leaves but more potent than the parent compound. Leaves and alkaloids are available online and have been detected in herbal blends distributed as incense.[17]

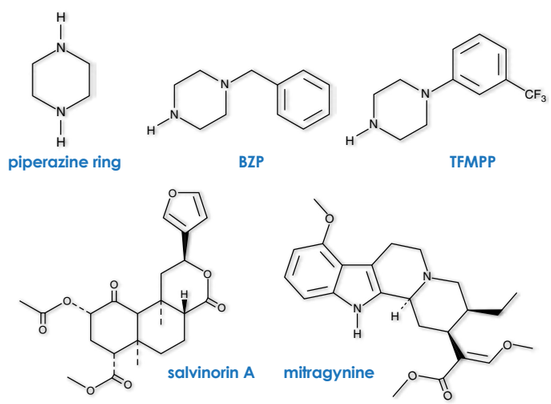



**Figure 5. Piperazines (above) and two psychoactive plant products (below)**

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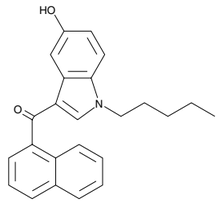
## JWH 018 5-hydroxyindole metabolite 9000852

**MF:** $C_{24}H_{23}NO_2$ **FW:** 357.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** A major urinary metabolite of JWH 018

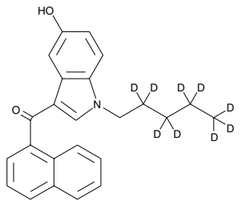
1 mg
5 mg
10 mg



## JWH 018 5-hydroxyindole metabolite-$d_9$ 10713

**MF:** $C_{24}H_{14}D_9NO_2$ **FW:** 366.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_9$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 018 5-hydroxyindole metabolite by GC- or LC-MS

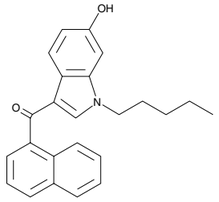
100 µg
500 µg
1 mg



## JWH 018 6-hydroxyindole metabolite 9000853

**MF:** $C_{24}H_{23}NO_2$ **FW:** 357.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** A minor urinary metabolite of JWH 018

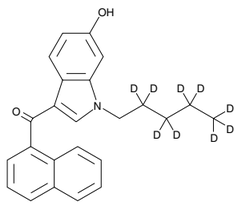
1 mg
5 mg
10 mg



## JWH 018 6-hydroxyindole metabolite-$d_9$ 10714

**MF:** $C_{24}H_{14}D_9NO_2$ **FW:** 366.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_9$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 018 6-hydroxyindole metabolite by GC- or LC-MS

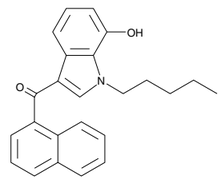
100 µg
500 µg
1 mg



## JWH 018 7-hydroxyindole metabolite 9000854

**MF:** $C_{24}H_{23}NO_2$ **FW:** 357.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A minor urinary metabolite of JWH 018

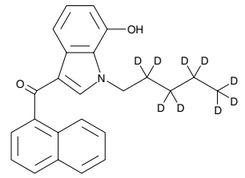
1 mg
5 mg
10 mg



## JWH 018 7-hydroxyindole metabolite-$d_9$ 10715

**MF:** $C_{24}H_{14}D_9NO_2$ **FW:** 366.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_9$); ≤1% $d_0$
A solution in methanol **Stability:** ≥2 years at -20°C
**Summary:** An internal standard for the quantification of JWH 018 7-hydroxyindole metabolite by GC- or LC-MS

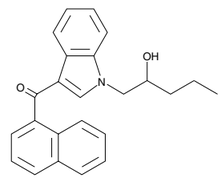
100 µg
500 µg
1 mg



## (±)-JWH 018 N-(2-hydroxypentyl) metabolite 11119

**MF:** $C_{24}H_{23}NO_2$ **FW:** 357.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potential metabolite of JWH 018, detectable in serum and in urine

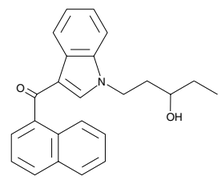
1 mg
5 mg
10 mg



## (±)-JWH 018 N-(3-hydroxypentyl) metabolite 11118

**MF:** $C_{24}H_{23}NO_2$ **FW:** 357.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A potential metabolite of JWH 018, detectable in serum and in urine

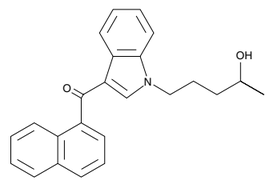
1 mg
5 mg
10 mg



## (±)-JWH 018 N-(4-hydroxypentyl) metabolite 10796

**MF:** $C_{24}H_{23}NO_2$ **FW:** 357.5 **Purity:** ≥97%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A urinary metabolite of JWH 018, characterized by monohydroxylation of the N-alkyl chain

1 mg
5 mg
10 mg



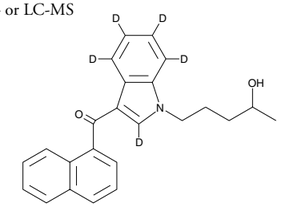




## (±)-JWH 018 N-(4-hydroxypentyl) metabolite-$d_5$ 10926

**MF:** $C_{24}H_{18}D_5NO_2$ **FW:** 362.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_5$); ≤1% $d_0$
A solution in methanol **Stability:** ≥2 years at -20°C
**Summary:** An internal standard for the quantification of (±)-JWH 018 N-(4-hydroxypentyl) metabolite by GC- or LC-MS

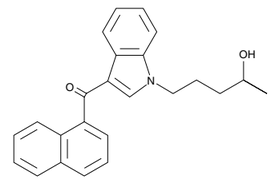
100 µg
500 µg
1 mg



## (+)-JWH 018 N-(4-hydroxypentyl) metabolite 10920

**MF:** $C_{24}H_{23}NO_2$ **FW:** 357.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A purified enantiomer of JWH 018 N-(4-hydroxypentyl) metabolite; intended for forensic purposes

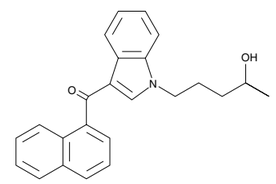
500 µg
1 mg
5 mg



## (-)-JWH 018 N-(4-hydroxypentyl) metabolite 10921

**MF:** $C_{24}H_{23}NO_2$ **FW:** 357.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A purified enantiomer of JWH 018 N-(4-hydroxypentyl) metabolite; intended for forensic purposes

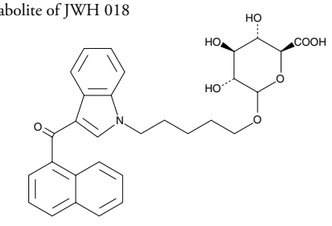
500 µg
1 mg
5 mg



## JWH 018 N-(5-hydroxypentyl) β-D-Glucuronide 10958

**MF:** $C_{30}H_{31}NO_8$ **FW:** 533.6 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A major urinary metabolite of JWH 018

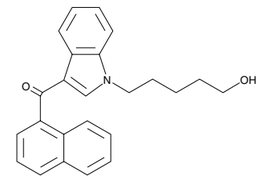
500 µg
1 mg



## JWH 018 N-(5-hydroxypentyl) metabolite 9000855

**MF:** $C_{24}H_{23}NO_2$ **FW:** 357.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A major urinary metabolite of JWH 018, characterized by monohydroxylation of the N-alkyl chain

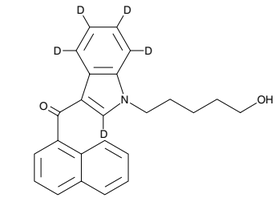
1 mg
5 mg
10 mg



## JWH 018 N-(5-hydroxypentyl) metabolite-$d_5$ 10933

**MF:** $C_{24}H_{18}D_5NO_2$ **FW:** 362.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_5$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 018 N-(5-hydroxypentyl) metabolite by GC- or LC-MS

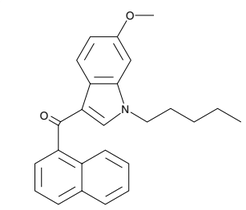
100 µg
500 µg
1 mg



## JWH 018 6-methoxyindole analog 10697

**MF:** $C_{25}H_{25}NO_2$ **FW:** 371.5 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
**Summary:** Analog of JWH 018 6-hydroxyindole metabolite, a urinary metabolite of the CB receptor agonist JWH 018

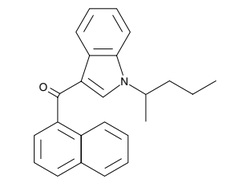
1 mg
5 mg
10 mg



## JWH 018 N-(1-methylbutyl) isomer 9001002

*JWH 073 1-methylbutyl homolog*
**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs from JWH 018 structurally by having a methylbutyl chain, rather than a pentyl chain, extending from the indole group

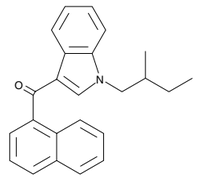
1 mg
5 mg
10 mg



## JWH 018 N-(2-methylbutyl) isomer 10690

*JWH 073 2-methylbutyl homolog*
**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥97%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An analog of JWH 073, a selective agonist of the $CB_1$ receptor

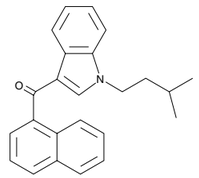
5 mg
10 mg
25 mg



## JWH 018 N-(3-methylbutyl) isomer 10691

*JWH 073 3-methylbutyl homolog*
**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥97%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An analog of JWH 073, a selective agonist of the $CB_1$ receptor

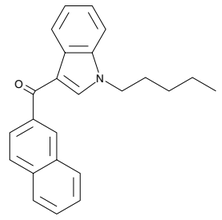
5 mg
10 mg
25 mg



## JWH 018 2'-naphthyl isomer 9001004

*[1131605-25-8]*
**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 018 by having the naphthyl group attached at the 2' position

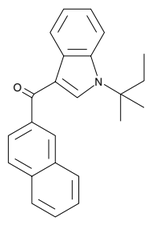
1 mg
5 mg
10 mg



## JWH 018 2'-naphthyl-N-(1,1-dimethylpropyl) isomer 9001007

**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A solution in acetonitrile **Stability:** ≥2 years at -20°C
**Summary:** Differs from JWH 018 structurally by having a 1,1-dimethylpropyl chain, rather than a pentyl chain, extending from the indole group and the naphthyl moiety attached at its 2 position

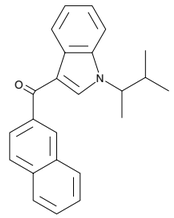
1 mg
5 mg
10 mg



## JWH 018 2'-naphthyl-N-(1,2-dimethylpropyl) isomer 9001006

**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs from JWH 018 structurally by having a 1,2-dimethylpropyl chain, rather than a pentyl chain, extending from the indole group and the naphthyl moiety attached at its 2 position

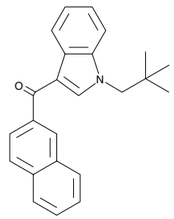
1 mg
5 mg
10 mg



## JWH 018 2'-naphthyl-N-(2,2-dimethylpropyl) isomer 9001008

**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 018 by having the naphthyl group attached at the 2' position and 2,2-dimethylpropyl in place of the pentyl chain

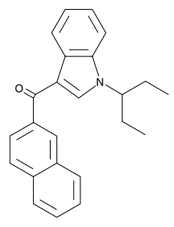
1 mg
5 mg
10 mg



## JWH 018 2'-naphthyl-N-(1-ethylpropyl) isomer 11586

**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An isomer of JWH 018, differing by having the naphthyl group attached at the 2, rather than 1, position, as well as an ethylpropyl group in place of the pentyl chain; intended for research and forensic applications

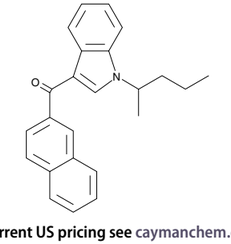
1 mg
5 mg
10 mg



## JWH 018 2'-naphthyl-N-(1-methylbutyl) isomer 9001009

**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs structurally from JWH 018 by having the naphthyl group attached at the 2' position and 1-methylbutyl in place of the pentyl chain

1 mg
5 mg
10 mg



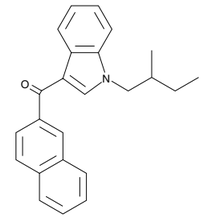




## JWH 018 2'-naphthyl-N-(2-methylbutyl) isomer 9001010

**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 018 by having the naphthyl group attached at the 2' position and 2-methylbutyl in place of the pentyl chain

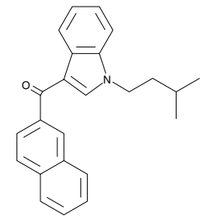
1 mg
5 mg
10 mg



## JWH 018 2'-naphthyl-N-(3-methylbutyl) isomer 9001005

**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs structurally from JWH 018 by having the naphthyl group attached at the 2' position and 3-methylbutyl in place of the pentyl chain

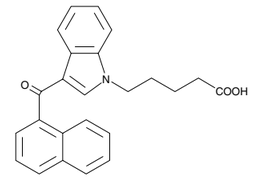
1 mg
5 mg
10 mg



## JWH 018 N-pentanoic acid metabolite 9000856

**MF:** $C_{24}H_{21}NO_3$ **FW:** 371.4 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A major urinary metabolite of JWH 018, characterized by monohydroxylation of the N-alkyl chain

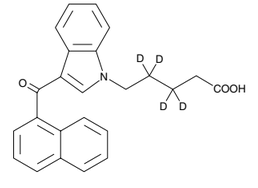
1 mg
5 mg
10 mg



## JWH 018 N-pentanoic acid metabolite-$d_4$ 9000867

**MF:** $C_{24}H_{17}D_4NO_3$ **FW:** 375.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_4$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 018 N-pentanoic acid metabolite by GC- or LC-MS

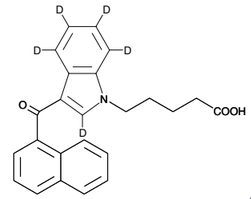
100 µg
500 µg
1 mg



## JWH 018 N-pentanoic acid metabolite-$d_5$ 11748

**MF:** $C_{24}H_{16}D_5NO_3$ **FW:** 376.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_5$); ≤1% $d_0$
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An internal standard for the quantification of JWH 018 N-pentanoic acid metabolite by GC- or LC-MS

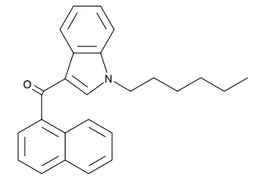
1 mg
5 mg
10 mg



## JWH 019 13633

*[209414-08-4]*
**MF:** $C_{25}H_{25}NO$ **FW:** 355.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A cannabimimetic indole that shows high-affinity for both $CB_1$ ($K_i$ = 9.8 nM) and $CB_2$ ($K_i$ = 5.6 nM) receptors

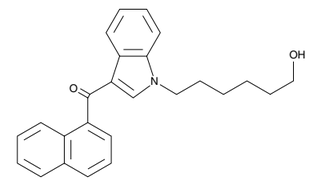
5 mg
10 mg
25 mg



## JWH 019 N-(6-hydroxyhexyl) metabolite 9000765

**MF:** $C_{25}H_{25}NO_2$ **FW:** 371.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An expected metabolite of JWH 019, detectable both in serum and urine

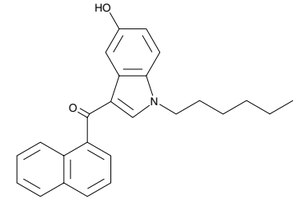
1 mg
5 mg
10 mg



## JWH 019 5-hydroxyindole metabolite 9000764

*JWH 019-M2*
**MF:** $C_{25}H_{25}NO_2$ **FW:** 371.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Expected to be a major metabolite, detectable in serum and urine, of JWH 019, based on the metabolism of the closely related compounds JWH 015 and JWH 018; biological effects are not known

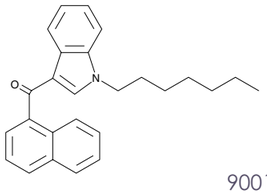
1 mg
5 mg
10 mg



## JWH 020 — 10850

*[209414-09-5]*
**MF:** $C_{26}H_{27}NO$ **FW:** 369.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A cannabimimetic indole derived from WIN 55,212-1; affinities for $CB_1$ and $CB_2$ receptors (128 and 205 nM, respectively) are significantly weaker than those of WIN 55,212-2 (1.89 and 0.28 nM, respectively)

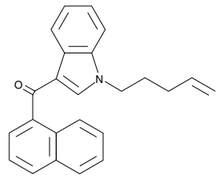
5 mg
10 mg
25 mg



## JWH 022 — 9001056

*[209414-16-4] AM2201 N-(4-pentenyl) analog*
**MF:** $C_{24}H_{21}NO$ **FW:** 339.4 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A cannabimimetic indole that is structurally related to JWH 018, a mildly selective agonist of the $CB_2$ receptor

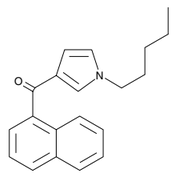
1 mg
5 mg
10 mg



## JWH 030 — 10831

*[162934-73-8]*
**MF:** $C_{20}H_{21}NO$ **FW:** 291.4 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A naphthoyl pyrrole cannabimimetic which activates the $CB_1$ receptor ($EC_{50}$ = 30.5 nM for rat, $K_i$ = 87 nM for mouse) better than $CB_2$ ($EC_{50}$ = 552 nM for human $CB_2$); potent *in vivo* in the mouse spontaneous activity and tail flick (antinociception) assays ($ED_{50}$ = 26.8 µM/kg)

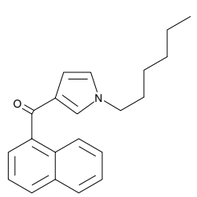
1 mg
5 mg
10 mg



## JWH 031 — 10824

*[162934-74-9]*
**MF:** $C_{21}H_{23}NO$ **FW:** 305.4 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A synthetic CB with a relatively low binding affinity for the central $CB_1$ receptor ($K_i$ = 399 nM); efficacious in reducing spontaneous activity and increasing antinociception in mice; intended for forensic and research applications

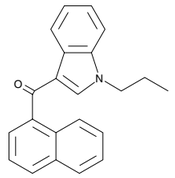
5 mg
10 mg
25 mg



## JWH 072 — 9001201

*[209414-06-2]*
**MF:** $C_{22}H_{19}NO$ **FW:** 313.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A synthetic CB that displays a higher affinity for the peripheral $CB_2$ receptor ($K_i$ = 170 nM) than the central $CB_1$ receptor ($K_i$ = 1,050 nM); intended for research and forensic purposes

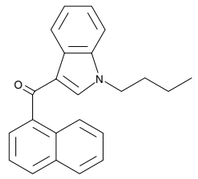
5 mg
10 mg
25 mg



## JWH 073 — 10904

*[208987-48-8]*
**MF:** $C_{23}H_{21}NO$ **FW:** 327.4 **Purity:** ≥97%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** A selective agonist of the $CB_1$ receptor with $K_i$ values of 8.9 and 38 nM for $CB_1$ and $CB_2$, respectively

5 mg
10 mg
25 mg

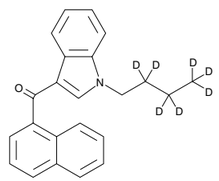


• Also Available: **JWH 073 (solution)** (13170)
*DEA-exempt formulation*

## JWH 073-$d_7$ (solution) — 9000868

**MF:** $C_{23}H_{14}D_7NO$ **FW:** 334.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_7$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 073 by GC- or LC-MS

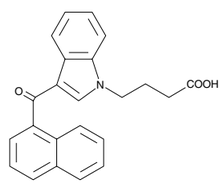
500 µg
1 mg
5 mg



## JWH 073 N-butanoic acid metabolite — 9000866

**MF:** $C_{23}H_{19}NO_3$ **FW:** 357.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Expected urinary metabolite of JWH 073

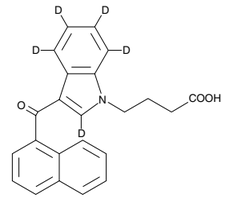
1 mg
5 mg
10 mg



## JWH 073 N-butanoic acid metabolite-$d_5$ — 9000870

**MF:** $C_{23}H_{14}D_5NO_3$ **FW:** 362.4 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_5$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quanitification of JWH 073 N-butanoic acid metabolite by GC- or LC-MS

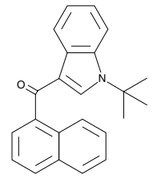
100 µg
500 µg
1 mg



## JWH 073 N-(1,1-dimethylethyl) isomer — 9001013

**MF:** $C_{23}H_{21}NO$ **FW:** 327.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 073 by having a 1,1-dimethylethyl group, rather than a butyl chain, extending from the indole group; intended for forensic and research applications

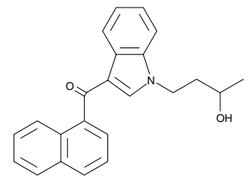
1 mg
5 mg
10 mg



## (±)-JWH 073 N-(3-hydroxybutyl) metabolite — 10795

**MF:** $C_{23}H_{21}NO_2$ **FW:** 343.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Expected product of the metabolism of JWH 073 by human liver microsomes *in vitro*, generated by the oxidation of the aminoalkyl chain; biological actions are unknown

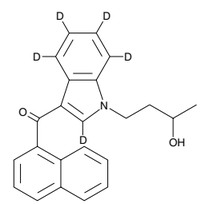
1 mg
5 mg
10 mg



## (±)-JWH 073 N-(3-hydroxybutyl) metabolite-$d_5$ — 10927

**MF:** $C_{23}H_{16}D_5NO_2$ **FW:** 348.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_5$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quanitification of (±)-JWH 073 N-(3-hydroxybutyl) metabolite by GC- or LC-MS

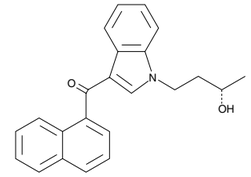
100 µg
500 µg
1 mg



## (S)-(+)-JWH 073 N-(3-hydroxybutyl) metabolite — 10898

**MF:** $C_{23}H_{21}NO_2$ **FW:** 343.4 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A purified single enantiomer of a major metabolite of JWH 073, produced by human liver microsomes *in vitro* and detected, as a glucuronidated form, in urine

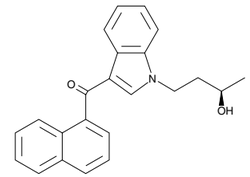
100 µg
500 µg
1 mg



## (R)-(-)-JWH 073 N-(3-hydroxybutyl) metabolite — 10899

**MF:** $C_{23}H_{21}NO_2$ **FW:** 343.4 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A purified single enantiomer of a major metabolite of JWH 073, produced by human liver microsomes *in vitro* and detected, as a glucuronidated form, in urine

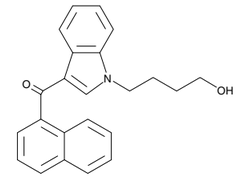
100 µg
500 µg
1 mg



## JWH 073 N-(4-hydroxybutyl) metabolite — 9000865

**MF:** $C_{23}H_{21}NO_2$ **FW:** 343.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Expected to be a major urinary metabolite of JWH 073

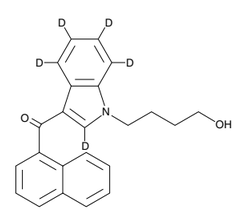
1 mg
5 mg
10 mg



## JWH 073 N-(4-hydroxybutyl) metabolite-$d_5$ — 10934

**MF:** $C_{23}H_{16}D_5NO_2$ **FW:** 348.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_5$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 073 N-(4-hydroxybutyl) metabolite by GC- or LC-MS

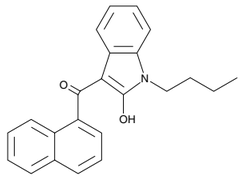
100 µg
500 µg
1 mg



## JWH 073 2-hydroxyindole metabolite 10633

**MF:** $C_{23}H_{21}NO_2$ **FW:** 343.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Expected urinary metabolite of JWH 073

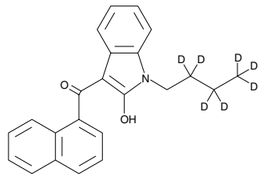
1 mg
5 mg
10 mg



## JWH 073 2-hydroxyindole metabolite-$d_7$ 10716

**MF:** $C_{23}H_{14}D_7NO_2$ **FW:** 350.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_7$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 073 2-hydroxyindole metabolite by GC- or LC-MS

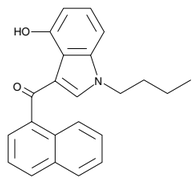
100 µg
500 µg
1 mg



## JWH 073 4-hydroxyindole metabolite 9000861

**MF:** $C_{23}H_{21}NO_2$ **FW:** 343.4 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
**Summary:** Expected urinary metabolite of JWH 073

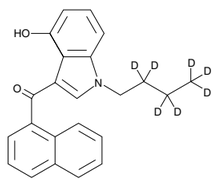
1 mg
5 mg
10 mg



## JWH 073 4-hydroxyindole metabolite-$d_7$ 10717

**MF:** $C_{23}H_{14}D_7NO_2$ **FW:** 350.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_7$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 073 4-hydroxyindole metabolite by GC- or LC-MS

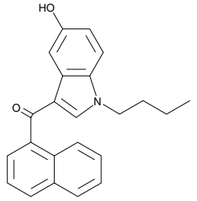
100 µg
500 µg
1 mg



## JWH 073 5-hydroxyindole metabolite 9000862

**MF:** $C_{23}H_{21}NO_2$ **FW:** 343.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** Expected urinary metabolite of JWH 073

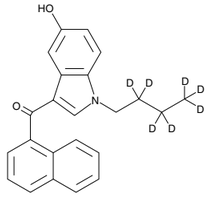
1 mg
5 mg
10 mg



## JWH 073 5-hydroxyindole metabolite-$d_7$ 10718

**MF:** $C_{23}H_{14}D_7NO_2$ **FW:** 350.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_7$); ≤1% $d_0$
A solution in acetonitrile **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 073 5-hydroxyindole metabolite by GC- or LC-MS

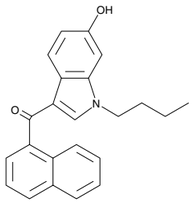
100 µg
500 µg
1 mg



## JWH 073 6-hydroxyindole metabolite 9000863

**MF:** $C_{23}H_{21}NO_2$ **FW:** 343.4 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Expected urinary metabolite of JWH 073

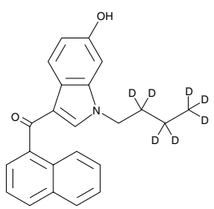
1 mg
5 mg
10 mg



## JWH 073 6-hydroxyindole metabolite-$d_7$ 10719

**MF:** $C_{23}H_{14}D_7NO_2$ **FW:** 350.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_7$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 073 6-hydroxyindole metabolite by GC- or LC-MS

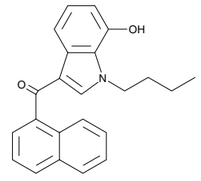
100 µg
500 µg
1 mg



## JWH 073 7-hydroxyindole metabolite 9000864

**MF:** $C_{23}H_{21}NO_2$ **FW:** 343.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Expected urinary metabolite of JWH 073

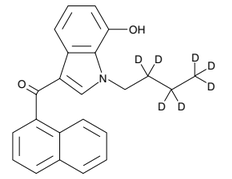
1 mg
5 mg
10 mg



## JWH 073 7-hydroxyindole metabolite-$d_7$ 10720

**MF:** $C_{23}H_{14}D_7NO_2$ **FW:** 350.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_7$); ≤1% $d_0$
A solution in methanol **Stability:** ≥2 years at -20°C
**Summary:** An internal standard for the quantification of JWH 073 7-hydroxyindole metabolite by GC- or LC-MS

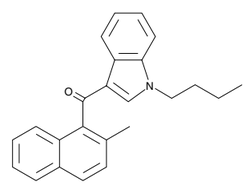
100 µg
500 µg
1 mg



## JWH 073 2-methylnaphthyl analog 10848

**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs structurally from JWH 073 by having a methyl group added at the 2 position of the naphthyl moiety

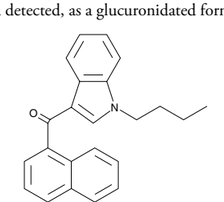
1 mg
5 mg
10 mg



## JWH 073 4-methylnaphthyl analog 9001076

*1-butyl-3-(1-(4-methyl)naphthoyl) indole, JWH 122 N-butyl analog*
**MF:** $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A purified single enantiomer of a major metabolite of JWH 073, produced by human liver microsomes *in vitro* and detected, as a glucuronidated form, in urine

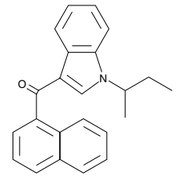
1 mg
5 mg
10 mg



## JWH 073 N-(1-methylpropyl) isomer 9001012

**MF:** $C_{23}H_{21}NO$ **FW:** 327.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 073 by having a methylpropyl chain, rather than a butyl group, extending from the indole group

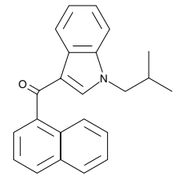
1 mg
5 mg
10 mg



## JWH 073 N-(2-methylpropyl) isomer 9001011

**MF:** $C_{23}H_{21}NO$ **FW:** 327.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 073 by having a methylpropyl chain, rather than a butyl group, extending from the indole group

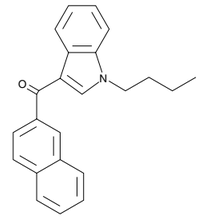
1 mg
5 mg
10 mg



## JWH 073 2'-naphthyl isomer 9001014

**MF:** $C_{23}H_{21}NO$ **FW:** 327.4 **Purity:** ≥97%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 073 by having the naphthyl group attached at the 2' position

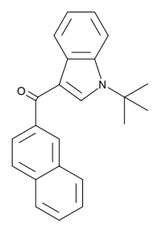
1 mg
5 mg
10 mg



## JWH 073 2'-naphthyl-N-(1,1-dimethylethyl) isomer 9001017

**MF:** $C_{23}H_{21}NO$ **FW:** 327.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 073 by having the naphthyl group attached at the 2 position and a 1,1-dimethylethyl group in place of a butyl chain; intended for forensic and research applications

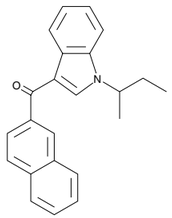
1 mg
5 mg
10 mg



## JWH 073 2'-naphthyl-N-(1-methylpropyl) isomer 9001016

**MF:** $C_{23}H_{21}NO$ **FW:** 327.4 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs structurally from JWH 073 by having the naphthyl group attached at the 2' position and a 1-methylpropyl group in place of a butyl chain

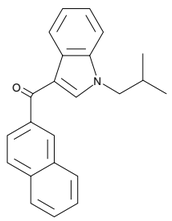
1 mg
5 mg
10 mg



## JWH 073 2'-naphthyl-N-(2-methylpropyl) isomer 9001015

**MF:** $C_{23}H_{21}NO$ **FW:** 327.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 073 by having the naphthyl group attached at the 2' position and a 2-methylpropyl group in place of a butyl chain

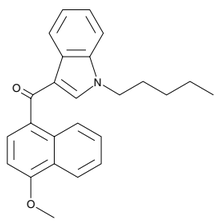
1 mg
5 mg
10 mg



## JWH 081 10579

*[210179-46-7]*
**MF:** $C_{25}H_{25}NO_2$ **FW:** 371.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A cannabimimetic indole with selectivity for the $CB_1$ receptor ($K_i$ = 1.2 nM) and ten-fold reduced affinity for the $CB_2$ receptor ($K_i$ = 12.4 nM)

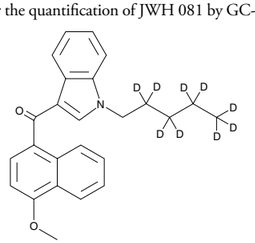
5 mg
10 mg
25 mg



## JWH 081-$d_9$ 10511

**MF:** $C_{25}H_{16}D_9NO_2$ **FW:** 380.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_9$); ≤1% $d_0$
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An internal standard for the quantification of JWH 081 by GC- or LC-MS

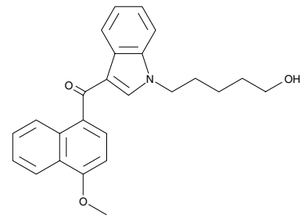
500 µg
1 mg
5 mg



## JWH 081 N-(5-hydroxypentyl) metabolite 9000768

**MF:** $C_{25}H_{25}NO_3$ **FW:** 387.5 **Purity:** ≥95%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Expected metabolite of JWH 081 that would be detectable both in serum and in urine

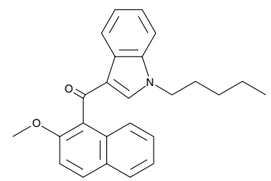
1 mg
5 mg
10 mg



## JWH 081 2-methoxynaphthyl isomer 9001044

*[824960-76-1] JWH 267*
**MF:** $C_{25}H_{25}NO_2$ **FW:** 371.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 081 by having the methoxy group attached to the naphthyl rings at the 2' position

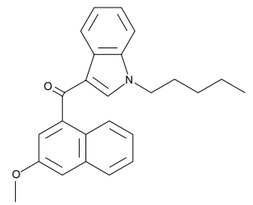
1 mg
5 mg
10 mg



## JWH 081 3-methoxynaphthyl isomer 9001045

**MF:** $C_{25}H_{25}NO_2$ **FW:** 371.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs structurally from JWH 081 by having the methoxy group attached to the naphthyl rings at the 3 position, instead of the 4 position; intended for forensic and research purposes

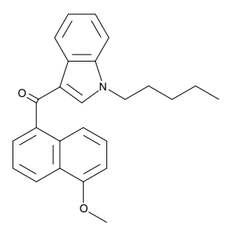
1 mg
5 mg
10 mg



## JWH 081 5-methoxynaphthyl isomer 9001046

**MF:** $C_{25}H_{25}NO_2$ **FW:** 371.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 081 by having the methoxy group attached to the naphthyl rings at the 5 position, instead of the 4 position

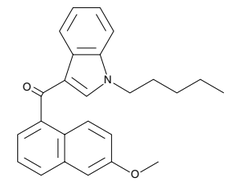
1 mg
5 mg
10 mg



## JWH 081 6-methoxynaphthyl isomer 9001047

*[824961-41-3] JWH 166*
**MF:** $C_{25}H_{25}NO_2$ **FW:** 371.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 081 by having the methoxy group attached to the naphthyl rings at the 6 position, instead of the 4 position ; intended for forensic and research purposes

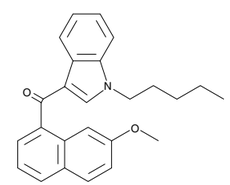
1 mg
5 mg
10 mg



## JWH 081 7-methoxynaphthyl isomer 9001048

*[824961-61-7] JWH 164*
**MF:** $C_{25}H_{25}NO_2$ **FW:** 371.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs structurally from JWH 081 by having the methoxy group attached to the naphthyl rings at the 7 position, instead of the 4 position

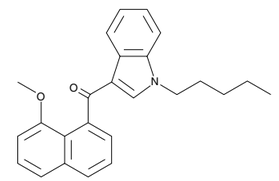
1 mg
5 mg
10 mg



## JWH 081 8-methoxynaphthyl isomer 9001049

**MF:** $C_{25}H_{25}NO_2$ **FW:** 371.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs structurally from JWH 081 by having the methoxy group attached to the naphthyl rings at the 8 position, instead of the 4 position; intended for forensic and research purposes

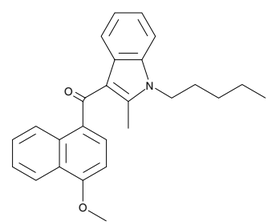
1 mg
5 mg
10 mg



## JWH 098 10680

*[316189-74-9]*
**MF:** $C_{26}H_{27}NO_2$ **FW:** 385.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent synthetic CB, activating the $CB_1$ receptor with a $K_i$ value of 4.5 nM and the $CB_2$ receptor with a $K_i$ value of 1.88 nM; effects in cells and animals are unknown

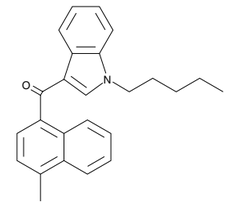
1 mg
5 mg
10 mg
25 mg



## JWH 122 10591

*[619294-47-2]*
**MF:** $C_{25}H_{25}NO$ **FW:** 355.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** A CB that displays high-affinities for both $CB_1$ ($K_i$ = 0.69 nM) and $CB_2$ ($K_i$ = 1.2 nM) receptors

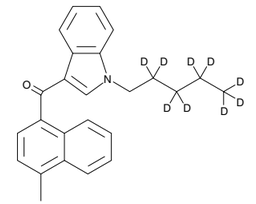
5 mg
10 mg
25 mg



## JWH 122-$d_9$ 10512

**MF:** $C_{25}H_{16}D_9NO$ **FW:** 364.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_9$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 122 by GC- or LC-MS

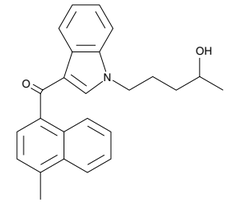
500 µg
1 mg
5 mg



## JWH 122 N-(4-hydroxypentyl) metabolite 11784

**MF:** $C_{25}H_{25}NO_2$ **FW:** 371.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An expected phase I metabolite of JWH 122, detectable in serum and urine; intended for research and forensic applications

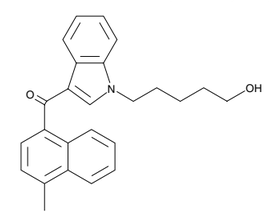
1 mg
5 mg
10 mg



## JWH 122 N-(5-hydroxypentyl) metabolite 10925

*MAM2201 N-(5-hydroxypentyl) metabolite*
**MF:** $C_{25}H_{25}NO_2$ **FW:** 371.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A metabolite of JWH 122 that is characterized by monohydroxylation of the N-alkyl chain

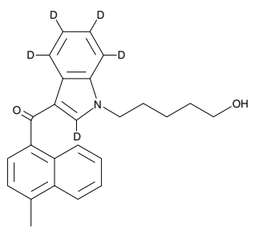
1 mg
5 mg
10 mg



## JWH 122 N-(5-hydroxypentyl) metabolite-$d_5$ 11475

*MAM2201 N-(5-hydroxypentyl) metabolite-$d_5$*
**MF:** $C_{25}H_{20}D_5NO_2$ **FW:** 376.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_5$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 122 N-(5-hydroxypentyl) metabolite by GC- or LC-MS

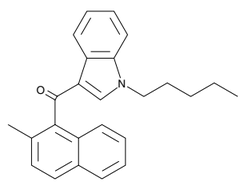
100 µg
500 µg
1 mg



## JWH 122 2-methylnaphthyl isomer 9001032

**MF:** $C_{25}H_{25}NO$ **FW:** 355.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs from JWH 122 in that the methyl group is attached to the naphthyl rings at the 2, rather than the 4, position

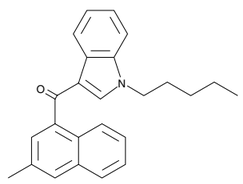
1 mg
5 mg
10 mg



## JWH 122 3-methylnaphthyl isomer 9001033

**MF:** $C_{25}H_{25}NO$ **FW:** 355.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs from JWH 122 in that the methyl group is attached to the naphthyl rings at the 3, rather than the 4, position; intended for forensic purposes

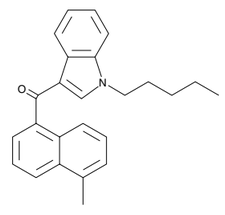
1 mg
5 mg
10 mg



## JWH 122 5-methylnaphthyl isomer 9001034

**MF:** $C_{25}H_{25}NO$ **FW:** 355.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs from JWH 122 in that the methyl group is attached to the naphthyl rings at the 5, rather than the 4, position; intended for forensic purposes

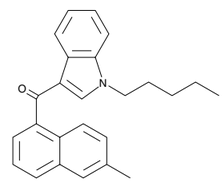
1 mg
5 mg
10 mg



## JWH 122 6-methylnaphthyl isomer 9001035

**MF:** $C_{25}H_{25}NO$ **FW:** 355.5 **Purity:** ≥95%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs from JWH 122 in that the methyl group is attached to the naphthyl rings at the 6, rather than the 4, position

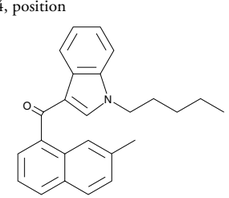
1 mg
5 mg
10 mg



## JWH 122 7-methylnaphthyl isomer 9001036

*[824960-56-7]*
**MF:** $C_{25}H_{25}NO$ **FW:** 355.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs from JWH 122 in that the methyl group is attached to the naphthyl rings at the 7, rather than the 4, position

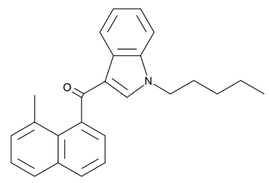
1 mg
5 mg
10 mg



## JWH 122 8-methylnaphthyl isomer 9001037

**MF:** $C_{25}H_{25}NO$ **FW:** 355.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs from JWH 122 in that the methyl group is attached to the naphthyl rings at the 8, rather than the 4, position

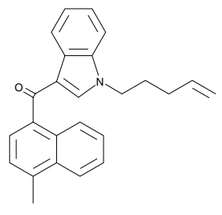
1 mg
5 mg
10 mg



## JWH 122 N-(4-pentenyl) analog 11611

*JWH 022 4-methylnaphthyl analog, MAM2201 N-(4-pentenyl) analog*
**MF:** $C_{25}H_{23}NO$ **FW:** 353.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Structurally related to JWH 122, differing only by the presence of a terminal double bond on the acyl chain; intended for forensic and research applications

1 mg
5 mg
10 mg



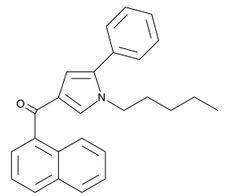




## JWH 145 10825

*[914458-19-8]*
**MF:** $C_{26}H_{25}NO$ **FW:** 367.5 **Purity:** ≥95%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A (1-naphthoyl)pyrrole analog of JWH 018 that potently activates both $CB_1$ and $CB_2$ receptors ($K_i$ values of 14 and 6.4 nM, respectively)

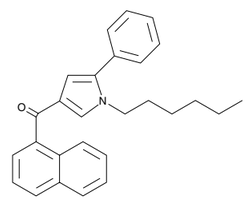
1 mg
5 mg
10 mg
25 mg



## JWH 147 10826

*[914458-20-1]*
**MF:** $C_{27}H_{27}NO$ **FW:** 381.5 **Purity:** ≥95%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** A synthetic CB with a high affinity for both the central $CB_1$ receptor ($K_i$ = 11 nM) and the peripheral $CB_2$ receptor ($K_i$ = 7.1 nM); intended for research and forensic applications

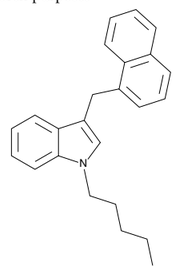
5 mg
10 mg
25 mg



## JWH 175 11201

*[619294-35-8]*
**MF:** $C_{24}H_{25}N$ **FW:** 327.5 **Purity:** ≥98%
A solution in acetonitrile **Stability:** ≥1 year at -20°C
**Summary:** A synthetic CB that potently activates the central $CB_1$ receptor ($K_i$ = 22 nM); intended for forensic and research purposes

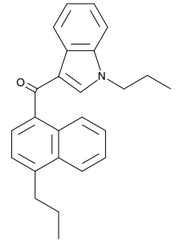
5 mg
10 mg
25 mg



## JWH 180 9001205

*[824959-87-7]*
**MF:** $C_{25}H_{25}NO$ **FW:** 355.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent synthetic CB that binds both the central $CB_1$ receptor ($K_i$ = 26 nM) and the peripheral $CB_2$ receptor ($K_i$ = 9.6 nM); intended for research and forensic applications

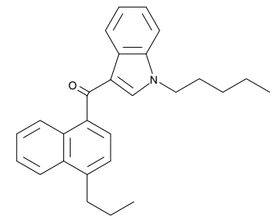
5 mg
10 mg
25 mg



## JWH 182 10643

*[824960-02-3]*
**MF:** $C_{27}H_{29}NO$ **FW:** 383.5 **Purity:** ≥97%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent synthetic CB, activating the central $CB_1$ receptor with a $K_i$ value of 0.65 nM and the peripheral $CB_2$ receptor with a $K_i$ value of 1.1 nM; effects in cells and animals are unknown

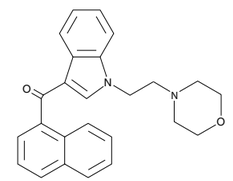
1 mg
5 mg
10 mg



## JWH 200 10902

*[103610-04-4]*
**MF:** $C_{25}H_{24}N_2O_2$ **FW:** 384.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An aminoalkylindole that acts as a CB receptor ligand, binding the $CB_1$ receptor with high-affinity ($IC_{50}$ = 7.8-42 nM)

5 mg
10 mg
25 mg

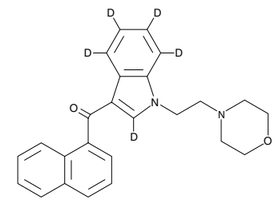


•Also Available: **JWH 200 (solution)** (13171)
*DEA-exempt formulation*

## JWH 200-$d_5$ 10903

**MF:** $C_{25}H_{19}D_5N_2O_2$ **FW:** 389.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_5$); ≤1% $d_0$
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An internal standard for the quantification of JWH 200 by GC- or LC-MS

500 µg
1 mg
5 mg

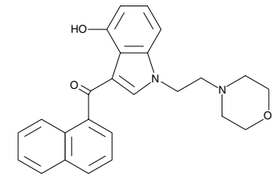


•Also Available: **JWH 200-$d_5$ (solution)** (10682)
*DEA-exempt formulation*

## JWH 200 4-hydroxyindole metabolite 10744

**MF:** $C_{25}H_{24}N_2O_3$ **FW:** 400.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Expected to be a urinary metabolite of JWH 200 based on the metabolism of the closely-related JWH 015 and JWH 018

1 mg
5 mg
10 mg



Olivia L. May, Ph.D.

# Regulating Endocannabinoid Levels

## CB receptor ligands, MAGL, FAAH

THC, the active ingredient in marijuana, and the body's own natural forms of THC, anandamide (or arachidonyl ethanolamide (AEA)) and 2-arachidonoyl glycerol (2-AG) produce effects by binding to and activating the cannabinoid $(CB)_1$ receptor and the $CB_2$ receptor.

$CB_1$ is one of the most widely expressed receptors on cells throughout the body, and it is particularly abundant in the brain where it is responsible for mediating the well-known effects of the typical marijuana high (including pain control, memory blocking, and appetite enhancement). In general, however, $CB_1$ modulates the activity of other systems in the brain. $CB_1$ receptors are distributed across the terminals of an axon, which delivers signals to another neuron across a synapse. Greater activity in the synapse tends to produce an upsurge of the brain's endogenous cannabinoids (endocannabinoids), which bind to $CB_1$ and trigger a change in the flow of signals across the synapse (Figure 1). $CB_1$ receptors are found on two broad classes of nerve terminals: excitatory, which increase the activity of target neurons, and inhibitory, which reduce activity. $CB_1$, therefore, can either enhance or diminish synaptic signaling depending on which of these systems it modulates. Thus, any manipulation with $CB_1$ agonists or antagonists could potentially have a host of effects, depending on the systems affected.

The other cannabinoid receptor, $CB_2$, was long considered a peripheral cannabinoid receptor, meaning that $CB_2$ receptors weren't present in the central nervous system, but were, however, abundant in the immune system, and seemed to be involved in inflammation as well as pain responses.[1] $CB_2$ receptors, though, have now been located in the central nervous system, and have been shown to be active in the brain during certain kinds of inflammatory responses.[2]

### Cannabinoid receptor ligands

As the brain's main endocannabinoid activating $CB_1$, anandamide (named for the Sanskrit word for bliss) has been shown to have analgesic, anti-anxiety and antidepressant roles, as well as connections to feeding control and obesity. In addition to the reinforcing influence on brain reward processes, $CB_1$ agonists have a number of other effects, particularly on movement, through receptors in the basal ganglia, and on cognition, by altering sensory perception through receptors in the cerebral cortex, and impacting memory by means of receptors in the hippocampus.[3]

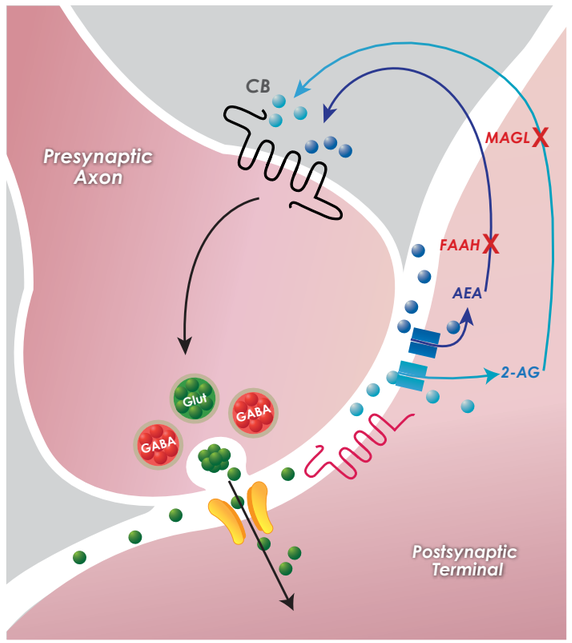



**Figure 1. Endocannabinoid signaling at the synapse. Glut = excitatory; GABA = inhibitory**

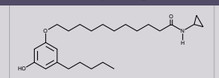
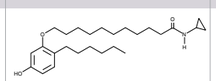
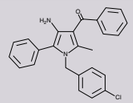
Direct pharmacological $CB_1$ agonists have been sought after to produce medicinally useful effects, such as pain relief, but a number of undesirable side effects, including locomotor and cognitive impairments, as well as abuse liability, prove hard to avoid. Additionally, many synthetic $CB_1$ ligands, modeled after metabolically labile AEA or 2-AG, are difficult to work with due to rapid degradation, polymerization, or high lipophilicity.[4] CB-25 and CB-52, derived from olivetol, the biosynthetic precursor of THC, were designed as analogs with promising analgesic activity that overcome the instability of AEA and its analogs.[5] With high affinity and specificity for $CB_1$ and $CB_2$ receptors, CB-25 and CB-52, behave *in vitro* mostly as $CB_1$ indirect agonists (inhibiting inactivation) and $CB_2$ neutral (inactive) antagonists, demonstrating efficacy in models of pain.[6] Little has been reported to clarify their activity *in vivo*. Invariably though, it has proved complicated to uncouple beneficial and negative properties of direct $CB_1$ agonists, limiting their therapeutic utility.

A somewhat similar complication surfaced with rimonabant, a $CB_1$ receptor inverse agonist, pursued for its utility in reducing food intake and body-weight gain. Rimonabant was quickly suspended from distribution when serious psychiatric side effects were attributed to its indiscriminate activity on $CB_1$ receptors in the CNS.[7] To circumvent these issues, a comparable compound, URB447, a mixed $CB_1$ receptor antagonist/$CB_2$ receptor agonist that does not cross the blood-brain barrier (to antagonize $CB_1$ receptors in the CNS), was developed to selectively block peripheral $CB_1$ receptors located in the gastrointestinal tract.[8]

### FAAH Inhibitors

Anandamide is degraded fairly quickly by fatty acid amide hydrolase (FAAH) near the synapses it activates. Genetic deletion of the *faah* gene in mice elevates brain anandamide levels and amplifies its antinociceptive effects.[9] Likewise, pharmacological blockade of FAAH activity reduces nocifensive behavior in animal models of acute and inflammatory pain.[10,11] Daniele Piomelli at the University of California-Irvine together with research teams at the Universities of Urbino and Parma in Italy developed URB597 (formulated for potential human use under the name KDS-4103), which prevents the breakdown of anandamide by specifically blocking the FAAH enzyme at low nanomolar concentrations.[12-14] Theoretically without degradation by FAAH, anandamide accumulates in tissues to levels sufficient to selectively activate more cannabinoid receptors. Under these conditions, a higher level of activity is maintained primarily where anandamide already signals and to a lesser extent in other areas of the CNS and periphery where the boosting of such activity could produce undesired side effects. When URB597 was administered in chronically stressed lab rodents, anandamide levels indeed increased and produced a physiological effect similar to that produced by certain antidepressant drugs by reducing inhibitory controls on a midbrain region where neurons deliver the neurotransmitters serotonin and noradrenaline.[15] By boosting the levels of these neurotransmitters in the brain of rodents and monkeys, URB597 provoked measurable antidepressant, anti-anxiety, and analgesic effects within 1-4 weeks of treatment.[15]

**Table 1. Cannabinoid Receptor Ligands**

| | | |
|---|---|---|
| **10010116** CB-25 exclusive |  | $CB_1$ receptor partial agonist ($K_i$ = 210 nM) and a $CB_2$ receptor neutral antagonist ($K_i$ = 30 nM) |
| **10010117** CB-52 exclusive |  | $CB_1$ receptor partial agonist ($K_i$ = 210 nM) and a $CB_2$ receptor neutral antagonist ($K_i$ = 30 nM) |
| **13261** URB447 |  | mixed $CB_1$ receptor antagonist ($IC_{50}$ = 313 nM) and a $CB_2$ receptor agonist ($IC_{50}$ = 41 nM) that does not cross the blood-brain barrier |

Importantly, FAAH inhibition does not reinforce other drug-taking behaviors, as THC and certain $CB_1$ agonists are known to do.[16] That is, the effects of anandamide were selectively targeted without inducing a potentially addictive, psychotropic high, like in cases of marijuana use. To circumvent activation of $CB_1$ receptors in the brain all-together, these same investigators developed the peripherally restricted inhibitor URB937. URB937 doesn't cross the blood-brain barrier, but it is still able to lessen pain by preventing the deactivation of anandamide at the site of an injury.[17] Anandamide has been shown to exert analgesic actions in various pain research models by binding strictly to peripheral $CB_1$ receptors.[18] Notably, there is likely little to no recreational effect with either URB597 or URB937.

### MAGL Inhibitors

Despite the structural similarities shared between AEA and 2-AG, a different serine hydrolase, monoacylglycerol lipase (MAGL) is the main enzyme responsible for inactivating 2-AG. Mice treated with the selective MAGL inhibitor JZL184 show 8- to 10-fold increases in brain 2-AG levels without changes in AEA content.[19] Distinct enzymes preferentially inactivating either anandamide or 2-AG have revealed key points of control over different endocannabinoid signaling events and produce only a subset of the behavioral effects observed with direct $CB_1$ agonists. For instance, inhibition of MAGL, but not FAAH, causes $CB_1$-dependent hypomotility.[19] Neither FAAH nor MAGL inhibitors have been shown to induce the cataleptic behavioral responses observed with direct $CB_1$ agonists and have largely proved inactive in models of drug abuse, such as drug discrimination assays.[20-22] Therefore, selective blockade of FAAH or MAGL can be used to tease apart some of the beneficial and undesirable effects of $CB_1$ activation.

**Table 2. FAAH Inhibitors**

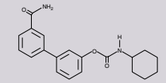
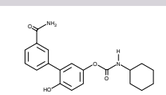
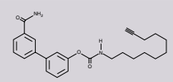
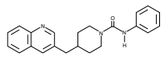
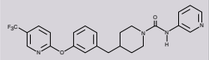
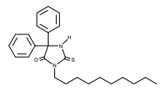
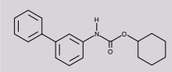
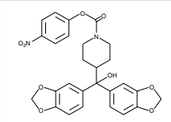
| | | |
|---|---|---|
| **10046** URB597 |  | inhibits FAAH ($IC_{50}$ = 4.6 nM in brain membranes and 0.5 nM in intact neurons) resulting in reduced sensation of pain in *in vivo* mouse models |
| **10674** URB937 exclusive |  | peripherally-specific FAAH inhibitor ($IC_{50}$ = 26.8 nM, *in vitro*) that does not cross the blood-brain barrier |
| **10008661** JP104 |  | irreversible FAAH inhibitor of the carbamate class ($IC_{50}$ = 7.3 nM for the human recombinant enzyme) |
| **10010908** PF-750 |  | irreversible FAAH inhibitor ($IC_{50}$S = 0.6 and 0.016 µM when preincubated with FAAH for 5 and 60 minutes, respectively) |
| **13279** PF-3845 |  | potent, selective, irreversible FAAH inhibitor ($K_i$ = 0.23 µM) |
| **10010032** CAY10570 |  | reversible, competitive FAAH inhibitor ($IC_{50}$ = 1.3 µM) with no affinity for the human $CB_1$ receptor |

**Table 3. MAGL Inhibitors**

| | | |
|---|---|---|
| **10007457** URB602 |  | selectively inhibits MAGL ($IC_{50}$ = 28 µM for the rat brain enzyme) and does not inhibit FAAH at concentrations up to 100 µM |
| **13158** JZL 184 |  | selectively inhibits MAGL ($IC_{50}$ = 8 nM) over FAAH $IC_{50}$= 4 µM) in mouse brain membranes |

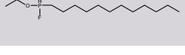
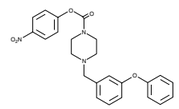
### Dually Inhibiting both FAAH and MAGL

On the other hand, pharmacologically inhibiting both FAAH and MAGL activities simultaneously to elevate brain levels of both AEA and 2-AG can give combined effects. Selective blockade of both FAAH and MAGL is sufficient to produce additive endocannabinoid activity in pain and catalepsy assays.[23] These behaviors include catalepsy and THC-like drug discrimination responses, indicating that some of the undesirable effects of direct $CB_1$ agonists derive from crosstalk between AEA and 2-AG signaling pathways. JZL195 is one such inhibitor that inactivates both FAAH and MAGL with high efficacy and selectivity *in vivo*.[23] It simultaneously augments brain levels of both AEA and 2-AG, producing antinociceptive, cataleptic, and hypomotility effects like those produced by direct $CB_1$ agonists. JZL195 was developed to improve on shortcomings of the fluorophosphonate IDFP, another dual inhibitor of both FAAH and MAGL that proved too promiscuous, inhibiting many additional serine hydrolases and was toxic to mice when tested *in vivo*.[24]

### Conclusion

Unfortunately due to their potential to elicit psychoactive effects, many of these compounds have piqued the interest of recreational chemists and experimental drug users. Cayman is dedicated to working with forensic agencies to identify emerging new drugs by providing authentic reference standards, as well as with academic communities exploring the therapeutic opportunities that arise from regulating endocannabinoid levels. As such, the cannabinoid receptor ligands and FAAH/MAGL inhibitors listed in tables 1-4 are available for forensic and research purposes only.

**Table 4. Dual MAGL and FAAH Inhibitors**

| | | |
|---|---|---|
| **10215** IDFP |  | dually inhibits MAGL ($IC_{50}$ = 0.8 nM) and FAAH ($IC_{50}$ = 3 nM) |
| **13668** JZL 195 |  | simultaneously augments brain levels of AEA and 2-AG by inhibiting both FAAH ($IC_{50}$ = 2 nM) and MAGL ($IC_{50}$ = 4 nM) |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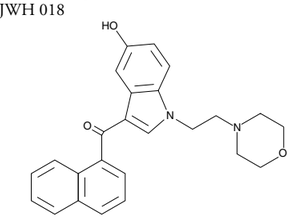
## JWH 200 5-hydroxyindole metabolite 10745

**MF:** $C_{25}H_{24}N_2O_3$ **FW:** 400.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Expected to be a urinary metabolite of JWH 200 based on the metabolism of the closely-related JWH 015 and JWH 018

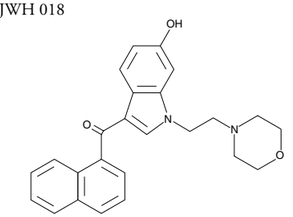
1 mg
5 mg
10 mg



## JWH 200 6-hydroxyindole metabolite 10746

**MF:** $C_{25}H_{24}N_2O_3$ **FW:** 400.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Expected to be a urinary metabolite of JWH 200 based on the metabolism of the closely-related JWH 015 and JWH 018

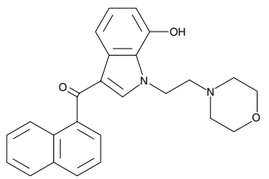
1 mg
5 mg
10 mg



## JWH 200 7-hydroxyindole metabolite 10747

**MF:** $C_{25}H_{24}N_2O_3$ **FW:** 400.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Expected to be a urinary metabolite of JWH 200 based on the metabolism of the closely related JWH 015 and JWH 018

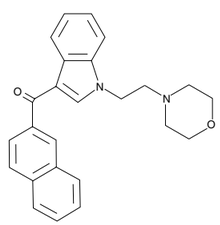
1 mg
5 mg
10 mg



## JWH 200 2'-naphthyl isomer 9000897

*[133438-66-1]*
**MF:** $C_{25}H_{24}N_2O_2$ **FW:** 384.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 200 by having the naphthyl group attached at the 2' position

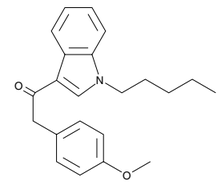
1 mg
5 mg
10 mg



## JWH 201 10721

*[864445-47-6]*
**MF:** $C_{22}H_{25}NO_2$ **FW:** 335.4 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
**Summary:** A synthetic CB with relatively poor affinities for both $CB_1$ ($K_i$ = 1.1 µM) and $CB_2$ ($K_i$ = 0.44 µM) receptors

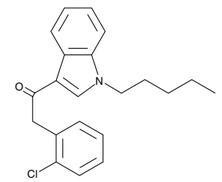
5 mg
10 mg
25 mg



## JWH 203 9000736

*[864445-54-5]*
**MF:** $C_{21}H_{22}ClNO$ **FW:** 339.9 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An analgesic chemical from the phenylacetylindole family that acts as a CB agonist with $K_i$ values of 8.0 and 7.0 nM at the $CB_1$ and $CB_2$ receptors, respectively

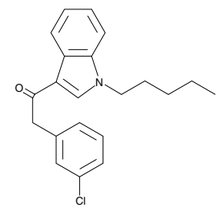
5 mg
10 mg
25 mg



## JWH 203 3-chlorophenyl isomer 10868

*[864445-56-7] JWH 203 3-chloro isomer, JWH 237*
**MF:** $C_{21}H_{22}ClNO$ **FW:** 339.9 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An analog of the phenylacetylindole CB agonist JWH 203 whose activity at the $CB_1$ and $CB_2$ receptors has not been reported

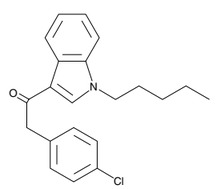
5 mg
10 mg
25 mg



## JWH 203 4-chlorophenyl isomer 10867

*[864445-58-9] JWH 203 4-chloro isomer, JWH 206*
**MF:** $C_{21}H_{22}ClNO$ **FW:** 339.9 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A synthetic CB with relatively poor affinities for both $CB_1$ ($K_i$ = 389 nM) and $CB_2$ ($K_i$ = 498 nM) receptors

5 mg
10 mg
25 mg

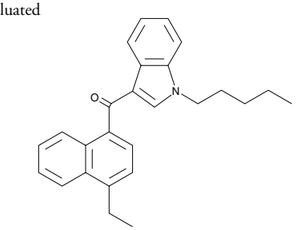




## JWH 210 10644

*[824959-81-1]*
**MF:** $C_{26}H_{27}NO$ **FW:** 369.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent cannabimimetic alkylindole, binding the $CB_1$ and $CB_2$ receptors with $K_i$ values of 0.46 and 0.69 nM, respectively; effects of JWH 210 in whole cells or organisms have not been evaluated

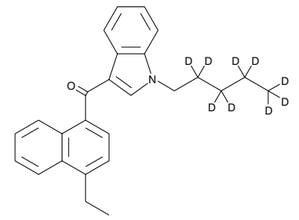
1 mg
5 mg
10 mg
25 mg



## JWH 210-$d_9$ 10510

**MF:** $C_{26}H_{10}D_9NO$ **FW:** 378.6 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_9$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 210 by GC- or LC-MS

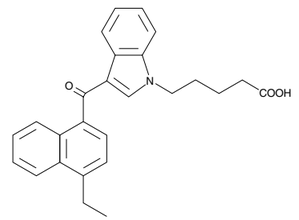
500 µg
1 mg
5 mg



## JWH 210 N-(5-carboxypentyl) metabolite 10941

**MF:** $C_{26}H_{25}NO_3$ **FW:** 399.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An expected metabolite of JWH 210, detectable primarily in the urine

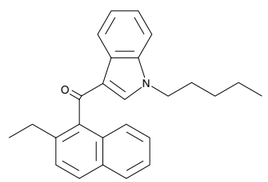
1 mg
5 mg
10 mg



## JWH 210 2-ethylnaphthyl isomer 9001038

**MF:** $C_{26}H_{27}NO$ **FW:** 369.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A positional isomer of JWH 210, having the ethyl side chain at the 2 position rather than at the 4 position of the naphthyl group; intended for forensic purposes

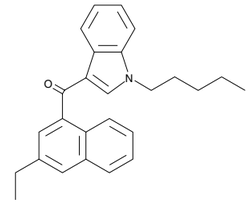
1 mg
5 mg
10 mg



## JWH 210 3-ethylnaphthyl isomer 9001039

**MF:** $C_{26}H_{27}NO$ **FW:** 369.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A positional isomer of JWH 210, having the ethyl side chain at the 3 position rather than at the 4 position of the naphthyl group; intended for forensic purposes

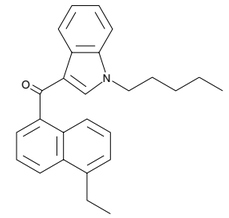
1 mg
5 mg
10 mg



## JWH 210 5-ethylnaphthyl isomer 9001040

**MF:** $C_{26}H_{27}NO$ **FW:** 369.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A positional isomer of JWH 210, having the ethyl side chain at the 5 position rather than at the 4 position of the naphthyl group; intended for forensic purposes

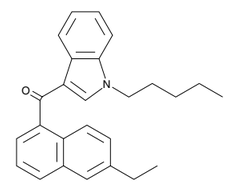
1 mg
5 mg
10 mg



## JWH 210 6-ethylnaphthyl isomer 9001041

**MF:** $C_{26}H_{27}NO$ **FW:** 369.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A positional isomer of JWH 210, having the ethyl side chain at the 6 position rather than at the 4 position of the naphthyl group; intended for forensic purposes

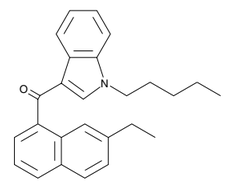
1 mg
5 mg
10 mg



## JWH 210 7-ethylnaphthyl isomer 9001042

*[824960-64-7] JWH 234*
**MF:** $C_{26}H_{27}NO$ **FW:** 369.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A positional isomer of JWH 210, having the ethyl side chain at the 7 position rather than at the 4 position of the naphthyl group; intended for forensic purposes

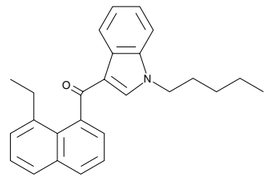
1 mg
5 mg
10 mg



## JWH 210 8-ethylnaphthyl isomer 9001043

**MF:** $C_{26}H_{27}NO$ **FW:** 369.5 **Purity:** ≥95%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A positional isomer of JWH 210, having the ethyl side chain at the 8 position rather than at the 4 position of the naphthyl group; intended for forensic purposes

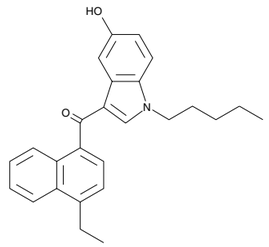
1 mg
5 mg
10 mg



## JWH 210 5-hydroxyindole metabolite 9000771

**MF:** $C_{26}H_{27}NO_2$ **FW:** 385.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An expected metabolite of JWH 210, detectable both in serum and urine

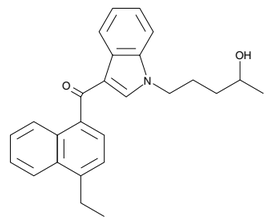
1 mg
5 mg
10 mg



## JWH 210 N-(4-hydroxypentyl) metabolite 10940

**MF:** $C_{26}H_{27}NO_2$ **FW:** 385.5 **Purity:** ≥95%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An expected metabolite of JWH 210, detectable in the serum and urine

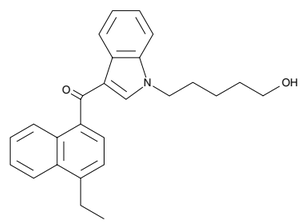
1 mg
5 mg
10 mg



## JWH 210 N-(5-hydroxypentyl) metabolite 9000772

**MF:** $C_{26}H_{27}NO_2$ **FW:** 385.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An expected metabolite of JWH 210, detectable in the serum and urine; intended for forensic purposes

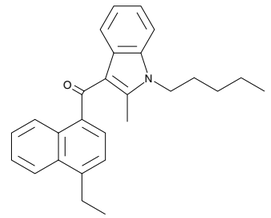
1 mg
5 mg
10 mg



## JWH 213 11659

*[824959-83-3]*
**MF:** $C_{27}H_{29}NO$ **FW:** 383.5 **Purity:** ≥98%
A solution in methanol **Stability:** ≥2 years at -20°C
**Summary:** A naphthoylindole-class synthetic cannabinoid (CB) which strongly binds both the central $CB_1$ and peripheral $CB_2$ receptor ($K_i$ values of 1.5 and 0.42 nM, respectively); intended for forensic and research applications

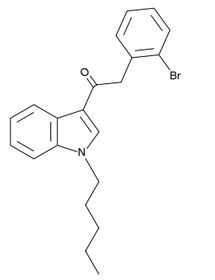
5 mg
10 mg
25 mg



## JWH 249 11153

*[864445-60-3]*
**MF:** $C_{21}H_{22}BrNO$ **FW:** 384.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A synthetic CB that potently activates the central $CB_1$ and peripheral $CB_2$ receptors ($K_i$ = 8.4 and 20 nM, respectively); intended for forensic and research purposes

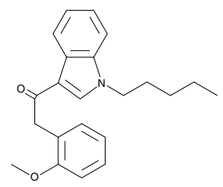
5 mg
10 mg
25 mg



## JWH 250 13634

*[864445-43-2]*
**MF:** $C_{22}H_{25}NO_2$ **FW:** 335.2 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A cannabimimetic indole that shows high affinity for both $CB_1$ ($K_i$ = 11 nM) and $CB_2$ ($K_i$ = 33 nM) receptors

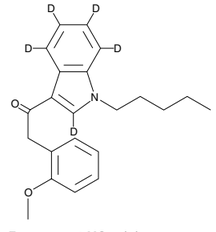
5 mg
10 mg
25 mg



## JWH 250-$d_5$ 10661

**MF:** $C_{22}H_{20}D_5NO_2$ **FW:** 340.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_5$); ≤1% $d_0$
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An internal standard for the quantification of JWH 250 by GC- or LC-MS

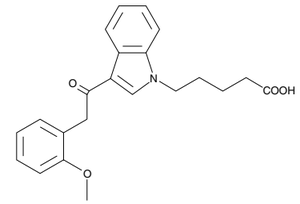
500 µg
1 mg
5 mg



## JWH 250 N-(5-carboxypentyl) metabolite 10938

**MF:** $C_{22}H_{23}NO_4$ **FW:** 365.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Expected metabolite of JWH 250 that would be detectable both in serum and in urine

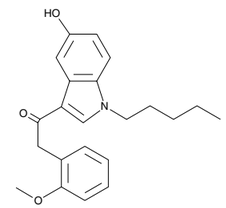
1 mg
5 mg
10 mg



## JWH 250 5-hydroxyindole metabolite 9000766

**MF:** $C_{22}H_{25}NO_3$ **FW:** 351.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Expected to be a metabolite of JWH 250 that would be detectable both in serum and in urine

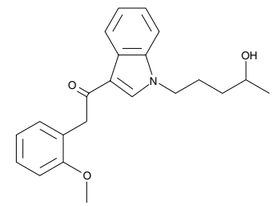
1 mg
5 mg
10 mg



## JWH 250 N-(4-hydroxypentyl) metabolite 10939

**MF:** $C_{22}H_{25}NO_3$ **FW:** 351.4 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Expected to be a cytochrome P450 phase I metabolite of JWH 250, detectable both in serum and urine

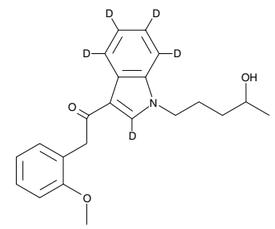
1 mg
5 mg
10 mg
25 mg



## JWH 250 N-(4-hydroxypentyl) metabolite-$d_5$ 11749

**MF:** $C_{22}H_{20}D_5NO_3$ **FW:** 356.5 **Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_5$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Intended for use as an internal standard for GC- or LC-MS

100 µg
500 µg
1 mg



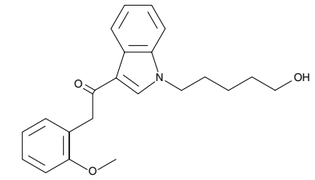




## JWH 250 N-(5-hydroxypentyl) metabolite 9000767

**MF:** $C_{22}H_{25}NO_3$ **FW:** 351.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Expected metabolite of JWH 250 that would be detectable both in serum and in urine

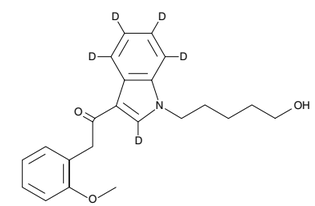
1 mg
5 mg
10 mg



## JWH 250 N-(5-hydroxypentyl) metabolite-$d_5$ 11474

**MF:** $C_{22}H_{20}D_5NO_3$ **FW:** 356.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_5$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 250 N-(5-hydroxypentyl) metabolite by GC- or LC-MS

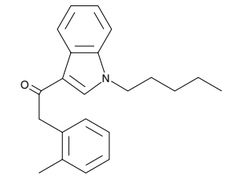
100 µg
500 µg
1 mg



## JWH 251 10578

*[864445-39-6]*
**MF:** $C_{22}H_{25}NO$ **FW:** 319.4 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
**Summary:** A cannabimimetic indole with selectivity for the $CB_1$ receptor ($K_i$ = 29 and 146 nM, for $CB_1$ and $CB_2$, respectively); stimulates GTPγS binding of $CB_1$ and $CB_2$ receptors with $EC_{50}$ values of 29 and 8.3 nM, respectively

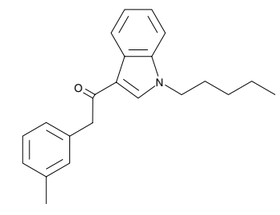
5 mg
10 mg
25 mg



## JWH 251 3-methylphenyl isomer 9001021

*JWH 251 3-methyl isomer*
**MF:** $C_{22}H_{25}NO$ **FW:** 319.4 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs from JWH 251 by having the methyl group at the 3 position, rather than the 2 position, on the phenyl group

5 mg
10 mg
25 mg



# CAYMAN LEADS THE WAY IN SYNTHETIC CANNABINOID FORENSIC ANALYSIS

## Synthetic Cannabinoid HPLC Mixtures

### Screen for Compounds most often Found in Designer Drugs

**AM • CP • JWH • HU • WIN**

**Synthetic Cannabinoid HPLC Mixture I** **13830**

**Purity:** ≥95% for each compound **Supplied as:** A solution in methanol
**Summary:** Contains (±)-CP 47,497, (±)-CP 47,497-C8-homolog, (±)-CP 55,940, HU-308, HU-331, JWH 015, JWH 018, JWH 019, JWH 073, JWH 200, JWH 250, and WIN 55212-2 (100 µg each)

1.2 mg

**Synthetic Cannabinoid HPLC Mixture II** **13850**

**Purity:** ≥95% for each compound **Supplied as:** A solution in methanol
**Summary:** Contains (±)-CP 47,497, (±)-CP 47,497-C8-homolog, HU-210, JWH 018, JWH 073, and JWH 200 (100 µg each)

600 µg

**Synthetic Cannabinoid HPLC Mixture III** **11335**

**Purity:** ≥95% for each compound **Supplied as:** A solution in methanol
**Summary:** Contains JWH 081, AM2201, JWH 210, RCS-4, RCS-8, JWH 201, JWH 398, JWH 251, JWH 016, and JWH 370

1 ea

**Synthetic Cannabinoid HPLC Mixture IV** **11336**

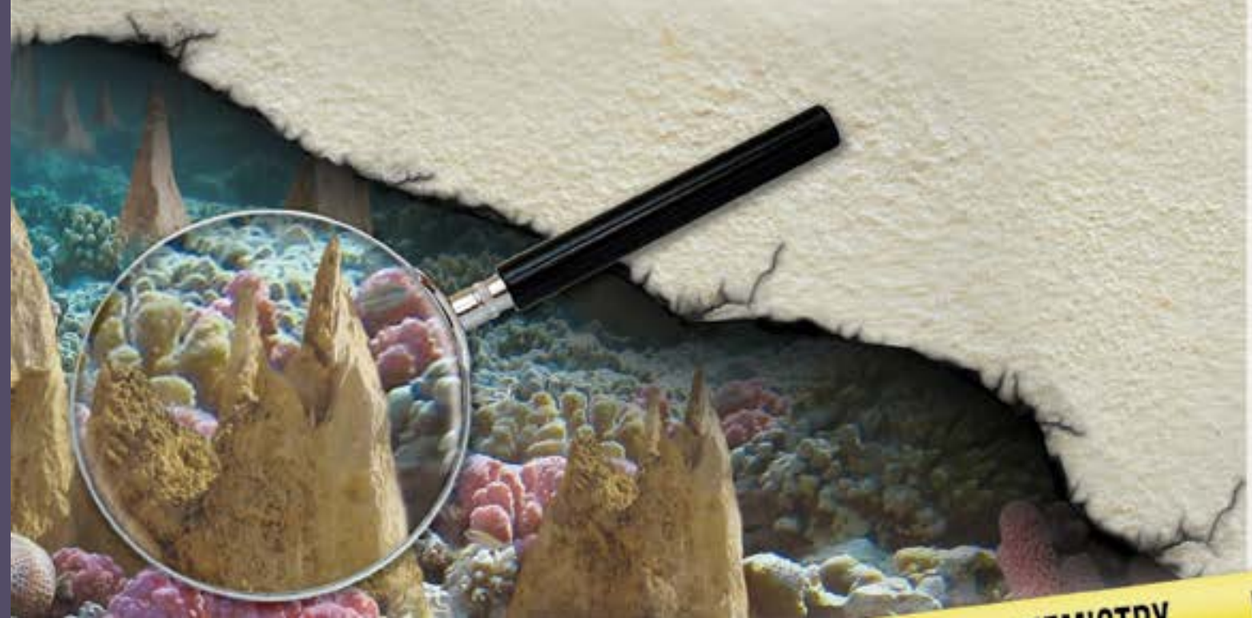
**Purity:** ≥95% for each compound **Supplied as:** A solution in methanol
**Summary:** Contains JWH 020, JWH 302, JWH 203, AM2233, JWH 098, Pravadoline, JWH 011, JWH 182, JWH 122, and JWH 022

1 ea

**Synthetic Cannabinoid HPLC Mixture V (AM Series)** **11337**

**Purity:** ≥95% for each compound **Supplied as:** A solution in methanol
**Summary:** Contains AM630, AM694, AM1220, AM1241, AM2201, and AM2233 (100 µg each)

1 ea



Item No. 580210

## JWH Metabolite ELISA

Cayman has developed this assay to detect a structural feature common to the urinary metabolites of many of the most popular synthetic cannabinoids (CBs), including JWH 018, JWH 073, JWH 200, JWH 122, JWH 398, AM2201, MAM2201, JWH 019, and JWH 022. This kit is intended to be used as a rapid, inexpensive, high-throughput screening tool for the detection of synthetic CB metabolites in urine. Because specific chemical modifications in various synthetic CB urinary metabolites can alter the relative strength of the signal in this assay, it is not possible to use this assay as a quantitative assay to determine the specific amounts of an individual CB in urine. Rather, it is designed to generate a qualitative positive versus negative answer. It is recommended that samples testing positive in Cayman's assay be confirmed and quantified using LC/MS. This assay has been validated with human urine samples, and demonstrates a high degree of correlation with LC/MS analysis.

### Detect K2/Spice Metabolites in Urine

**More time and cost effective than LC/MS • Rapid results in just a few hours**

**Optimized to minimize false positives • Highly accurate with nanomolar sensitivity**

### Specificity:

| Analyte | Cross Reactivity |
|---|---|
| JWH 018 N-pentanoic acid metabolite (Item No. 9000856) | 100% |
| JWH 200 (Item No. 10902) | 156% |
| (±)-JWH 073 N-(3-hydroxybutyl) metabolite (Item No. 10795) | 142% |
| JWH 073 N-butanoic acid metabolite (Item No. 9000866) | 131% |
| JWH 073 N-(4-hydroxybutyl) metabolite (Item No. 9000865) | 102% |
| (+)-JWH 018 N-(4-hydroxypentyl) metabolite (Item No. 10920) | 97% |
| JWH 018 N-(5-hydroxypentyl) metabolite (Item No. 9000855) | 76% |
| JWH 018 N-(4-hydroxypentyl) β-D-Glucuronide (Item No. 10959) | 73% |
| JWH 019 N-(6-hydroxyhexyl) metabolite (Item No. 9000765) | 59% |
| AM2201 N-(4-hydroxypentyl) metabolite (Item No. 10203) | 58% |
| JWH 073 (Item No. 10904) | 51% |
| AM2201 (Item No. 10707) | 39% |
| JWH 018 N-(5-hydroxypentyl) β-D-Glucuronide (Item No. 10958) | 38% |
| JWH 122 N-(5-hydroxypentyl) metabolite (Item No. 10925) | 32% |
| JWH 398 N-(5-hydroxypentyl) metabolite (Item No. 9000770) | 32% |

| Analyte | Cross Reactivity |
|---|---|
| JWH 022 (Item No. 9001056) | 30% |
| JWH 018 (Item No. 10900) | 15% |
| MAM2201 (Item No. 9001219) | 13% |
| JWH 210 N-(5-carboxypentyl) metabolite (Item No. 10941) | 11% |
| JWH 015 (Item No. 10009018) | 4.2% |
| JWH 122 (Item No. 10591) | 3.6% |
| JWH 081 N-(5-hydroxypentyl) metabolite (Item No. 9000768) | 3.2% |
| JWH 020 (Item No. 10850) | 2.5% |
| JWH 398 (Item No. 13636) | 2.4% |
| JWH 250 N-(5-carboxypentyl) metabolite (Item No. 10938) | 0.6% |
| JWH 210 (Item No. 10644) | 0.5% |
| Arachidonoyl Ethanolamide (Item No. 90050) | * |
| 2-Arachidonoyl Glycerol (Item No. 62160) | * |
| STS-135 (Item No. 11564) | * |
| XLR11 (Item No. 11565) | * |

* Not Detected

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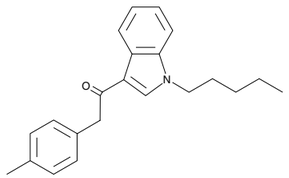
FORENSIC CHEMISTRY FORENSIC CHEMISTRY FORENSIC CHEMISTRY FORE

## JWH 251 4-methylphenyl isomer 9001022

*[864445-41-0] JWH 251 4-methyl isomer*
**MF:** $C_{22}H_{25}NO$ **FW:** 319.4 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs from JWH 251 by having the methyl group at the 4 position, rather than the 2 position, on the phenyl group

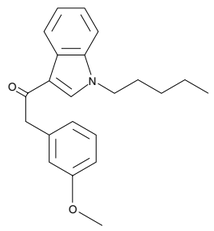
5 mg
10 mg
25 mg



## JWH 302 10722

*[864445-45-4]*
**MF:** $C_{22}H_{25}NO_2$ **FW:** 335.4 **Purity:** ≥95%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
**Summary:** A cannabimimetic indole with 5-fold selectivity for the $CB_1$ receptor ($K_i$ = 17 nM) compared to the $CB_2$ receptor ($K_i$ = 89 nM); stimulates GTPγS binding of $CB_1$ and $CB_2$ receptors with $EC_{50}$ values of 29.3 and 24.4 nM, respectively

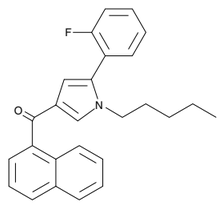
5 mg
10 mg
25 mg



## JWH 307 10797

*[914458-26-7]*
**MF:** $C_{26}H_{24}FNO$ **FW:** 385.5 **Purity:** ≥96%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** A (1-naphthoyl)pyrrole cannabimimetic that potently activates both $CB_1$ and $CB_2$ receptors ($K_i$ values of 7.7 and 3.3 nM, respectively)

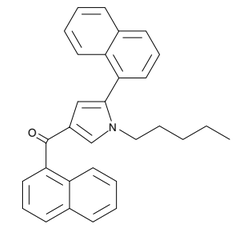
1 mg
5 mg
10 mg



## JWH 309 10830

*[914458-42-7]*
**MF:** $C_{30}H_{27}NO$ **FW:** 417.6 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
**Summary:** A synthetic CB that displays high affinities for both the central $CB_1$ receptor ($K_i$ = 41 nM) and the peripheral $CB_2$ receptor ($K_i$ = 49 nM); intended for forensic and research applications

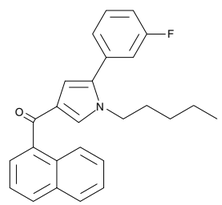
1 mg
5 mg
10 mg



## JWH 368 10829

*[914458-31-4]*
**MF:** $C_{26}H_{24}FNO$ **FW:** 385.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** A (1-naphthoyl)pyrrole cannabimimetic that potently activates both $CB_1$ and $CB_2$ receptors ($K_i$ values of 16 and 9.1 nM, respectively); intended for forensic and research applications

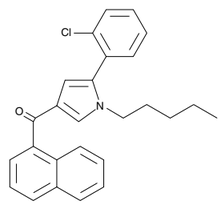
1 mg
5 mg
10 mg



## JWH 369 10828

*[914458-27-8]*
**MF:** $C_{26}H_{24}ClNO$ **FW:** 401.9 **Purity:** ≥95%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A synthetic CB that potently activates the central $CB_1$ and peripheral $CB_2$ receptors ($K_i$ = 7.9 and 5.2 nM, respectively); intended for forensic and research purposes

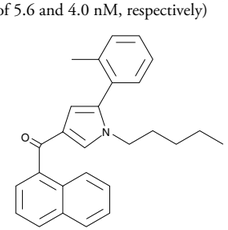
1 mg
5 mg
10 mg



## JWH 370 10827

*[914458-22-3]*
**MF:** $C_{27}H_{27}NO$ **FW:** 381.5 **Purity:** ≥95%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** A (1-naphthoyl)pyrrole analog of JWH 018 that potently activates both $CB_1$ and $CB_2$ receptors ($K_i$ values of 5.6 and 4.0 nM, respectively)

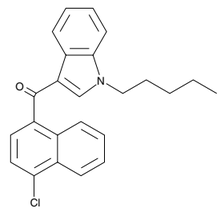
1 mg
5 mg
10 mg
25 mg



## JWH 398 13636

**MF:** $C_{24}H_{22}ClNO$ **FW:** 375.9 **Purity:** ≥95%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An agonist at both the $CB_1$ receptor and the $CB_2$ receptor ($K_i$s = 2.3 and 2.8 nM, respectively)

1 mg
5 mg
10 mg



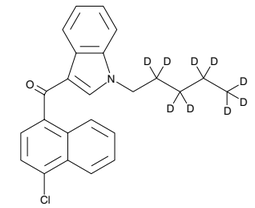




## JWH 398-$d_9$ 10514

**MF:** $C_{24}H_{13}D_9ClNO$ **FW:** 385.0 **Purity:** ≥95%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_9$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of JWH 398 by GC- or LC-MS

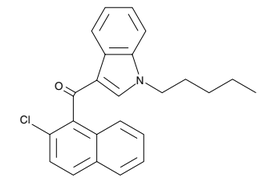
500 µg
1 mg
5 mg



## JWH 398 2-chloronaphthyl isomer 9001023

**MF:** $C_{24}H_{22}ClNO$ **FW:** 375.9 **Purity:** ≥95%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs structurally from JWH 398 by having the chloro group attached to the naphthyl rings at the 2, rather than the 4, position; intended for forensic purposes

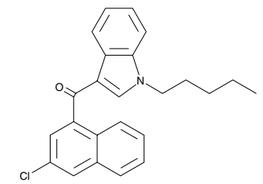
1 mg
5 mg
10 mg



## JWH 398 3-chloronaphthyl isomer 9001024

**MF:** $C_{24}H_{22}ClNO$ **FW:** 375.9 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 398 by having chlorine positioned on the naphthyl rings at the 3, rather than the 4, position; intended for forensic purposes

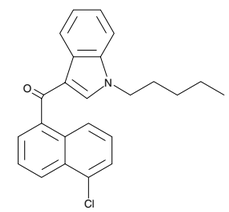
1 mg
5 mg
10 mg



## JWH 398 5-chloronaphthyl isomer 9001025

**MF:** $C_{24}H_{22}ClNO$ **FW:** 375.9 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 398 by having the chloro group attached to the naphthyl rings at the 5, rather than the 4, position

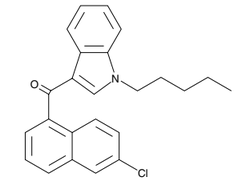
1 mg
5 mg
10 mg



## JWH 398 6-chloronaphthyl isomer 9001026

**MF:** $C_{24}H_{22}ClNO$ **FW:** 375.9 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 398 by having the chloro group attached to the naphthyl rings at the 6, rather than the 4, position; intended for forensic purposes

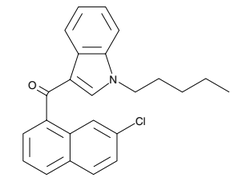
1 mg
5 mg
10 mg



## JWH 398 7-chloronaphthyl isomer 9001027

**MF:** $C_{24}H_{22}ClNO$ **FW:** 375.9 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs structurally from JWH 398 by having the chloro group attached to the naphthyl rings at the 7, rather than the 4, position; intended for forensic purposes

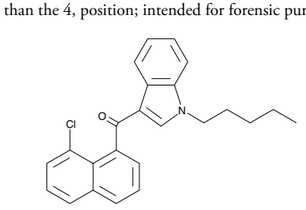
1 mg
5 mg
10 mg



## JWH 398 8-chloronaphthyl isomer 9001028

**MF:** $C_{24}H_{22}ClNO$ **FW:** 375.9 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** Differs structurally from JWH 398 by having chlorine positioned on the naphthyl rings at the 8, rather than the 4, position; intended for forensic purposes

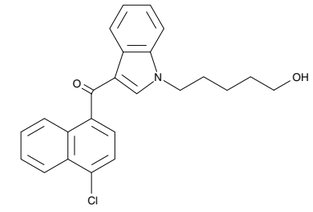
1 mg
5 mg
10 mg



## JWH 398 N-(5-hydroxypentyl) metabolite 9000770

**MF:** $C_{24}H_{22}ClNO_2$ **FW:** 391.9 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potential metabolite of JWH 398, detectable in urine

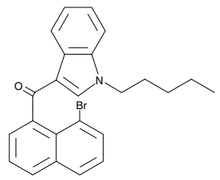
1 mg
5 mg
10 mg



### JWH 424 — 9001203

**MF:** $C_{24}H_{22}BrNO$ **FW:** 420.3 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An 8-bromonaphthyl derivative of JWH 018 which shows a reduced selectivity for $CB_1$ over $CB_2$ ($K_i$ = 20.9 and 5.4, respectively); intended for forensic and research applications

5 mg
10 mg
25 mg

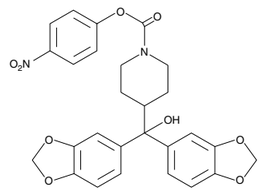


# JZL Series

### JZL 184 — 13158

*[1101854-58-3]*
**MF:** $C_{27}H_{24}N_2O_9$ **FW:** 520.2 **Purity:** ≥97%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent and selective inhibitor of MAGL that displays $IC_{50}$ values of 8 nM and 4 µM for inhibition of MAGL and FAAH, respectively in mouse brain membranes

5 mg
10 mg
50 mg
100 mg

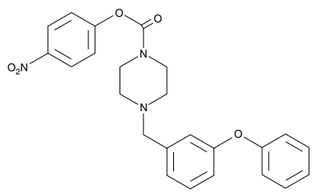


*NOTE: Sold under license from The Scripps Research Institute*

### JZL 195 — 13668

*[121004-12-8]*
**MF:** $C_{24}H_{23}N_3O_5$ **FW:** 433.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent inhibitor of both FAAH and MAGL ($IC_{50}$ = 2 and 4 nM, respectively); poorly inhibits other brain serine hydrolases

5 mg
10 mg
50 mg
100 mg



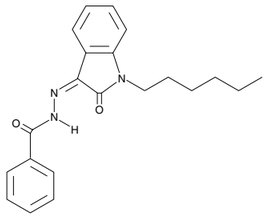
*NOTE: Sold under license from The Scripps Research Institute*

# MDA Series

### MDA 19 — 10563

*[1048973-47-2]*
**MF:** $C_{21}H_{23}N_3O_2$ **FW:** 349.4 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A selective agonist of the $CB_2$ receptor, with an $EC_{50}$ value for $CB_2$ activation (63.4 nM) that is 14-fold lower than that for $CB_1$ activation ($EC_{50}$ = 867 nM); dose-dependently reduces tactile allodynia in rats and in $CB_2^{+/+}$ mice but not in $CB_2^{-/-}$ mice

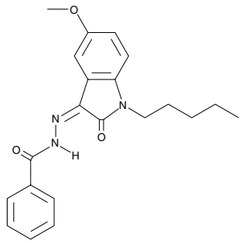
1 mg
5 mg
10 mg
50 mg



### MDA 77 — 10639

*[1103774-21-5]*
**MF:** $C_{21}H_{23}N_3O_3$ **FW:** 365.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A selective inverse agonist of the human $CB_2$ receptor that demonstrates an $EC_{50}$ value of 5.8 nM at $CB_2$ and no activity at $CB_1$

1 mg
5 mg
10 mg
50 mg

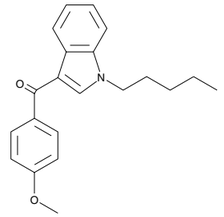


# RCS Series

### RCS-4 — 10645

*BTM-4, E-4, OBT-199, SR-19*
**MF:** $C_{21}H_{23}NO_2$ **FW:** 321.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** A synthetic JWH 018 CB analog identified as a component of several different 'herbal incense' products

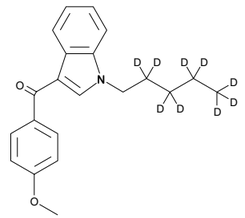
1 mg
5 mg
10 mg



### RCS-4-$d_9$ — 10513

*BTM-4-$d_9$, E-4-$d_9$, OBT-199-$d_9$, SR-19-$d_9$*
**MF:** $C_{21}H_{14}D_9NO_2$ **FW:** 330.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_9$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of RCS-4 by GC- or LC-MS

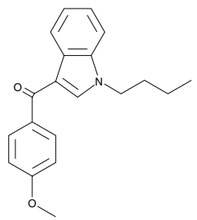
500 µg
1 mg
5 mg



### RCS-4-C4 homolog — 10798

*BTM-4, E-4, OBT-199, SR-19*
**MF:** $C_{20}H_{21}NO_2$ **FW:** 307.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Identical to RCS-4 except the N-1 alkyl chain length has been shortened from C5 to C4; detected in herbal blends

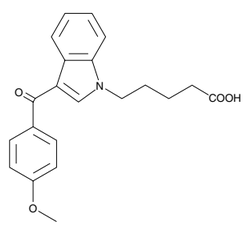
1 mg
5 mg
10 mg



### RCS-4 N-(5-carboxypentyl) metabolite — 10937

**MF:** $C_{21}H_{21}NO_4$ **FW:** 351.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An expected metabolite of RCS-4, which should be detectable in the urine

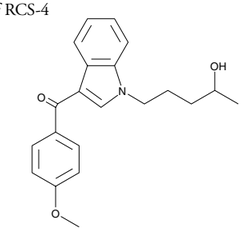
1 mg
5 mg
10 mg



### RCS-4 N-(4-hydroxypentyl) metabolite — 10936

**MF:** $C_{21}H_{33}NO_3$ **FW:** 337.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potential metabolite of RCS-4

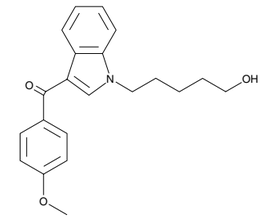
1 mg
5 mg
10 mg



### RCS-4 N-(5-hydroxypentyl) metabolite — 10935

**MF:** $C_{21}H_{23}NO_3$ **FW:** 337.4 **Purity:** ≥98%
A solution in acetonitrile **Stability:** ≥1 year at -20°C
**Summary:** A potential metabolite of RCS-4

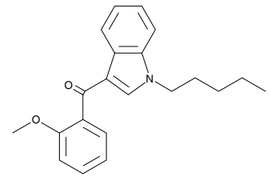
1 mg
5 mg
10 mg



### RCS-4 2-methoxy isomer — 10865

**MF:** $C_{21}H_{23}NO_2$ **FW:** 321.4 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An analog of RCS-4 that differs only in the location of the methoxy group on the phenyl ring; structurally resembles JWH 250, which shows a high-affinity for both $CB_1$ and $CB_2$ ($K_i$ = 11 and 33 nM, respectively)

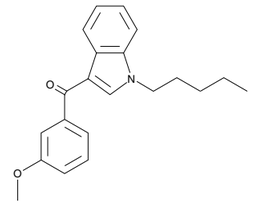
1 mg
5 mg
10 mg



### RCS-4 3-methoxy isomer — 10866

**MF:** $C_{21}H_{23}NO_2$ **FW:** 321.4 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An RCS-4 analog whose design is based on the structure of the synthetic CB JWH 018 whose biological activity has not been reported

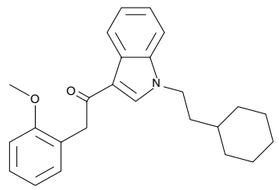
1 mg
5 mg
10 mg



## RCS-8 10636

*[1345970-42-4 ] BTM-8, SR-18*
**MF:** $C_{25}H_{29}NO_2$ **FW:** 375.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** A synthetic CB identified as a component of several different herbal incense products; an analog of JWH 250

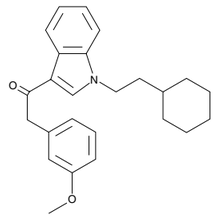
1 mg
5 mg
10 mg



## RCS-8 3-methoxy isomer 10864

**MF:** $C_{25}H_{29}NO_2$ **FW:** 375.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs from RCS-8 by having a methoxy group at the 3, rather than 2, position of its phenylacetyl group

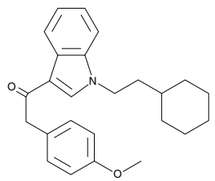
1 mg
5 mg
10 mg



## RCS-8 4-methoxy isomer 10863

**MF:** $C_{25}H_{29}NO_2$ **FW:** 375.5 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Differs from RCS-8 by having a methoxy group at the 4, rather than 2, position of its phenylacetyl group

1 mg
5 mg
10 mg

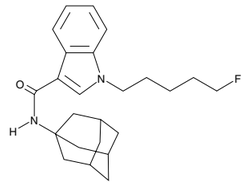


# STS Series

## STS-135 11564

*[1354631-26-7] N-adamantyl-1-fluoropentylindole-3-Carboxamide*
**MF:** $C_{24}H_{31}FN_2O$ **FW:** 382.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A designer drug purported to be found in herbal blends; intended for research and forensic applications

1 mg
5 mg
10 mg

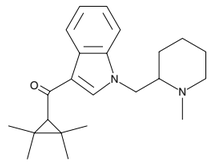


# UR- Series

## AB-005 11766

*[895155-25-6]*
**MF:** $C_{23}H_{32}N_2O$ **FW:** 352.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A synthetic CB built on a 1-[(1-methylpiperidin-2-yl)methyl]-indole base that is characteristic of a series of potent CBs; may have selectivity for the $CB_2$ receptor; intended for forensic and research applications

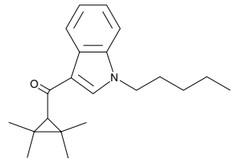
1 mg
5 mg
10 mg



## UR-144 11502

*[1199943-44-6] KM-X1*
**MF:** $C_{21}H_{29}NO$ **FW:** 311.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent synthetic CB which preferentially binds the peripheral $CB_2$ receptor ($K_i$ = 1.8 nM) over the central $CB_1$ receptor ($K_i$ = 150 nM); intended for research and forensic applications

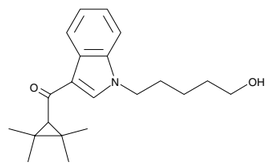
1 mg
5 mg
10 mg



## (±)-UR-144 N-(4-hydroxypentyl) metabolite 11774

**MF:** $C_{21}H_{29}NO_2$ **FW:** 327.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An expected phase I metabolite of UR-144; should be detectable in either serum or urine; intended for forensic and research applications

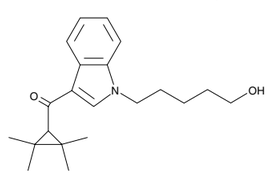
1 mg
5 mg
10 mg



## UR-144 N-(5-hydroxypentyl) metabolite 11775

*[895155-95-0]*
**MF:** $C_{21}H_{29}NO_2$ **FW:** 327.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** An expected phase I metabolite of UR-144, based on the metabolism of similar cannabimimetics; should be detectable in either serum or urine; intended for forensic and research applications

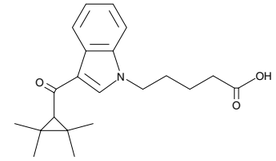
1 mg
5 mg
10 mg



## UR-144 N-pentanoic acid metabolite 11773

**MF:** $C_{21}H_{27}NO_3$ **FW:** 341.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An expected phase I metabolite of UR-144; should be detectable in either serum or urine; intended for forensic and research applications

1 mg
5 mg
10 mg

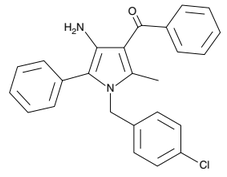


# URB Series

## URB447 13261

*[1132922-57-6]*
**MF:** $C_{25}H_{21}ClN_2O$ **FW:** 400.9 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A mixed $CB_1$ receptor antagonist/$CB_2$ receptor agonist with $IC_{50}$ values of 313 and 41 nM, respectively; reduces food intake and body-weight gain in *ob/ob* mice and Swiss mice (20 mg/kg) with an efficacy comparable to rimonabant; does not penetrate the blood-brain barrier

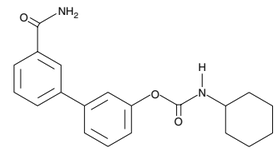
5 mg
10 mg
25 mg
50 mg



## URB597 10046

*[546141-08-6]*
**MF:** $C_{20}H_{22}N_2O_3$ **FW:** 338.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent and selective inhibitor of FAAH with an $IC_{50}$ value of 4.6 nM in brain membranes and 0.5 nM in intact neurons; exhibits anti-nociceptive and anxiolytic effects *in vivo*

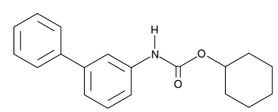
5 mg
10 mg
50 mg
100 mg



## URB602 10007457

*[565460-15-3]*
**MF:** $C_{19}H_{21}NO_2$ **FW:** 295.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A selective inhibitor of MAGL, exhibiting an $IC_{50}$ value of 28 µM for the rat brain enzyme

5 mg
10 mg
50 mg
100 mg



vol. 17
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Thomas G. Brock, Ph.D.

# The Metabolism of JWH-type Synthetic Cannabinoids

For most users, the appeal of "Spice/K2" blends and synthetic cannabinoids (CBs) centers on drug testing: the active compounds do not score positive on standard tests for drugs of abuse. This is particularly important to those users who prefer cannabis, since the relatively long half-lives of metabolites of the key compound, $\Delta^9$-tetrahydrocannabinol (THC), leave users vulnerable to drug testing for days to weeks after partaking. The guarantee of a negative drug test can make an experimental herbal mixture, even a potentially nasty one, a little more attractive.

There are two issues regarding the synthetic CBs used in Spice/K2 blends that make them challenging for forensic testing. First, the diverse variety of potent CBs that can be interchanged and mixed together (see Related Article, page 4) makes it hard to zero in on offending compounds. Perhaps more critically, tests must detect the metabolites of all of these compounds, since synthetic CBs, like THC, are rapidly processed by the body. Several recent studies on the metabolism of the most popular synthetic CBs provide a valuable foundation for understanding the challenges to forensic testing of these drugs of abuse.

## Lessons from *Cannabis*

What have we learned from marijuana? Although the bud from *C. sativa* contains over 400 chemicals, forensic testing has focused on THC, a major component which most potently produces the psychoactive effect of interest. Remarkably, marijuana contains some 65 other structurally- and functionally-related compounds which are unique to this plant genus and are truly 'cannabinoids', including cannabinol and cannabidiol. Something that should certainly be kept in mind is that the physiological and toxicological effects of using cannabis must be the integrated impact of all of these chemicals, not just THC.

Still, the testing for cannabis use centers on the presence of THC and its metabolites. $\Delta^9$-THC is rapidly metabolized in the body to a number of oxygenated products.[1] In the primary route of metabolism, a methyl group at carbon 11 is metabolized by liver cytochrome P450 to produce 11-hydroxy-THC (Figure 1). This intermediate is subsequently converted to an acid, 11-COOH-THC, known also as THC-COOH or more formally as 11-nor-$\Delta^9$-THC-9-carboxylic acid. Either the hydroxylated or carboxylated metabolite may be glucuronidated, facilitating urinary excretion. While THC has a short half-life in serum, 11-COOH-THC has a half-life of days to weeks due to accumulation in fatty tissue and delayed elimination, making it the ideal target for forensic testing. Metabolites are most commonly detected in urine samples after deglucuronidation, but detection of both THC and 11-COOH-THC in oral fluids is possible after concentration and derivatization.[2] Assessment of oral fluid obviates the possibility of substituting 'clean' samples; measuring both compounds minimizes the potential for misidentifying individuals passively exposed to marijuana smoke.

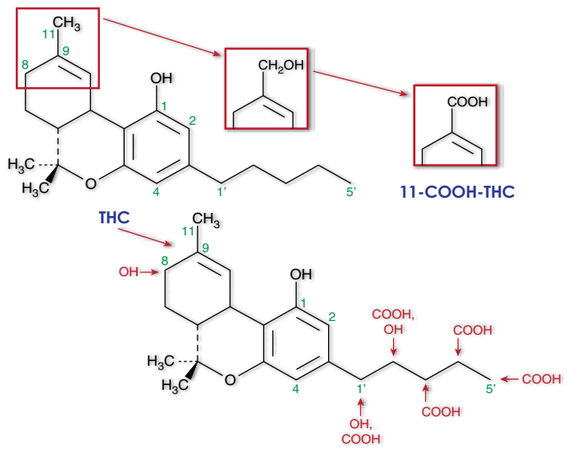



**Figure 1. The metabolism of $\Delta^9$-THC**

Other metabolites of THC are produced, although they are less abundant than 11-COOH-THC and aren't used in forensic tests. These metabolites are produced by oxidation along the five carbon side chain as well as at C-8 (Figure 1). Many different combinations may be detected in serum; COOH residues are subject to glucuronidation, with these products detectable in urine.

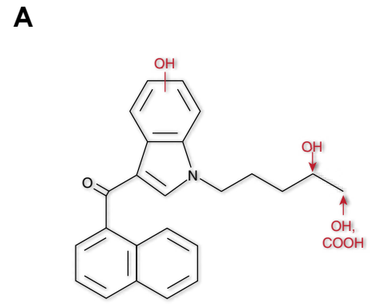
The term 'metabolite' may be misleading by suggesting lack of activity: many compounds derived from THC have diverse actions which may mimic THC or be pharmacologically distinct. Perhaps of greatest interest, the primary metabolite 11-COOH-THC, which clearly lacks the psychoactive actions of THC, may significantly contribute to the analgesic properties of marijuana and may, in fact, limit the psychoactive effects of THC.[1]

## Metabolism of JWH 018

Although JWH 018 has been banned and is now less commonly found in current herbal blends, it remains the archetypical naphthoylalkylindole type of synthetic CB. When exposed to human liver microsomes (to mimic phase I metabolism), diverse products are obtained, including mono-, di-, and trihydroxylated, N-dealkylated, carboxylated, and/or dehydrogenated forms.[3] However, the majority of the metabolites are monohydroxylated on one of many carbons throughout the molecule, while a second group consists of dihydrodiols resulting from arene oxidation of the naphthalene ring system.[3] Analyses of human urine samples, using predominantly LC-MS/MS, confirmed that the prevailing metabolite is monohydroxylated, typically on the terminal (ω) carbon of the alkyl group (Figure 2), and that essentially all monohydroxylated products are glucuronidated.[4-7] Also commonly detected in human urine are metabolites that are monohydroxylated on the ω-1 alkyl site, monohydroxylated on the indole group, or carboxylated on the ω alkyl site (JWH 018-COOH). Reminiscent of the long serum half-life of 11-COOH-THC, JWH 018-COOH is poorly glucuronidated,[5,6] suggesting that this metabolite might be less efficiently excreted than the hydroxylated metabolites. Interestingly, N-dealkylated and N-dealkyl monohydroxylated metabolites of JWH 018 are abundant in rat urine but rare in human samples.[7]

The metabolism of THC, as noted earlier, occurs predominantly in the liver, with a high clearance rate that reflects a high degree of first-pass metabolism. The rate of plasma clearance of THC varies greatly between individuals and may be higher in females than males and in regular THC users than in naïve users.[8] The metabolism of JWH 018 is comparably rapid (Figure 2). Both a female regular smoker and male occasional smoker showed an approximately 80% reduction in the maximum measurable serum JWH 018 one hour after inhalation; JWH 018 was still detectable in the serum of both subjects after 24 h.[9] This very small study suggests that clearance of this synthetic CB is fast, regardless of sex or experience of the consumer.

The activity of metabolites of JWH 018 may be important. As seen with THC vs. 11-COOH-THC, CB metabolites may mimic, oppose, or have distinct actions from parent compounds. Remarkably, the monohydroxylated metabolites of JWH 018 bind the central $CB_1$ receptor with high affinity and act as full agonists.[10] This indicates that, for this CB, phase I metabolism may not significantly diminish action. This finding does not generalize to all synthetic CBs, as phase I metabolites of JWH 073 exhibit only neutral antagonist or partial agonist activity, although they still strongly bind the $CB_1$ receptor.[11] Furthermore, glucuronidated metabolites can act as neutral antagonists at $CB_1$ receptors, blocking receptor activation.[12]



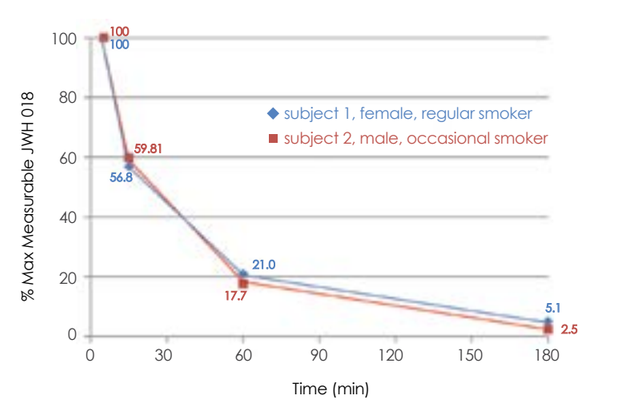




**Figure 2. Metabolism of JWH 018. A.) Sites of modification in major metabolites detected in human urine. B.) Time course of metabolism of JWH 018 in human subjects following inhalation.**

## Metabolism of Other JWH-type CBs

Different studies have been published on the metabolism of JWH 015 *in vitro* using rat liver microsomes,[13] JWH 073 in humans,[5-7] and JWH 250 in humans and rats.[14] Like JWH 018, each of these contains an aminoalkylindole group; JWH 015 and JWH 073 also have a naphthoyl group in common with JWH 018 (Figure 3). The *in vitro* metabolism of JWH 015 produces 22 products reminiscent of those detected following similar treatment of JWH 018.[13] The diversity of products generated by this method greatly exceeds those typically reported from urine, as in the studies examining the human urinary metabolites of JWH 073. As JWH 073 differs structurally from JWH 018 solely in alkyl chain length (butyl for pentyl), the human urinary metabolites are naturally comparable: monohydroxylation of the indole group or alkyl ω site or ω-carboxylation of the alkyl chain.[5,6] Again, all monohydroxylated forms are fully glucuronidated while only a fraction (<50%) of the carboxylated products are glucuronidated.

The analysis of JWH 250 metabolism in humans and rats used GC-MS as well as LC-MS/MS, examined urine samples from eleven different human subjects, and also evaluated metabolites in human serum.[14] By GC-MS, which is relatively more sensitive than LC-MS/MS, some 20 different metabolites of JWH 250 can be detected in human urine, although many are of very low abundance. Native JWH 250 is not detectable. Unlike the case for JWH 018, N-dealkylated JWH 250 is detected in both rat and human urine, although the levels in human samples are low. Mono- and dihydroxylated metabolites are the most prevalent metabolites detected in human urine by LC-MS/MS, with monohydroxylation occurring on the terminal alkyl carbon and the second hydroxylation on the methoxybenzyl moiety (Figure 3). The ratios between these two metabolites differs between individuals, the second hydroxylation assumed to reflect increased time between JWH 250 administration and urine collection. Evaluation of the serum sample by GC-MS reveals five metabolites. All of these are hydroxylated on the alkyl chain, on the methoxybenzyl group, or on both sites. No carboxylated metabolites of JWH 250 are identified in either human urine or serum samples.

## Summary

Over a decade ago, Aung *et al.* demonstrated that, for a variety of cannabimimetics, an alkyl chain of 3-6 carbons is sufficient for high affinity binding to the CB receptors.[15] The most common human urinary metabolite for synthetic CBs having this tail is monohydroxylated (and glucuronidated) at the ω site of the chain. With increasing time after consumption, this product may be less abundant, replaced in prevalence by either a dihydroxylated metabolite or an ω-carboxylated product. The ω-monohydroxylated metabolite, often referred to as 'M1' in the literature, has been called the 'most convenient compound for establishing consumption',[14] because of its abundance and apparent universality across synthetic CBs.

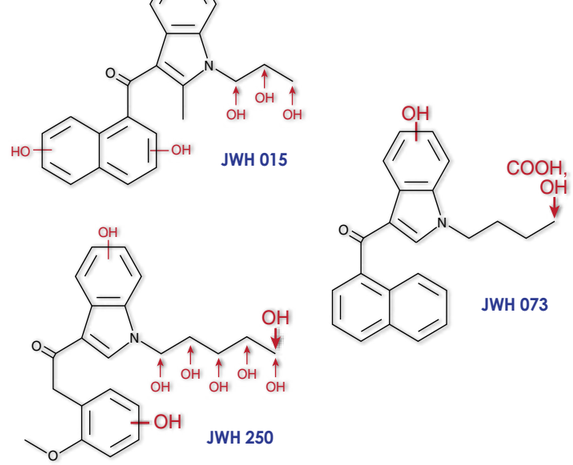



**Figure 3. The metabolism of JWH compounds 015, 073, and 250; major metabolites are given in larger font.**

References

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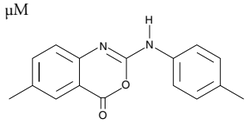
## URB754 10007691

*[86672-58-4]*
**MF:** $C_{16}H_{14}N_2O_2$ **FW:** 266.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Reported to be a potent, noncompetitive inhibitor of MAGL; conflicting data indicates that it does not inhibit human recombinant, rat brain, or mouse brain MAGL at concentrations up to 100 µM

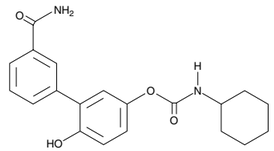
5 mg
10 mg
50 mg
100 mg



## URB937 10674

*[1357160-72-5]*
**MF:** $C_{20}H_{22}N_2O_4$ **FW:** 354.4 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent FAAH inhibitor ($IC_{50}$ = 26.8 nM, *in vitro*) that does not penetrate the blood-brain barrier; $ED_{50}$ value for FAAH inhibition in brain is 200-fold higher than the $ED_{50}$ value for FAAH inhibition in liver when administered systemically in mice; attenuates behavioral responses elicited in mouse models of visceral ($ED_{50}$ = 0.1 mg/kg), neuropathic, and inflammatory pain

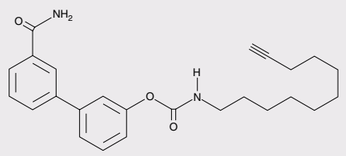
5 mg
10 mg
50 mg
100 mg



## JP104 10008661

**MF:** $C_{25}H_{30}N_2O_3$ **FW:** 406.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An irreversible FAAH inhibitor with an $IC_{50}$ value of 7.3 nM for the human recombinant enzyme

5 mg
10 mg
50 mg
100 mg

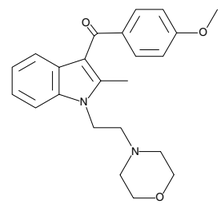


# WIN Series

## Pravadoline 10006973

*[92623-83-1] WIN 48,098*
**MF:** $C_{23}H_{26}N_2O_3$ **FW:** 378.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A nonacidic, aminoalkylindole analgesic agent that inhibits COX; inhibits PG synthesis ($IC_{50}$ = 5 µM in mouse brain microsomes) and displays antinociceptive activity ($ED_{50}$ = 26 mg/kg in an ACh-induced writhing assay in mice); inhibits neuronally stimulated contractions in mouse vas deferens preparations ($IC_{50}$ = 0.45 µM)

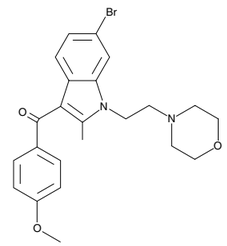
5 mg
10 mg
25 mg



## WIN 54,461 9001204

*[166599-63-9] 6-Bromopravadoline*
**MF:** $C_{23}H_{25}BrN_2O_3$ **FW:** 457.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An aminoalkylindole which acts as a CB mimetic, displacing WIN 55,212-2 from CB receptors on rat cerebellum membranes ($IC_{50}$ = 515 nM); antagonizes the inhibition of electrically-induced contractions in isolated mouse vas deferens preparations by tetrahydrocannabinol or pravadoline; intended for research and forensic applications

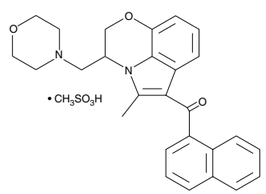
1 mg
5 mg
10 mg



## (±)-WIN 55,212 (mesylate) 10736

*[137795-17-6]*
**MF:** $C_{27}H_{26}N_2O_3 \bullet CH_3SO_3H$ **FW:** 522.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A mixture of the two enantiomers, (+)-WIN 55,212-2 and (-)-WIN 55,212-3

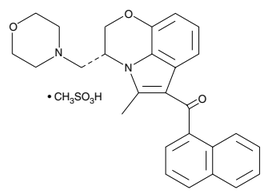
5 mg
10 mg
25 mg
50 mg



## (+)-WIN 55,212-2 (mesylate) 10009023

*[131543-23-2]*
**MF:** $C_{27}H_{26}N_2O_3 \bullet CH_3SO_3H$ **FW:** 522.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent aminoalkylindole CB receptor agonist with $K_i$ values of 62.3 and 3.3 nM for human recombinant $CB_1$ and $CB_2$ receptors, respectively

5 mg
10 mg
25 mg
50 mg

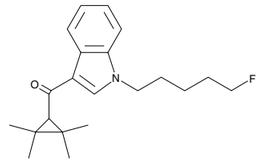


# XLR Series

## XLR11 11565

*[1364933-54-9] 5-fluoro UR-144*
**MF:** $C_{21}H_{28}FNO$ **FW:** 329.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An aminoalkylindole compound that is expected to be a CB mimetic; intended for forensic and research applications

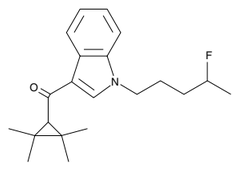
1 mg
5 mg
10 mg



## XLR11 N-(4-fluoropentyl) isomer 11769

**MF:** $C_{21}H_{28}FNO$ **FW:** 329.5 **Purity:** ≥95%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An isomer of XLR11 which has the fluorine atom placed on the 4 position, rather than the terminal 5 position, of the alkyl group; intended for forensic and research purposes

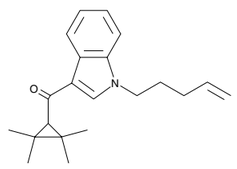
100 µg
500 µg
1 mg



## XLR11 N-(4-pentenyl) analog 11688

*UR-144 N-(4-pentenyl) analog*
**MF:** $C_{21}H_{27}NO$ **FW:** 309.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A variant of XLR11 which replaces the N-(5-fluoropentyl) chain with N-(4-pentenyl); commonly observed component of herbal mixtures containing synthetic CBs with the 5-fluoropentyl moiety; intended for forensic and research applications

1 mg
5 mg
10 mg



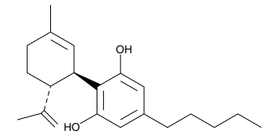


# Miscellaneous

## Cannabidiol (DEA Schedule I Regulated Compound) 90080

*[13956-29-1] CBD*
**MF:** $C_{21}H_{30}O_2$ **FW:** 314.5 **Purity:** ≥99%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** Displays antioxidant activity when administered at relatively high doses without undesired toxic or psychological effects seen with $\Delta^9$-THC; is neuroprotective against both excitatory neurotransmitter (glutamate) and oxidant (hydroperoxide) induced neurotoxicity at a concentration of 10 µM

1 mg
5 mg
10 mg
50 mg

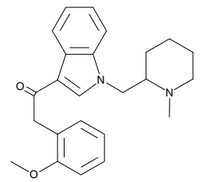


•Also Available: **Cannabidiol (solution)** (90081)
*DEA-exempt formulation*

## Cannabipiperidiethanone 11655

*[1345970-43-5]*
**MF:** $C_{24}H_{28}N_2O_2$ **FW:** 376.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** A synthetic cannabinoid that binds to the cannabinoid receptors $CB_1$ and $CB_2$ with $IC_{50}$ values of 591 and 968 nM, respectively; this product is intended for forensic purposes and research applications

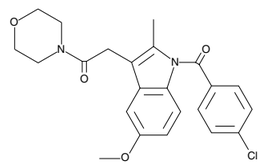
5 mg
10 mg
25 mg



## IMMA 70275

*BML-190, Indomethacin Morpholinylamide*
**MF:** $C_{23}H_{23}ClN_2O_4$ **FW:** 426.9 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** A selective $CB_2$ receptor agonist with $K_i$ values of >20,000 and 435 nM for the $CB_1$ and $CB_2$ receptors, respectively

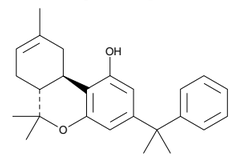
5 mg
10 mg
50 mg
100 mg



## KM 233 10640

*[628263-22-9]*
**MF:** $C_{25}H_{30}O_2$ **FW:** 362.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** $\Delta^8$-THC analog with 13-fold selectivity for the $CB_2$ receptor ($K_i$s = 12.3 and 0.91 nM, for $CB_1$ and $CB_2$ respectively); its CB agonist activity inhibits human U87 glioma cell proliferation *in vitro* ($IC_{50}$ = 1.4 µM) and *in vivo* (2 mg/kg in a severe combined immunodeficiency mouse xenograft side-pocket model)

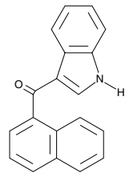
1 mg
5 mg
10 mg
25 mg



## 1'-Naphthoyl Indole 11687

*[109555-87-5]*
**MF:** $C_{19}H_{13}NO$ **FW:** 271.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Represents the simplest form of a large group of related synthetic CBs; should have no appreciable affinity for either CB receptor; intended for forensic and research applications

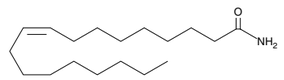
5 mg
10 mg
25 mg



## 9-Octadecenamide 90375

*[301-02-0] cis-9-Octadecenamide, Oleamide*
**MF:** $C_{18}H_{35}NO$ **FW:** 281.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** The amide of oleic acid found in cerebrospinal fluid; induces physiological sleep when injected into rats intraperitoneally at 5 to 50 mg doses

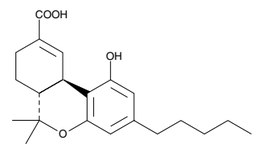
50 mg
100 mg
500 mg
1 g



## (-)-11-nor-9-carboxy-Δ⁹-THC (solution) 10009897

*[56354-06-4]*
**MF:** $C_{21}H_{28}O_4$ **FW:** 344.4 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** The major metabolite of $\Delta^9$-THC, used as an internal standard in various analytical procedures to unequivocally confirm its presence in biological fluids

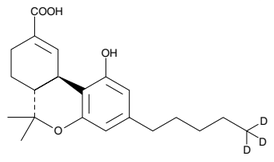
500 µg
1 mg
5 mg
10 mg



## (-)-11-nor-9-carboxy-Δ⁹-THC-$d_3$ (solution) 10009898

*[130381-15-6]*
**MF:** $C_{21}H_{25}D_3O_4$ **FW:** 347.5 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_3$); ≤1% $d_0$
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An internal standard for the quantification of (-)-11-nor-9-carboxy-$\Delta^9$-THC by GC- or LC-MS

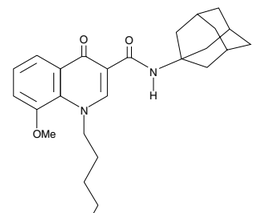
100 µg
500 µg
1 mg
5 mg



## 4-Quinolone-3-Carboxamide $CB_2$ Ligand 11093

*[1314230-69-7] 4Q3C $CB_2$ Ligand*
**MF:** $C_{26}H_{34}N_2O_3$ **FW:** 422.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A selective, high affinity ligand of the $CB_2$ receptor ($K_i$ = 0.6 nM v. $CB_1$ binding at a $K_i$ >10,000 nM *in vitro*) that may behave as an inverse agonist; displays antinociceptive activity in a formalin test in mice at a dose of 6 mg/kg

1 mg
5 mg
10 mg
25 mg

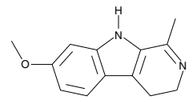


# Alkaloids

## Harmaline 10995

*[304-21-2]*
**MF:** $C_{13}H_{14}N_2O$ **FW:** 214.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A psychoactive indole found naturally in certain plants; inhibitor of monoamine oxidases; induces tremor in mice through the N-methyl-D-aspartate receptor; intended for forensic or research purposes

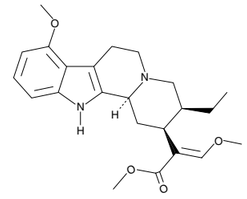
5 mg
10 mg
25 mg



## Mitragynine 11151

*[4098-40-2] 9-methoxy Corynantheidine, Kratom*
**MF:** $C_{23}H_{30}N_2O_4$ **FW:** 398.5 **Purity:** ≥95%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** An indole alkaloid that has stimulatory, antinociceptive, and opiate-like effects, acting through noradrenergic, serotonergic, and opioid receptors; has a higher affinity for the μ-opioid receptor than the δ- or κ-opioid receptors ($pK_i$ = 8.14, 7.22, and 5.96, respectively); intended for forensic applications

1 mg
5 mg
10 mg

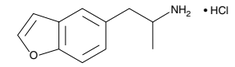


# Amphetamines

## 5-APB (hydrochloride) 11134

*[286834-80-8] 5-(2-Aminopropyl) Benzofuran*
**MF:** $C_{11}H_{13}NO$ • HCl **FW:** 211.7 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An analog of MDA where the 3,4-methylenedioxyphenyl ring system has been replaced with a benzofuran ring; intended for forensic purposes

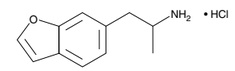
1 mg
5 mg
10 mg



## 6-APB (hydrochloride) 11079

*[286834-84-2] Benzo-Fury, 6-(2-aminopropyl)Benzofuran*
**MF:** $C_{11}H_{13}NO$ • HCl **FW:** 211.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A phenethylamine designer drug analog to the amphetamine MDA in that the 3,4-methylendioxyphenyl ring system has been replaced with a benzofuran ring; intended for forensic and research applications

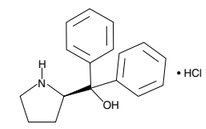
1 mg
5 mg
10 mg



## D2PM (hydrochloride) 11160

*[172152-19-1] Diphenylprolinol, Diphenyl-2-pyrrolidinemethanol*
**MF:** $C_{17}H_{19}NO$ • HCl **FW:** 289.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A psychoactive designer drug; also used in organic synthesis to prepare the Corey-Bakshi-Shibata catalyst; intended for forensic purposes

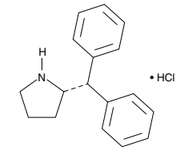
5 mg
10 mg
25 mg



## (S)-Desoxy-D2PM (hydrochloride) 9001095

*[188398-87-0] (S)-2-Diphenylmethylpyrrolidine*
**MF:** $C_{17}H_{19}N$ • HCl **FW:** 273.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Most commonly used as a chiral solvating agent for NMR analysis of chiral compounds; structurally related to desoxypipradrol, a dopamine transporter inhibitor and psychoactive stimulant

5 mg
10 mg
25 mg



## 3,4-Dihydroxymethamphetamine (trifluoroacetate salt) 10515

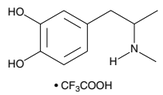
*DHMA, HHMA*

**MF:** $C_{10}H_{15}NO_2 \bullet CF_3COOH$ **FW:** 295.3 **Purity:** ≥95%

A solution in methanol **Stability:** ≥1 year at -20°C

**Summary:** A catecholamine derived from the metabolism of MDMA by CYP2D6; subsequently O-methylenated by catechol-O-methyltransferase to produce HHMA or glucuronidated prior to excretion; intended for forensic or research purposes

5 mg
10 mg
50 mg




## 2,5-Dimethoxyamphetamine 9001314

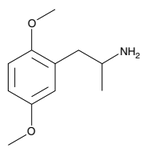
*[2801-68-5] 2,5-DMA*

**MF:** $C_{11}H_{17}NO_2$ **FW:** 195.3 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

**Summary:** One of many amphetamines which have appeared on the illicit drug market; intended for research and forensic applications

5 mg
10 mg
25 mg
50 mg




## 3,4-Dimethoxymethamphetamine (hydrochloride) 11128

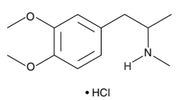
*[70932-18-2] 3,4-DMMA*

**MF:** $C_{12}H_{19}NO_2 \bullet HCl$ **FW:** 245.7 **Purity:** ≥97%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** An MDMA analog that appears to act as a serotonin-norepinephrine-dopamine releasing agent binding to and inhibiting uptake at noradrenalin and serotonin transporters ($K_i$s = 22.8 and 7.7 µM and $IC_{50}$s = 253.4 and 108 µM, respectively); significantly less potent than MDMA

5 mg
10 mg
50 mg




## DOET 11141

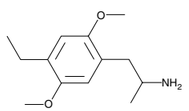
*[22004-32-6]*

**MF:** $C_{13}H_{21}NO_2$ **FW:** 223.3 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A potent, long-acting psychedelic drug of the phenethylamine and amphetamine chemical classes that likely acts as a serotonin 5-$HT_2$ receptor partial agonist; intended only for research and forensic applications

5 mg
10 mg
50 mg




## 2-Fluoroamphetamine (hydrochloride) 11419

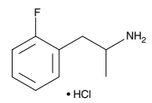
*[1626-69-3] 2-FA*

**MF:** $C_9H_{12}FN \bullet HCl$ **FW:** 189.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A structural isomer of 4-FA, having the fluorine at the 2, rather than the 4, position; intended for research and forensic applications

5 mg
10 mg
50 mg




## 3-Fluoroamphetamine (hydrochloride) 9001191

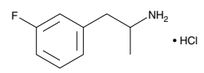
*[1716-59-2] 3-FA*

**MF:** $C_9H_{12}FN \bullet HCl$ **FW:** 189.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A structural isomer of 4-FA, having the fluorine at the 3, rather than the 4, position; intended for research and forensic applications

5 mg
10 mg
50 mg




## para-Fluoroamphetamine (hydrochloride) 11156

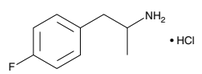
*[64609-06-9] p-FA, 4-FA*

**MF:** $C_9H_{12}FN \bullet HCl$ **FW:** 189.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** Inhibits the uptake of dopamine, serotonin, and norepinephrine with $IC_{50}$ values of 0.77, 6.8, and 0.42 µM, respectively, indicating potency comparable to cocaine or methamphetamine; intended for forensic purposes

5 mg
10 mg
50 mg




## 2-Fluoromethamphetamine (hydrochloride) 11420

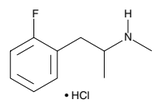
*2-FMA*

**MF:** $C_{10}H_{14}FN \bullet HCl$ **FW:** 203.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A stimulant drug related to methamphetamine and 2-fluroamphetamine that has been identified as a component of designer drugs sold as "legal high" replacements for restricted substances; intended for use as a standard for the forensic analysis of samples that may contain this compound

5 mg
10 mg
50 mg




## 3-Fluoromethamphetamine (hydrochloride) 9001185

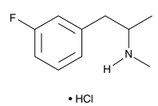
*3-FMA*

**MF:** $C_{10}H_{14}FN \bullet HCl$ **FW:** 203.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** An isomer of 4-FMA characterized by having fluorine at the 3 position of the phenyl group; intended for forensic and research applications

5 mg
10 mg
50 mg




## 4-Fluoromethamphetamine (hydrochloride) 9001070

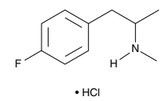
*[52063-62-4] 4-FMA*

**MF:** $C_{10}H_{14}FN \bullet HCl$ **FW:** 203.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A stimulant drug related to methamphetamine and 4-fluoroamphetamine that has been identified as a component of designer drugs sold as "legal high" replacements for restricted substances; intended for use as a standard for the forensic analysis of samples that may contain this compound

5 mg
10 mg
50 mg




## MDMA methylene homolog (hydrochloride) 10979

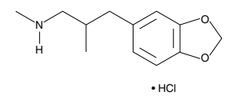
*3,4-Methylenedioxymethamphetamine methyl homolog*

**MF:** $C_{12}H_{17}NO_2 \bullet HCl$ **FW:** 243.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A potential designer drug created by inserting a methylene group in the methylamphetamine portion of MDMA

1 mg
5 mg
10 mg




## Methiopropamine (hydrochloride) 11161

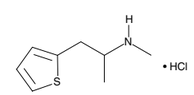
*[7464-94-0] MPA, NSC 400137*

**MF:** $C_8H_{13}NS \bullet HCl$ **FW:** 191.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A structural analog of methamphetamine in which the phenyl group has been replaced with thiophene; intended for forensic and research applications

5 mg
10 mg
50 mg




## Methoxetamine (hydrochloride) 11139

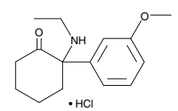
*[1239908-48-5] MXE*

**MF:** $C_{15}H_{21}NO_2 \bullet HCl$ **FW:** 283.8 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A 3-methoxy, N-ethyl analog of ketamine which, like ketamine, has been abused recreationally; intended for forensic and research applications

1 mg
5 mg
10 mg




## Methylhexanamine (hydrochloride) 10749

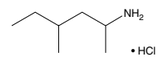
*[13803-74-2] Dimethylamylamine, DMAA, Floradrene, Forthane, Geranamine, NSC 1106*

**MF:** $C_7H_{17}N \bullet HCl$ **FW:** 151.2 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A simple aliphatic amine that was once marketed as a nasal decongestant but is now sold as a bodybuilding supplement; sold as a mild stimulant in the form of party pills; intended for forensic or research purposes

5 mg
10 mg
50 mg






## 4-MTA 11555

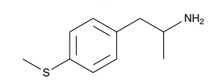
*[14116-06-4] 4-Methylthioamphetamine, P 1882*

**MF:** $C_{10}H_{15}NS$ **FW:** 181.3 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

**Summary:** A methylthio analog of PMA, a hallucinogenic drug that has been scheduled in many countries; intended for forensic applications

1 mg
5 mg
10 mg




## TMA-2 11144

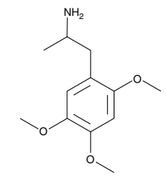
*[1083-09-6] 2,4,5-Trimethoxysmphetamine*

**MF:** $C_{12}H_{19}NO_3$ **FW:** 225.3 **Purity:** ≥95%

A solution in ethanol **Stability:** ≥1 year at -20°C

**Summary:** A psychedelic hallucinogen which has appeared on the illicit drug market; intended for research and forensic applications

5 mg
10 mg
50 mg

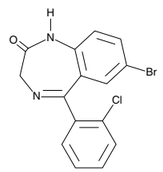


# Benzodiazepines

## Phenazepam 9000849

*[51753-57-2] BD 98, Fenazepam*
**MF:** $C_{15}H_{10}BrClN_2O$ **FW:** 349.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** A benzodiazepine agonist of the $GABA_A$-benzodiazepine receptor chloride channel complex; has been shown to exhibit strong anxiolytic, sedative, anticonvulsive, and hypnotic properties; has been shown to act as an anxioselective tranquilizer at very low doses (10-5 to 10-10 mg/kg)

5 mg
10 mg
50 mg
100 mg

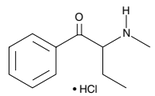


# Cathinones

## Buphedrone (hydrochloride) 11283

*[166593-10-8] α-methylamino-Butyrophenone, MABP*
**MF:** $C_{11}H_{15}NO$ • HCl **FW:** 213.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A substituted cathinone characterized by an ethyl group at the alpha position and an N-terminal methyl group; intended for forensic applications

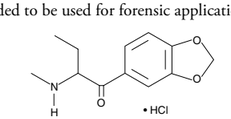
5 mg
10 mg
50 mg



## Butylone (hydrochloride) 10393

*[17762-90-2] β-keto MBDB*
**MF:** $C_{12}H_{15}NO_3$ • HCl **FW:** 257.7 **Purity:** ≥97%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A β-keto derivative of MBDB that has been identified in designer drugs sold as bath salts; a cathinone, intended to be used for forensic applications

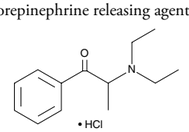
5 mg
10 mg
50 mg
100 mg



## Diethylcathinone (hydrochloride) 11333

*[134-80-5] Menutil, Moderatan, Tenuate*
**MF:** $C_{13}H_{19}NO$ • HCl **FW:** 241.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A stimulant drug of the phenethylamine, amphetamine, and cathinone chemical classes that is used as an appetite suppressant; functions as an inactive prodrug to ethcathinone, a selective norepinephrine releasing agent

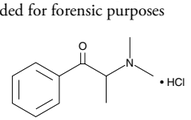
5 mg
10 mg
50 mg



## N,N-Dimethylcathinone (hydrochloride) 9001144

*[10105-90-5] Metamfepramone*
**MF:** $C_{11}H_{15}NO$ • HCl **FW:** 213.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A psychotropic compound of the phenethylamine and cathinone classes; slightly less potent than methcathinone and essentially equipotent with cathinone, in behavioral studies involving rats; intended for forensic purposes

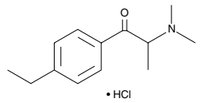
5 mg
10 mg
50 mg



## 4-ethyl-N,N-Dimethylcathinone (hydrochloride) 11207

**MF:** $C_{13}H_{19}NO$ • HCl **FW:** 241.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potential stimulatory designer drug of the amphetamine and cathinone chemical classes; intended for forensic purposes

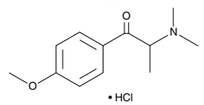
5 mg
10 mg
50 mg



## 4-methoxy-N,N-Dimethylcathinone (hydrochloride) 11666

*[1089307-23-2 ] N-Methylmethedrone*
**MF:** $C_{12}H_{17}NO_2$ • HCl **FW:** 243.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** An analog of methedrone, differing by the presence of a second aminomethyl group; intended for forensic and research applications

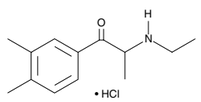
5 mg
10 mg
50 mg



## 3,4-Dimethylethcathinone (hydrochloride) 11228

*3,4-DMEC*
**MF:** $C_{13}H_{19}NO$ • HCl **FW:** 241.8 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A substituted cathinone with potential for abuse; intended for forensic and research applications

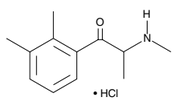
5 mg
10 mg
50 mg



## 2,3-Dimethylmethcathinone (hydrochloride) 11225

*2,3-DMMC*
**MF:** $C_{12}H_{17}NO$ • HCl **FW:** 227.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potential designer drug that is structurally related to 4-MMC; intended for research and forensic applications

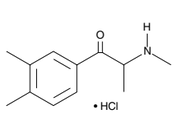
5 mg
10 mg
50 mg



## 3,4-Dimethylmethcathinone (hydrochloride) 9001098

*[1081772-06-6] 3,4-DMMC*
**MF:** $C_{12}H_{17}NO$ • HCl **FW:** 227.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potential designer drug that is structurally related to 4-MMC; intended for research and forensic applications

5 mg
10 mg
50 mg



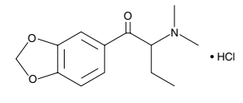




## bk-DMBDB (hydrochloride) 9001125

*[17763-12-1] Dibutylone*
**MF:** $C_{13}H_{17}NO_3$ • HCl **FW:** 271.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potential psychotropic designer drug of the phenethylamine, amphetamine, and cathinone chemical classes; intended for forensic purposes

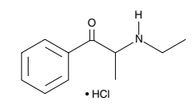
5 mg
10 mg
50 mg



## Ethcathinone (hydrochloride) 11241

*[51553-17-4] N-Ethylcathinone, RMI 8201A*
**MF:** $C_{11}H_{15}NO$ • HCl **FW:** 213.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A substituted cathinone that produces amphetamine-like stimulus effects in rats trained to discriminate amphetamine from vehicle; intended for research and forensic applications

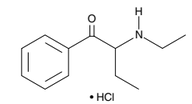
5 mg
10 mg
50 mg



## N-Ethylbuphedrone (hydrochloride) 11665

*NEB*
**MF:** $C_{12}H_{17}NO$ • HCl **FW:** 227.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A substituted cathinone characterized by an ethyl group at the alpha position as well as an N-terminal ethyl group; intended for forensic and research applications

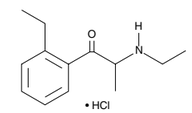
5 mg
10 mg
50 mg



## 2-Ethylethcathinone (hydrochloride) 11199

*2-EEC*
**MF:** $C_{13}H_{19}NO$ • HCl **FW:** 241.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A substituted cathinone with potential for abuse; intended for forensic and research applications

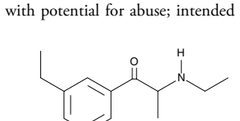
5 mg
10 mg
50 mg



## 3-Ethylethcathinone (hydrochloride) 11198

*3-EEC*
**MF:** $C_{13}H_{19}NO$ • HCl **FW:** 241.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A substituted cathinone with potential for abuse; intended for forensic applications

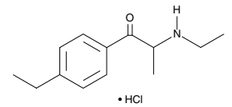
5 mg
10 mg
50 mg



## 4-Ethylethcathinone (hydrochloride) 11197

*4-EEC*
**MF:** $C_{13}H_{19}NO$ • HCl **FW:** 241.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A substituted cathinone with potential for abuse; intended for forensic applications

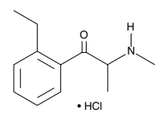
5 mg
10 mg
50 mg



## 2-Ethylmethcathinone (hydrochloride) 9001081

*2-EMC*
**MF:** $C_{12}H_{17}NO$ • HCl **FW:** 227.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potential stimulant/entactogen designer drug of the amphetamine, phenethylamine, and cathinone chemical classes; intended for forensic purposes

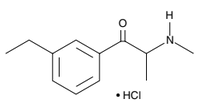
5 mg
10 mg
50 mg



## 3-Ethylmethcathinone (hydrochloride) 9001082

*3-EMC*
**MF:** $C_{12}H_{17}NO$ • HCl **FW:** 227.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potential stimulant/entactogen designer drug of the amphetamine, phenethylamine, and cathinone chemical classes; intended for forensic purposes

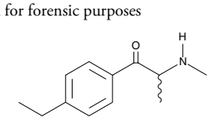
5 mg
10 mg
50 mg



## 4-Ethylmethcathinone (hydrochloride) 9001078

*4-EMC*
**MF:** $C_{12}H_{17}NO$ • HCl **FW:** 227.7 **Purity:** ≥97%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potential stimulant/entactogen designer drug of the amphetamine and cathinone chemical classes; intended for forensic purposes

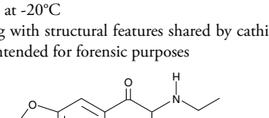
5 mg
10 mg
50 mg



## Eutylone (hydrochloride) 9001103

*[17764-18-0] bk-EBDB, β-keto-Ethylbenzodioxolylbutanamine*
**MF:** $C_{13}H_{17}NO_3$ •HCl **FW:** 271.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potential designer drug with structural features shared by cathinones, amphetamines, and pyrovalerones; intended for forensic purposes

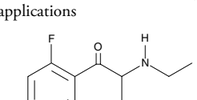
5 mg
10 mg
50 mg



## 2-Fluoroethcathinone (hydrochloride) 11229

*2-FEC*
**MF:** $C_{11}H_{14}FNO$ • HCl **FW:** 231.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A fluorine-substituted synthetic cathinone that has potential for abuse; intended for forensic and research applications

5 mg
10 mg
50 mg



## 3-Fluoroethcathinone (hydrochloride) 11230

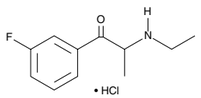
*3-FEC*

**MF:** $C_{11}H_{14}FNO \cdot HCl$ **FW:** 231.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A fluorine-substituted synthetic cathinone that has potential for abuse; intended for forensic and research applications

5 mg
10 mg
50 mg



## 4-Fluoroethcathinone (hydrochloride) 11231

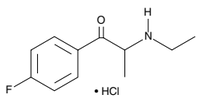
*4-FEC*

**MF:** $C_{11}H_{14}FNO \cdot HCl$ **FW:** 231.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A structural analog of 4-FMC, with an ethyl group replacing the amino terminal methyl group; intended to be used for research and forensic applications

5 mg
10 mg
50 mg



## 4-Fluoroisocathinone (hydrochloride) 9001146

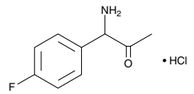
*4-FIC*

**MF:** $C_9H_{10}FNO \cdot HCl$ **FW:** 203.6 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A compound which structurally mimics substituted cathinones and phenethylamines; a potential designer drug of abuse; intended for research and forensic applications

1 mg
5 mg
10 mg



## 2-Fluoromethcathinone (hydrochloride) 9001135

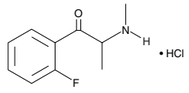
*2-FMC*

**MF:** $C_{10}H_{12}FNO \cdot HCl$ **FW:** 217.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** An isomer of 4-fluoromethcathinone, having fluorine at the 2 position rather than the 4 position of the phenyl group; intended for forensic applications

5 mg
10 mg
50 mg



## 3-Fluoromethcathinone (hydrochloride) 10730

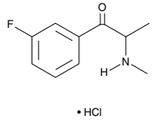
*3-FMC*

**MF:** $C_{10}H_{12}FNO \cdot HCl$ **FW:** 217.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A cathinone derivative identified in several designer drugs that are marketed as plant feeders; for use as a standard for the forensic analysis of samples that may contain this compound

5 mg
10 mg
50 mg



## 4-Fluoromethcathinone (hydrochloride) 10859

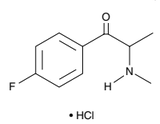
*[7589-35-7] Flephedrone, 4-FMC*

**MF:** $C_{10}H_{12}FNO \cdot HCl$ **FW:** 217.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A cathinone derivative identified in several designer drugs that are marketed as plant feeders; intended for use as a standard for the forensic analysis of samples that may contain this compound

5 mg
10 mg
50 mg



## bk-MDDMA (hydrochloride) 9001124

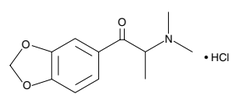
*[109367-07-9] Dimethylone*

**MF:** $C_{12}H_{15}NO_3 \cdot HCl$ **FW:** 257.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥1 year at -20°C

**Summary:** A potential psychotropic designer drug of the phenethylamine, amphetamine, and cathinone chemical classes; intended for forensic purposes

5 mg
10 mg
50 mg



## bk-MDEA (hydrochloride) 9001123

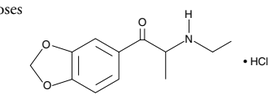
*Ethylone, MDEC*

**MF:** $C_{12}H_{15}NO_3 \cdot HCl$ **FW:** 257.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A psychotropic designer drug of the phenethylamine, amphetamine, and cathinone chemical classes; detected in products marketed as bath salts, plant food, and tablets; intended for forensic purposes

5 mg
10 mg
50 mg



## nor-Mephedrone (hydrochloride) 9000940

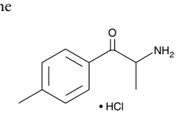
*[6941-17-9] Mephedrone Metabolite, NSC 60487*

**MF:** $C_{10}H_{13}NO \cdot HCl$ **FW:** 199.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A metabolite of mephedrone that can be detected in the urine; formed by the N-demethylation of the primary amine

5 mg
10 mg
50 mg



## Methedrone (hydrochloride) 10529

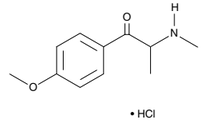
*[879665-92-6] 4-Methedrone, para-Methoxymethcathinone, Methoxyphedrine, PMMC*

**MF:** $C_{11}H_{15}NO_2 \cdot HCl$ **FW:** 229.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A phenethylamine, amphetamine, and cathinone derivative that acts as a triple reuptake/release/reversible MAO inhibitor; intended for use as a standard for the forensic analysis of samples that may contain this compound

1 mg
5 mg
10 mg
50 mg







## *para*-Methoxymethamphetamine (hydrochloride) 11562

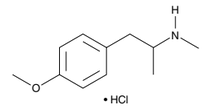
*[3398-68-3] PMMA*

**MF:** $C_{11}H_{17}NO \cdot HCl$ **FW:** 215.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A structural analog of the amphetamine-class serotonergic drug PMA that produces discriminative stimulus effects similar, though not identical, to that of MDMA; intended for research and forensic applications

5 mg
10 mg
50 mg



## 2-Methoxymethcathinone (hydrochloride) 9001186

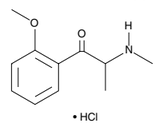
*2-MMC*

**MF:** $C_{11}H_{15}NO_2 \cdot HCl$ **FW:** 229.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A positional isomer of methedrone, having the methoxy group at the 2 rather than the 4 position; intended for forensic and research applications

5 mg
10 mg
50 mg



## 3-Methoxymethcathinone (hydrochloride) 9001187

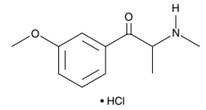
*3-MeOMC*

**MF:** $C_{11}H_{15}NO_2 \cdot HCl$ **FW:** 229.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A positional isomer of methedrone, having the methoxy group at the 3 rather than the 4 position; intended for forensic and research applications

5 mg
10 mg
50 mg



## 4'-Methoxy-α-pyrrolidinopropiophenone (tosylate) 10449

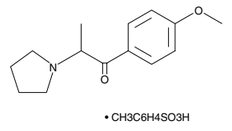
*4'-MeO-α-PPP, 4'-MeOPPP*

**MF:** $C_{14}H_{19}NO_2 \cdot C_7H_8O_3S$ **FW:** 405.5 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A structural analog of α-PPP, differing by the addition of a methoxy group in the para position of the phenyl ring; metabolites that are detectable in rat urine have been described; intended for forensic testing

5 mg
10 mg
50 mg



## 4-Methylbuphedrone (hydrochloride) 11486

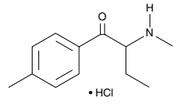
*[1336911-98-8 ] BZ-6378, 4-MeBP*

**MF:** $C_{12}H_{17}NO \cdot HCl$ **FW:** 227.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥1 year at -20°C

**Summary:** A para-methyl analog of buphedrone; intended for forensic applications

5 mg
10 mg
50 mg



## 4-methyl-N-Methylbuphedrone (hydrochloride) 11667

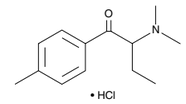
*4-methyl-α-Methylaminobutiophenone*

**MF:** $C_{13}H_{19}NO \cdot HCl$ **FW:** 241.8 **Purity:** ≥98%

A crystalline solid **Stability:** ≥1 year at -20°C

**Summary:** A para-methyl analog of buphedrone with an aminomethyl addition; intended for research and forensic applications

5 mg
10 mg
50 mg



## N-ethyl-N-Methylcathinone (hydrochloride) 11604

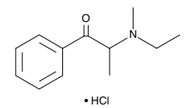
*[1157739-24-6]*

**MF:** $C_{12}H_{17}NO \cdot HCl$ **FW:** 227.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A substituted cathinone structurally similar to the designer drugs mephedrone and methylone; intended for forensic and research applications

5 mg
10 mg
50 mg



## 2,3-Methylenedioxymethcathinone (hydrochloride) 9001133

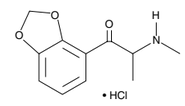
*2,3-MDMC*

**MF:** $C_{11}H_{13}NO_3 \cdot HCl$ **FW:** 243.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A positional isomer of methylone, having the methylenedioxy group attached to the 2 and 3, rather than the 3 and 4, positions; intended for forensic and research applications

5 mg
10 mg
50 mg



## Methylenedioxy Pyrovalerone 10624

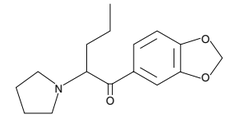
*[687603-66-3] MDPV*

**MF:** $C_{16}H_{21}NO_3$ **FW:** 275.3 **Purity:** ≥98%

A solution in methanol **Stability:** ≥1 year at -20°C

**Summary:** An analog of pyrovalerone which includes the 3,4-methylenedioxy moiety found on MDMA; physiological, neurological, and toxicological actions have not been characterized; reported by the DEA to be abused as a CNS stimulant; intended to be used in the forensic analysis of samples that may contain this compound

5 mg
10 mg
50 mg



## Methylenedioxy Pyrovalerone (hydrochloride) 10684

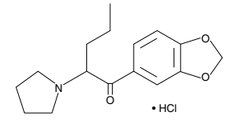
*[24622-62-6] MDPV*

**MF:** $C_{16}H_{21}NO_3 \cdot HCl$ **FW:** 311.8 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

**Summary:** A more aqueous soluble form of MDPV

5 mg
10 mg
50 mg



Thomas G. Brock, Ph.D.

# Analysis of Synthetic Cannabinoids and Designer Drugs

Designer drugs are creating opportunities. Herbal blends advertised as "100% legal" are popular with students and young adults, although the ingredients aren't listed. That creates an opportunity for companies to develop ways to accurately detect synthetic cannabinoids (CBs) and designer drugs that might be mixed with flavorings and scents in plant material. There are opportunities for manufacturers of equipment to produce instruments that can detect parent compounds and metabolites in urine, saliva, serum, or hair. Also generating opportunities are those off-white powders that are found in foil packets, marketed as bath salts, plant food, or anything else that would not normally be for human consumption. These mystery mixtures might contain any of the usual controlled substances or their analogs, or they may have something quite different and unexpected. Most likely, they will contain a mixture of active compounds, as well as some filler or camouflaging compound. Several companies are developing devices to analyze these powders in the lab. Finally, an opportunity exists in the field, where bulk powders and liquids are being transported alongside legal goods. Point-and-shoot identification of designer drugs is needed there.

Of course, these opportunities are generated by designer CBs, cathinones, and other compounds, currently being marketed to a curious public. In fact, the public is very accepting of pills, formulations, and herbal remedies that might alleviate any discomfort. Many have tried products to lose weight or increase their energy, knowing little about the ingredients. The phrase "100% legal" may suggest that the contents have been approved by authorities, which, in turn, indicates that the products are safe for consumption. Unfortunately, diverse stimulants, relaxants, entactogens, anxiolytics, and hallucinogens, which are commonly chemical isomers or analogs of known controlled substances, constitute the biological activity of many of these "100% legal" products currently available online, as well as at gas stations, head shops, and other commercial outlets. The magnitude of this problem is underscored by the number of users admitted to emergency rooms around the world.[1,2]

## Synthetic Cannabinoids and Their Metabolites

It seemed like a good idea at the time: develop stable analogs of THC, the most potent ingredient in cannabis, that might be able to reduce pain or stimulate appetite without the psychoactive effects. Several laboratories accepted the challenge during the 1990s and 2000s, developing an array of structurally distinct compounds which avidly activate one or both of the CB receptors (see related article on page 4). Unfortunately, certain entrepreneurs had a different idea, to create synthetic marijuana by adding these synthetic CBs to dried plant material. Originally known as Spice or K2 and marketed as incense, these products contain varying mixes of synthetic CBs in uncharacterized concentrations. The use of these cannabimimetics translates, often, into hospital admissions due to cannabinoid toxicity and other adverse effects. Still, because the synthetic CBs are structurally distinct from THC, users who anticipate being tested for smoking weed have an added incentive: the synthetic CBs and their metabolites are not detected by marijuana tests.

Enter the Cayman JWH Metabolite ELISA. This assay detects urinary metabolites of many of the most popular synthetic CBs, including JWH 018, JWH 073, JWH 019, JWH 200, and AM2201. It has been validated with human urine samples and demonstrates a high degree of correlation with LC/MS analysis. This assay is designed as a rapid and inexpensive screening tool that generates a positive *vs.* negative answer (Figure 1). Samples testing positive in Cayman's assay should be confirmed by quantitative analysis, such as LC/MS.

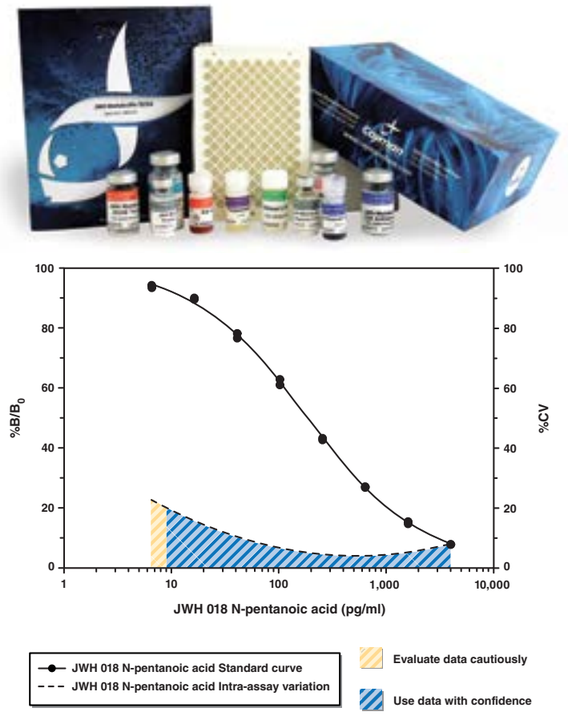



**Figure 1. The Cayman JWH Metabolite ELISA kit (top) selectively and sensitively detects several JWH metabolites, like JWH 018 N-pentanoic acid (bottom).**

## Analysis at the Bench

The analysis of samples which might contain one or more forensic compounds can be performed using a variety of related techniques. Gas chromatography (GC) paired with mass spectroscopy (MS) has long been the gold standard for forensic analysis. In GC/MS, chemicals in a mixture are separated by GC, ionized, and then the mass to charge ratio (m/z) of each compound is determined by MS. The mass spectrum is then compared with a spectral library of known compounds for identification. While MS provides the m/z of a compound, tandem mass spectrometry (MS/MS) involves fragmenting the compound after initial MS and then determining the m/z of each piece, providing important information when parent compounds have identical mass. Different types of mass analyzers may be used, including quadrupole and time of flight (TOF), which differ in their sensitivity and selectivity. Tandem MS often combines sequential quadrupole devices (triple quadrupole, or QQQ) or quadrupole followed by TOF (QTOF). Other types of detectors may also follow GC (*e.g.*, flame ionization detectors (FID)) or LC (*e.g.,* photodiode array detectors (PDA, DAD)).

Different equipment is suited to different goals in analysis. In some cases, analysis is targeted, seeking to specifically test whether a particular substance is present in a given sample. For this purpose, both the analytical hardware and the acquisition software should be optimized to avoid false positives. For this goal, Agilent's 6400 series Triple Quadrupole LC/MS systems with triggered MRM (tMRM) acquisition software would be an excellent match: this system produces quantitative data and a searchable library spectrum in a single injection in order to avoid false positive identification. Alternatively, the goal may be to identify a variety of compounds, some novel, in a complex mixture, as is often the case in designer drug preparations. In this case, the appropriate hardware must be combined with software that can scan an extensive library of compounds. Here, one might choose from Agilent's 6500 series Q-TOF LC/MS platforms which combine accurate mass analysis with the ability to retrospectively mine data for new compounds without reinjection. In addition, Agilent offers high quality accurate mass databases and libraries across all of its GC/MS and LC/MS instruments for thousands of compounds related to Forensic Toxicology. Cayman is actively synthesizing new and expected analytical reference standards, including synthetic CBs, cathinones, and others, to help develop these forensic libraries.

Synthetic CBs and cathinones provide a unique challenge for MS analysis: many isomers have identical masses and cannot be distinguished by MS or MS/MS. One example would be flephedrone (4-fluoromethcathinone, 4-FMC) and 3-FMC, which are, respectively, *para-* and *ortho*-substituted isomers of a cathinone that may be found in bath salt-type pouders. The DiscovIR-GC™ from Spectra Analysis couples Fourier transform infrared spectroscopy (FTIR) with gas chromatography (Figure 2). The DiscovIR-GC™ provides a high resolution solid phase transmission spectrum for each component of a sample. Infrared spectroscopy can resolve *ortho-*, *meta-* and *para*-substituted isomers; even diastereomers can be resolved by infrared spectroscopy. FTIR can differentiate isomers based on spectral differences, so the DiscovIR-GC™ does not rely on retention time, a crucial capability


**Figure 2. The DiscovIR-GC™ from Spectra Analysis differentiates isomers based on spectral differences.**

when the mass spectra are identical and retention times are similar. Please visit www.Spectra-Analysis.com for more information.

## Not Outstanding in the Field

The curious can find designer drugs online, but where are they made? The answer is often some variation on 'Clandestine labs in other countries, most likely China or India'. This means that the front line of defense is at the borders, where evaluation of imported powders and liquids for drugs must be performed rapidly and accurately, often in the field. One contemporary option is the portable Raman Spectrometer, a handheld device which offers point-and-shoot analysis.

Sir Chandrasekhara Venkata Raman was a Nobel Prize winning physicist from India. He discovered that, when light traverses a transparent material, some of the light that is deflected changes in wavelength (Raman scattering). In one current approach, laser light is directed at a sample and is scattered by specific molecules in the sample. A sensor then measures the intensity of light at each wavelength and converts it to a spectrum that fingerprints those molecules. Raman spectroscopy may be used in diverse applications, including profiling molecular components of cells and tissues (*e.g.*, for cancer detection), studying static and changing chemical structure, and analyzing liquids for explosives. Raman spectroscopy is rapid and does not require processing or labeling of samples. Certain forms of Raman spectroscopy show low sensitivity to surface layers and can be used without opening packaging, including plastic bags, glass containers, and gel caps.

Portable or handheld Raman spectrometers are available in a variety of formats for forensic analysis in the field. Four devices were recently evaluated by the National Forensic Science Technology Center (nfstc.org). It is worth noting that previous evaluations of portable GC-MS, near infrared (NIR) or FTIR devices revealed numerous drawbacks, most notably failure to identify compounds in samples accurately and reproducibly. The overall review of portable Raman spectrometers is somewhat favorable: testing is rapid and non-destructive, units are easy to operate, and very little sample preparation is required prior to analysis. However, accuracy remains a limitation, with only 50% accuracy being typical for mixtures of controlled substances (although the Thermo FirstDefender RM attained 70% accuracy). Reproducibility was less than 50% for all devices. Moreover, Raman spectrometry does not work well with trace amounts or with highly fluorescent or pigmented samples. In short, field testing remains an area for opportunity.

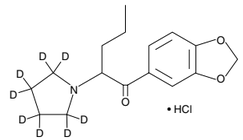
This brings us back to GC/MS. Companies have engineered instruments to be operated under field conditions, some with internal gas cylinders and vacuum pumps, capacities for rapid sample processing, and integrated software analysis. Torion Technologies has an extremely rugged and truly portable unit that combines GC with toroidal ion trap MS which offers both sample preparation (extraction) and sample injection in one device, its Solid Phase Micro Extraction (SPME) syringe. FLIR Systems offers several portable MS devices, including the Griffin 400 and 460 GC/MS models for mobile forensic investigations. These instruments also have SPME capacity and are MS/MS capable. Cayman Chemical is collaborating with FLIR Systems by providing analytical reference standards of known and anticipated designer drugs to produce a Mass Spectral Library that can be used with the Griffin GC/MS systems.

References
1. James,D., Adams,R.D., Spears,R., *et al. Emerg. Med. J.* **28(8),** 686-689 (2011).
2. Schifano, F., Albanese, A., Fergus, S., *et al. Psychopharmacol. (Berl).* **214(3),** 593-602 (2011).

## Methylenedioxy Pyrovalerone-$d_8$ (hydrochloride) 10679

*[1246820-09-6] MDPV-$d_8$*
**MF:** $C_{16}H_{13}D_8NO_3$ • HCl **FW:** 319.9 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_8$); ≤1% $d_0$
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An internal standard for the quantification of MDPV (hydrochloride) by GC- or LC-MS

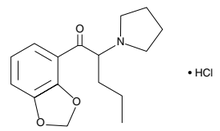
1 mg
5 mg
10 mg



## 2,3-Methylenedioxy Pyrovalerone (hydrochloride) 9001051

*2,3-MDPV*
**MF:** $C_{16}H_{21}NO_3$ • HCl **FW:** 311.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potential psychoactive designer drug structurally related to 3,4-MDPV; intended for forensic purposes

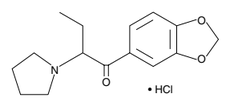
5 mg
10 mg
50 mg



## 3'4'-Methylenedioxy-α-pyrrolidinobutiophenone (hydrochloride) 10437

*[24622-60-4] 3',4'-MD-α-PBP, 3',4'-MDPBP*
**MF:** $C_{15}H_{19}NO_3$ • HCl **FW:** 297.8 **Purity:** ≥97%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Shares structural features of the stimulants α-PPP and MDPV; intended to be used for forensic applications

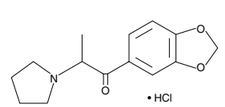
5 mg
10 mg
25 mg
50 mg



## 3',4'-Methylenedioxy-α-pyrrolidinopropiophenone (hydrochloride) 10439

*[24698-57-5] 3',4'-MD-α-PPP, 3',4'-MDPPP*
**MF:** $C_{14}H_{17}NO_3$ • HCl **FW:** 283.8 **Purity:** ≥97%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Shares structural features of the stimulants PPP and MDPV; intended to be used for forensic applications

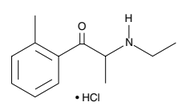
5 mg
10 mg
50 mg



## 2-Methylethcathinone (hydrochloride) 11221

*2-MEC*
**MF:** $C_{12}H_{17}NO$ • HCl **FW:** 227.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A substituted cathinone with potential for abuse; intended for research and forensic applications

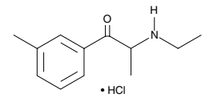
5 mg
10 mg
50 mg



## 3-Methylethcathinone (hydrochloride) 11222

*3-MEC*
**MF:** $C_{12}H_{17}NO$ • HCl **FW:** 227.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A substituted cathinone with potential for abuse; intended for forensic and research applications

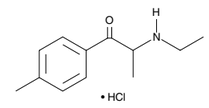
5 mg
10 mg
50 mg



## 4-Methylethcathinone (hydrochloride) 9001069

*[1266688-86-1] 4-methyl-N-ethyl Cathinone, 4-MEC*
**MF:** $C_{12}H_{17}NO$ • HCl **FW:** 227.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A cathinone derivative identified in several designer drugs that are sold as "legal high" replacements for controlled stimulants such as methamphetamine and MDMA; intended for use as a standard for the forensic analysis of samples that may contain this compound

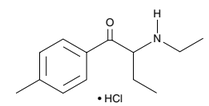
5 mg
10 mg
50 mg



## 4-Methyl-α-ethylaminobutiophenone (hydrochloride) 11489

*[18268-19-4]*
**MF:** $C_{13}H_{19}NO$ • HCl **FW:** 241.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** A para-methyl analog of buphedrone with an ethyl group replacing methyl at the alpha position; intended for forensic and research applications

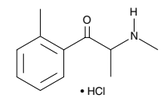
5 mg
10 mg
50 mg



## 2-Methylmethcathinone (hydrochloride) 11223

*[1246815-51-9] 2-MeMC*
**MF:** $C_{11}H_{15}NO$ • HCl **FW:** 213.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potential major impurity in the preparation of 4-MMC; may be marketed as a designer drug; intended for forensic and research applications

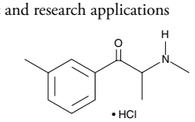
5 mg
10 mg
50 mg



## 3-Methylmethcathinone (hydrochloride) 11224

*[1246816-62-5] 3-MeMC*
**MF:** $C_{11}H_{15}NO$ • HCl **FW:** 213.7 **Purity:** ≥97%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potential major impurity in preparations of 4-MMC; may be marketed as a designer drug; intended for forensic and research applications

5 mg
10 mg
50 mg

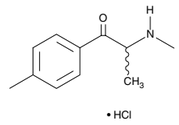




## 4-Methylmethcathinone (hydrochloride) 10801

*[1189726-22-4] 4-Methylephedrone, 4-MeMC*
**MF:** $C_{11}H_{15}NO$ • HCl **FW:** 213.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A designer drug of the phenethylamine class that shares substantial structural similarities with methcathinone and methamphetamine; intended to be used to facilitate the identification of 4-MMC in complex mixtures

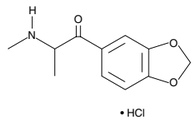
5 mg
10 mg
50 mg



## Methylone (hydrochloride) 10986

*[186028-80-8] M1, bk-MDMA, 3,4-Methylenedioxy-N-methylcathinone*
**MF:** $C_{11}H_{13}NO_3$ • HCl **FW:** 243.1 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A designer drug that is structurally similar to MDMA, differing by having a β-keto group; detected in products marketed as bath salts, plant food, and tablets

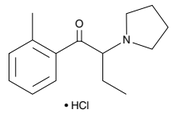
5 mg
10 mg
50 mg
100 mg



## 2-Methyl-α-pyrrolidinobutiophenone (hydrochloride) 9001188

*2-Me-α-PBP, 2-MePBP*
**MF:** $C_{15}H_{21}NO$ • HCl **FW:** 267.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An isomer of 4-Me-α-PBP, having the methyl group attached at the 2 position of the phenyl ring, instead of the 4 position; intended for forensic and research applications

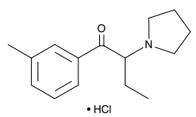
5 mg
10 mg
50 mg



## 3-Methyl-α-pyrrolidinobutiophenone (hydrochloride) 9001189

*3-Me-α-PBP, 3-MePBP*
**MF:** $C_{15}H_{21}NO$ • HCl **FW:** 267.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An isomer of 4-MBPB, having the methyl group attached at the 3 position of the phenyl ring, instead of the 4 position; intended for forensic and research applications

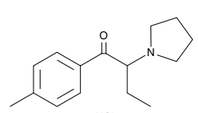
5 mg
10 mg
50 mg



## 4-Methyl-α-pyrrolidinobutiophenone (hydrochloride) 9001190

*[1214-15-9] F 1938, 4-Me-α-PBP, 4-MePBP*
**MF:** $C_{15}H_{21}NO$ • HCl **FW:** 267.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A synthetic cathinone with psychoactive properties which has recently been identified in party pills and powders; intended for forensic and research applications

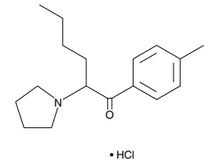
5 mg
10 mg
50 mg



## 4'-Methyl-α-pyrrolidinohexanophenone (hydrochloride) 10448

*4'-Me-α-PHP, 4'-MePHP*
**MF:** $C_{17}H_{25}NO$ • HCl **FW:** 295.9 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An α-PPP derivative, homologous to MPPP; assumed to be a psychostimulant; intended to be used for forensic purposes

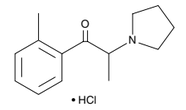
5 mg
10 mg
50 mg



## 2-Methyl-α-pyrrolidinopropiophenone (hydrochloride) 11484

*2-Me-α-PPP, 2-MePPP*
**MF:** $C_{14}H_{19}NO$ • HCl **FW:** 253.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
**Summary:** Shares structural features with the stimulant α-PPP and is a positional isomer of 4-MeMPPP, which has been detected in bath salts and other formulations; this product is intended to be used for forensic and research applications

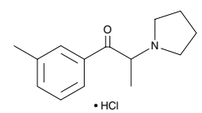
5 mg
10 mg
50 mg



## 3-Methyl-α-pyrrolidinopropiophenone (hydrochloride) 11485

*3-Me-α-PPP, 3-MePPP*
**MF:** $C_{14}H_{19}NO$ • HCl **FW:** 253.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A structural isomer of 4'Me-α-PPP, having the methyl group at the 3 position, rather than the 4 position, of the phenyl group; intended for forensic and research applications

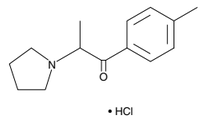
5 mg
10 mg
50 mg



## 4'-Methyl-α-pyrrolidinopropiophenone (hydrochloride) 10446

*[1313393-58-6] 4'-Me-α-PPP, 4'-MePPP*
**MF:** $C_{14}H_{19}NO$ • HCl **FW:** 253.8 **Purity:** ≥97%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A cathinone that shares structural features with the stimulant α-PPP; intended to be used for forensic applications

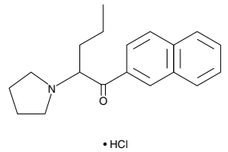
5 mg
10 mg
50 mg



## Naphyrone (hydrochloride) 10517

*[850352-11-3] Naphpyrovalerone, β-Naphyrone, NRG-1, O-2482*
**MF:** $C_{19}H_{23}NO$ • HCl **FW:** 317.9 **Purity:** ≥97%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An analog of pyrovalerone that is characterized by the substitution of the methylphenyl group of pyrovalerone with a naphthyl group; potently inhibits dopamine, serotonin, and norepinephrine transporters ($IC_{50}$ = 20, 33, and 136 nM, respectively); intended for forensic and research purposes

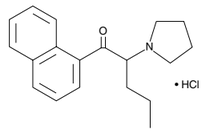
1 mg
5 mg
10 mg



## Naphyrone 1-naphthyl isomer (hydrochloride) 11240

**MF:** $C_{19}H_{23}NO$ • HCl **FW:** 317.9 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A structural isomer of naphyrone, having the napthyl group attached at the 1, rather than 2, position; intended for forensic and research applications

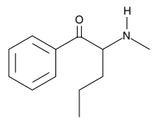
1 mg
5 mg
10 mg



## Pentedrone (hydrochloride) 11011

*[879669-95-1] α-methylamino-Valerophenone*
**MF:** $C_{12}H_{17}NO$ • HCl **FW:** 227.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A substituted cathinone that is structurally similar to methcathinone

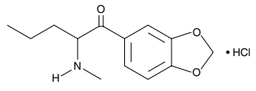
5 mg
10 mg
50 mg



## Pentylone (hydrochloride) 9000746

*[17763-01-8]*
**MF:** $C_{13}H_{17}NO_3$ • HCl **FW:** 271.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A cathione derivative abused as a central nervous system stimulant; for the forensic analysis of samples that may contain this compound

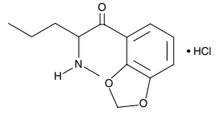
5 mg
10 mg
50 mg



## 2,3-Pentylone isomer (hydrochloride) 11463

**MF:** $C_{13}H_{17}NO_3$ • HCl **FW:** 271.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A structural isomer of pentylone, having the methylenedioxy group attached at carbons 2 and 3 of the terminal phenyl group; intended for forensic and research applications

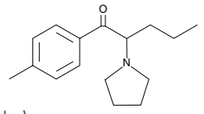
5 mg
10 mg
50 mg



## Pyrovalerone 10817

*[3563-49-3] Centroton, Thymergix, Valerophenone*
**MF:** $C_{16}H_{23}NO$ **FW:** 245.4 **Purity:** ≥95%
A solution in methanol **Stability:** ≥1 year at -20°C
**Summary:** An inhibitor of the transporters for certain monoamine neurotransmitters, including dopamine and norepinephrine, preventing their uptake; for use in the forensic analysis of samples that may contain this compound

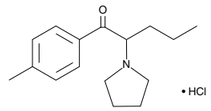
5 mg
10 mg
50 mg



## Pyrovalerone (hydrochloride) 10836

*[1147-62-2] Centroton, Thymergix, Valerophenone*
**MF:** $C_{16}H_{23}NO$ • HCl **FW:** 281.8 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An inhibitor of the transporters for certain monoamine neurotransmitters, including dopamine and norepinephrine, preventing their uptake; for use in the forensic analysis of samples that may contain this compound

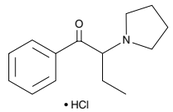
5 mg
10 mg
50 mg
100 mg



## α-Pyrrolidinobutiophenone (hydrochloride) 9001195

*[13415-54-8] α-PBP*
**MF:** $C_{14}H_{19}NO$ • HCl **FW:** 253.8 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A synthetic cathinone/butyrophenone that has potential for abuse; intended for forensic and research applications

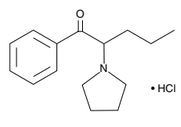
5 mg
10 mg
50 mg



## α-Pyrrolidinopentiophenone (hydrochloride) 9001083

*[5485-65-4] O-2387, α-PVP, 2-(1-pyrrolidinyl)-Valerophenone*
**MF:** $C_{15}H_{21}NO$ • HCl **FW:** 267.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An analog of pyrovalerone, lacking only the methyl group that is found on the phenyl moiety of pyrovalerone; expected to be a psychoactive stimulant; intended for forensic applications

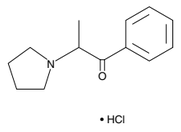
5 mg
10 mg
50 mg



## α-Pyrrolidinopropiophenone (hydrochloride) 10445

*[92040-10-3] α-PPP*
**MF:** $C_{13}H_{17}NO$ • HCl **FW:** 239.7 **Purity:** ≥97%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An analog of the appetite suppressant diethylcathinone related to the designer drug MPPP; metabolized to a variety of products, including cathinone; intended to be used for forensic applications

5 mg
10 mg
50 mg





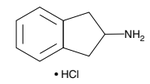


# Indanes

## 2-AI (hydrochloride) 11048

*[2338-18-3] 2-Aminoindane, SU 8629*
**MF:** $C_9H_{11}N$ • HCl **FW:** 169.7 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An aminoindane that serves as the starting point for the synthesis of psychoactive compounds, such as 5,6-methylenedioxy-2-aminoindane; has modest analgesic and stimulatory properties; intended for forensic applications

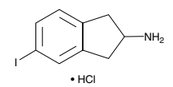
1 mg
5 mg



## 5-IAI (hydrochloride) 11035

*5-iodo-2-Aminoindan*
**MF:** $C_9H_{10}IN$ • HCl **FW:** 295.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A psychoactive analog of p-iodoamphetamine that is indistinguishable, in its physiological effects, from MDMA in rats; significantly reduces both serotonin uptake sites and hippocampal serotonin levels in rats; intended for forensic applications

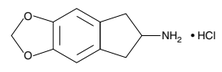
5 mg
10 mg
50 mg



## MDAI (hydrochloride) 9001102

*[155344-90-4] 5,6-Methylenedioxy-2-aminoindane*
**MF:** $C_{10}H_{11}NO_2$ • HCl **FW:** 213.7 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An indane analog of MDA; produces significant serotonin neurotoxicity when given with dopaminergic agents; intended for forensic purposes

1 mg
5 mg
10 mg

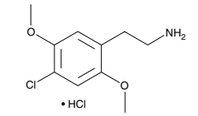


# Phenethylamines

## 2C-C (hydrochloride) 11735

*[88441-15-0]*
**MF:** $C_{10}H_{14}ClNO_2$ • HCl **FW:** 252.1 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A member of a family of 2,5-dimethoxy-phenethylamines, substituted on the 4-position of the aromatic ring with chlorine; potently alters monoamine re-uptake

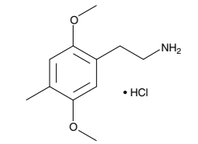
5 mg
10 mg
50 mg



## 2C-D (hydrochloride) 11888

*[25505-65-1]*
**MF:** $C_{11}H_{17}NO_2$ • HCl **FW:** 231.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A member of a family of 2,5-dimethoxy-phenethylamines, substituted on the 4-position of the aromatic ring with a methyl group; weakly alters monoamine re-uptake

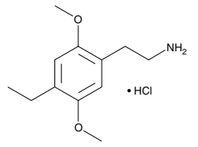
5 mg
10 mg
50 mg



## 2C-E (hydrochloride) 10395

*[923013-67-6] 2,5-Dimethoxy-4-ethylphenethylamine*
**MF:** $C_{12}H_{19}NO_2$ • HCl **FW:** 245.7 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent monoamine oxidase inhibitor, blocking the uptake of serotonin and norepinephrine ($IC_{50}$ values of 72 and 89 µM, respectively), but not dopamine; intended for forensic applications

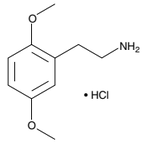
5 mg
10 mg
50 mg



## 2C-H (hydrochloride) 11889

*[3166-74-3]*
**MF:** $C_{10}H_{15}NO_2$ • HCl **FW:** 217.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Described formally as 2,5-dimethoxyphenethylamine; has little effect on serotonin receptors; intended for research and forensic applications

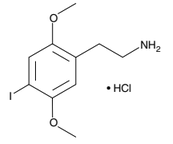
5 mg
10 mg
50 mg



## 2C-I (hydrochloride) 11113

*[64584-32-3]*
**MF:** $C_{10}H_{14}INO_2$ • HCl **FW:** 343.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A monoamine oxidase inhibitor, blocking the uptake of serotonin and norepinephrine ($IC_{50}$ values of 79 and 37 µM, respectively), but not dopamine; intended for forensic applications

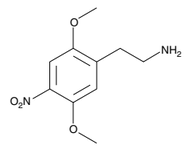
5 mg
10 mg
50 mg



## 2C-N 11890

*[261789-00-8]*
**MF:** $C_{10}H_{14}N_2O_4$ **FW:** 226.2 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Described formally as 2,5-dimethoxy-4-nitrophenethylamine; potently stimulates arachidonic acid release through the serotonin receptors 5-$HT_{2C}$ ($pEC_{50}$ = 5.91) and 5-$HT_{2A}$ ($pEC_{50}$ = 4.78); intended for forensic and research applications

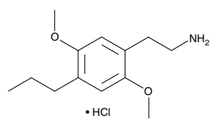
5 mg
10 mg
50 mg



## 2C-P (hydrochloride) 11696

*[1359704-27-0]*
**MF:** $C_{13}H_{21}NO_2$ • HCl **FW:** 259.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A member of a family of 2,5-dimethoxy-phenethylamines, substituted on the 4-position of the aromatic ring with an ethyl group

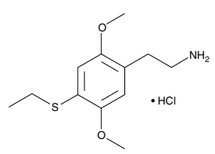
5 mg
10 mg
50 mg



## 2C-T-2 (hydrochloride) 11891

*[681160-71-4]*
**MF:** $C_{12}H_{19}NO_2S$ • HCl **FW:** 277.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A member of a family of 2,5-dimethoxy-phenethylamines, substituted on the 4-position of the aromatic ring with an ethylthio group; detected in illicit drugs

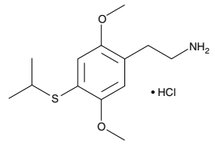
5 mg
10 mg
50 mg



## 2C-T-4 (hydrochloride) 11892

*[868738-44-7]*
**MF:** $C_{13}H_{21}NO_2S$ • HCl **FW:** 291.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A member of a family of 2,5-dimethoxy-phenethylamines, substituted on the 4-position of the aromatic ring with an isopropylthio group

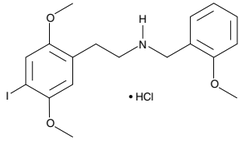
5 mg
10 mg
50 mg



## 25I-NBOMe 9001128

*[1043868-97-8]*
**MF:** $C_{18}H_{22}INO_3$ • HCl **FW:** 463.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A derivative of the phenethylamine hallucinogen 2C-I that acts as a highly potent agonist for the human 5-$HT_{2A}$ receptor ($K_i$ = 0.044 nM)

1 mg
5 mg
10 mg

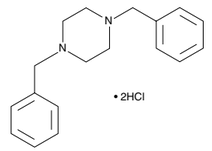


# Piperazines

## 1,4-Dibenzylpiperazine (hydrochloride) 11206

*[2298-55-7] DBZP*
**MF:** $C_{18}H_{22}N_2$ • 2HCl **FW:** 339.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A common impurity produced as a reaction byproduct during the synthesis of BZP; intended for forensic applications

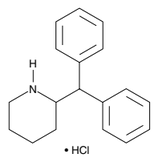
10 mg
50 mg
100 mg



## 2-DPMP (hydrochloride) 11481

*[5807-81-8] Desoxypipradrol, 2-Diphenylmethylpiperidine*
**MF:** $C_{18}H_{21}N$ • HCl **FW:** 287.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** Structurally related to pipradrol and methylphenidate (Ritalin), which are psychostimulatory piperadines that inhibit monoamine transporters; identified in recreational drugs; intended for research and forensic applications

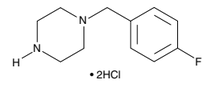
5 mg
10 mg
25 mg



## 1-(4-Fluorobenzyl) piperazine (hydrochloride) 11112

*[199672-06-5]*
**MF:** $C_{11}H_{15}FN_2$ • 2HCl **FW:** 267.2 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A substituted benzylpiperazine with a potential for abuse; intended for forensic and research applications

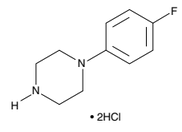
10 mg
50 mg
100 mg



## 1-(p-Fluorophenyl) piperazine (hydrochloride) 11204

*[64090-19-3] pFPP, NSC 149515*
**MF:** $C_{10}H_{13}FN_2$ • 2HCl **FW:** 253.1 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A substituted phenylpiperazine with a potential for abuse; intended for forensic and research applications

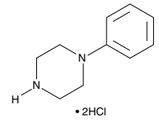
10 mg
50 mg
100 mg



## Phenylpiperazine (hydrochloride) 11203

*[4004-95-9] NSC 38914, NSC 150847*
**MF:** $C_{10}H_{14}N_2$ • 2HCl **FW:** 235.2 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** The base compound from which bioactive drugs, such as the entactogen *meta*-chlorophenylpiperazine, are derived; intended for forensic applications

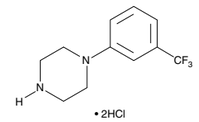
10 mg
50 mg
100 mg



## 1-(m-Trifluoromethylphenyl) piperazine (hydrochloride) 11205

*[76835-14-8] TFMPP*
**MF:** $C_{11}H_{13}F_3N_2$ • 2HCl **FW:** 303.2 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An entactogenic drug which selectively promotes the release of serotonin; in combination with BZP, increases both serotonin and dopamine, mirroring the effects of MDMA; has been identified in party pills and powders and is intended for forensic applications

10 mg
50 mg
100 mg





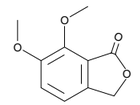


# Terpenoids

## Meconin 9001140

*[569-31-3] NSC 35547, Opianyl*
**MF:** $C_{10}H_{10}O_4$ **FW:** 194.2 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A noscapine metabolite used to detect illicit opiates in urine samples; intended for use as a forensic standard

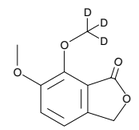
1 mg
5 mg
10 mg



## Meconin-$d_3$ 9001141

*NSC 35547-$d_3$, Opianyl-$d_3$*
**MF:** $C_{10}H_7D_3O_4$ **FW:** 197.2 **Chemical Purity:** ≥98%
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_3$); ≤1% $d_0$
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An internal standard for the quantification of meconin by GC- or LC-MS

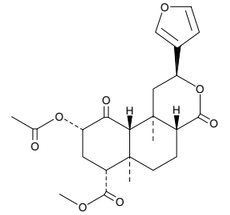
1 mg
5 mg
10 mg



## Salvinorin A 11487

*[83729-01-5] Divinorin A*
**MF:** $C_{23}H_{28}O_8$ **FW:** 432.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent, selective κ opioid receptor agonist with potential for recreational abuse; it is intended for forensic and research applications

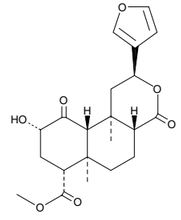
5 mg
10 mg
50 mg
100 mg



## Salvinorin B 11488

*[92545-30-7] Divinorin B*
**MF:** $C_{21}H_{26}O_7$ **FW:** 390.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** The major deacetylated metabolite of Salvinorin A, a potent, selective κ opioid receptor agonist with potential for recreational abuse; though it lacks pharmacological activity, alkoxymethyl ether derivatives have been designed to develop selective κ opioid receptor antagonists or partial agonists with potential research utility in the treatment of depression and the study of κ opioid receptor signaling

5 mg
10 mg
50 mg
100 mg

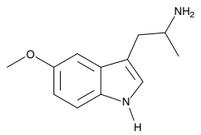


# Tryptamines

## 5-methoxy AMT 11553

*[1137-04-8] 5-MeO AMT*
**MF:** $C_{12}H_{16}N_2O$ **FW:** 204.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A potent psychoactive analog of 5-methoxy DiPT and AMT that inhibits re-uptake ($IC_{50}$s = 0.18, 2.9, and 3.37 µM) and stimulates release ($EC_{50}$s = 1.5, 460, and 8.9 µM) of dopamine, serotonin, and norepinephrine, respectively from rat brain synaptosomes

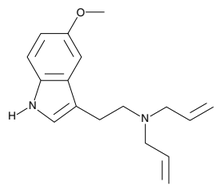
5 mg
10 mg
25 mg



## 5-methoxy DALT 10729

*[928822-98-4] N,N-Diallyl-5-Methoxytryptamine*
**MF:** $C_{17}H_{22}N_2O$ **FW:** 270.4 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A tryptamine derivative with psychoactive effects used as a component in 'bath salts'; intended as an analytical standard for the forensic analysis of samples that may contain this compound

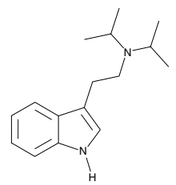
1 mg
5 mg
10 mg



## DiPT 11550

*[14780-24-6] N,N-Diisopropyltryptamine*
**MF:** $C_{16}H_{24}N_2$ **FW:** 244.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** An uncommonly abused psychedelic drug related to 5-MeO DiPT; intended for forensic and research applications

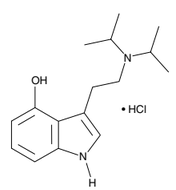
5 mg
10 mg
25 mg



## 4-hydroxy DiPT (hydrochloride) 11312

*[63065-90-7] 4-OH DiPT*
**MF:** $C_{16}H_{24}N_2O$ • HCl **FW:** 296.8 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A synthetic tryptamine derivative with structural and functional similarities to psilocin; intended for forensic and research applications

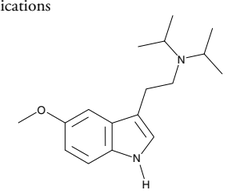
5 mg
10 mg
25 mg



## 5-methoxy DiPT 11865

*[4021-34-5] 5-methoxy-N,N-Diisopropyltryptamine, FOXY, 5-MeO DiPT*
**MF:** $C_{17}H_{26}N_2O$ **FW:** 274.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A tryptamine-type designer drug with pronounced psychoactive and physiological effects; inhibits the re-uptake of monoamines ($IC_{50}$ = 0.65, 2.2, and 8.2 µM for dopamine, serotonin, and norepinephrine, respectively) while not affecting their release; intended for forensic applications

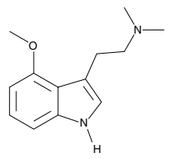
5 mg
10 mg
25 mg



## 4-methoxy DMT 9000895

*[3965-97-7] 4-methoxy-N,N-Dimethyltryptamine, 4-MeO DMT*
**MF:** $C_{13}H_{18}N_2O$ **FW:** 218.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A substituted form of DMT that binds 5-HT receptors with comparable affinity ($pA_2$ = 6.17 for 4-methoxy DMT *vs.* 6.00 for DMT); also has behavior disruption activity in rats that is similar to that of DMT; intended for forensic and research applications

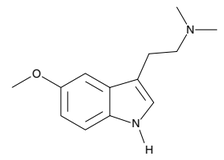
5 mg
10 mg
25 mg



## 5-methoxy DMT 11480

*[1019-45-0] 5-methoxy-N,N-Dimethyltryptamine, 5-MeO DMT*
**MF:** $C_{13}H_{18}N_2O$ **FW:** 218.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A naturally-occurring hallucinogenic indolealkylamine that potently activates serotonin receptors; inactivated by monoamine oxidases; intended for forensic applications

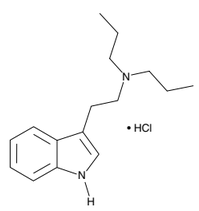
5 mg
10 mg
25 mg



## DPT (hydrochloride) 11551

*[16382-06-2] N,N-Dipropyltryptamine*
**MF:** $C_{16}H_{24}N_2$ • HCl **FW:** 280.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A psychedelic drug of the tryptamine class; inhibits the re-uptake of dopamine, serotonin, and norepinephrine ($IC_{50}$ = 23, 2.9, and 9.1 µM); intended for forensic and research applications

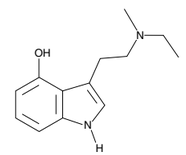
5 mg
10 mg
25 mg



## 4-hydroxy MET 11148

*[77872-41-4] 4-OH MET, Metocin*
**MF:** $C_{13}H_{18}N_2O$ **FW:** 218.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A psychoactive synthetic tryptamine with structural and functional similarities to psilocin; intended for forensic and research applications

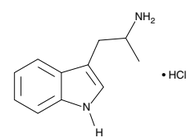
5 mg
10 mg
25 mg



## α-Methyltryptamine (hydrochloride) 11135

*[879-36-7] Indopan, α-MT*
**MF:** $C_{11}H_{14}N_2$ • HCl **FW:** 210.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A psychedelic drug that is scheduled in the United States; potently stimulates the release of monoamines from synaptosomes and inhibits their re-uptake ($IC_{50}$s = 0.73, 0.38, and 0.4 µM for dopamine, serotonin, and norepinephrine, respectively); intended for forensic uses

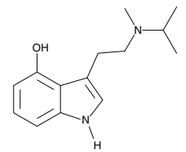
5 mg
10 mg
50 mg



## 4-hydroxy MiPT 11552

*[77872-43-6] 4-OH MiPT*
**MF:** $C_{14}H_{20}N_2O$ **FW:** 232.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A synthetic tryptamine derivative with structural and functional similarities to psilocin; intended for forensic and research applications

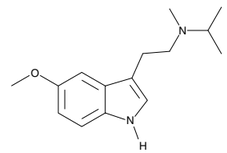
5 mg
10 mg
25 mg



## 5-methoxy MiPT 11482

*[96096-55-8] 5-MeO MiPT*
**MF:** $C_{15}H_{22}N_2O$ **FW:** 246.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
**Summary:** A psychedelic tryptamine which potently inhibits the re-uptake of the monoamines serotonin and norepinephrine ($IC_{50}$s = 6.4 and 2.6 µM, respectively), but does not affect dopamine re-uptake; intended for forensic and research applications

5 mg
10 mg
25 mg



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