

# Stimulant Analytical Standards

Stimulants belong to a diverse group of psychoactive drugs whose function exerts a constant contribution to hyperactivity and impulse control. Illegal stimulant derivatives including amphetamines, arylcyclohexylamines, cathinones, cocaine/tropanes, phenethylamines, and piperazines are among the most widely abused across the US and Europe. However, the popularity of each substance, particularly in party culture settings, is frequently changing. Cayman offers more than 700 analytical standards for the identification of stimulants and is dedicated to working with the forensic community to quickly make reference standards available for new psychoactive substances (NPS). A library of mass spectral data containing many of Cayman's emerging stimulant standards is freely available for download at [www.caymanchem.com/CSL](http://www.caymanchem.com/CSL).



ACCREDITED  
ISO/IEC 17025 #AT-1773  
ISO 17034 #AR-1774

## More than 700 Stimulant Standards Available for

- Amphetamines
- Arylcyclohexylamines
- Cathinones
- Cocaine & Tropanes
- Indanes
- Phenethylamines
- Piperazines
- And More

## Tools to Rapidly Screen for Major Controlled Stimulants

### Cocaine/Heroin/Methamphetamine Mixture (CRM)

Item No. 9002662

A CRM mixture of cocaine, heroin, and methamphetamine (1 mg/ml of each)

### GC-MS Drug Standard Mixture 4

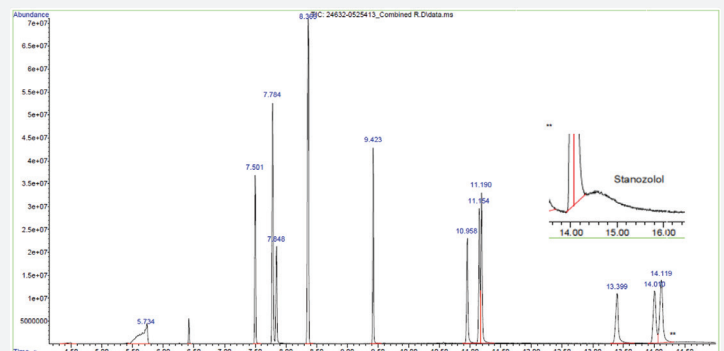
Item No. 24632

A mixture of common stimulants, opioids, and steroids as well as a synthetic cannabinoid and a benzodiazepine (250 µg/ml of each)

### Chlorpseudoephedrine (hydrochloride)/Chloroephedrine (hydrochloride) Mixture

Item No. 9002346

A mixture of two diastereomer contaminants produced during the illicit manufacture of (+)-methamphetamine from pseudoephedrine or ephedrine



Representative chromatogram of the compounds included in the GC-MS Drug Standard Mixture 4

Peak order from left to right:  $\alpha$ -Pyrrolidinobutiophenone,  $\alpha$ -Pyrrolidinopentiophenone, bk-MDEA, Butylone, Tenocyclidine, PCP, Cocaine, Nandrolone, (S)-5-fluoro ADB, Heroin, Alprazolam, Furanyl fentanyl, Furanyl fentanyl 3-furancarboxamide isomer, Stanozolol

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# Amphetamines

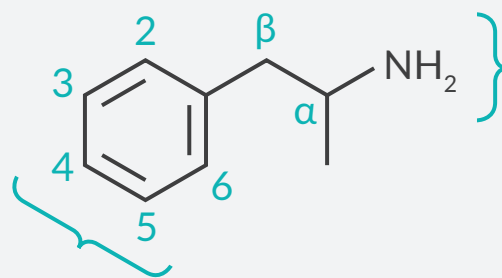
Amphetamine is a synthetic derivative of phenylethylamine, a naturally occurring substance found in chocolate, cheeses, and some wines that looks similar in structure to dopamine. The addition of a methyl group attached to the  $\alpha$ -carbon of the phenylethylamine side chain protects amphetamine from degradation by monoamine oxidases, which enables the effects of amphetamine to persist. While variations of the amphetamine scaffold have been developed by pharmaceutical companies for treatment of ADHD, appetite suppression, or to slow the progression of Parkinson's disease (e.g., Adderall, phentermine, and selegiline), designer drug chemists attempting to skirt DEA regulations have also made modifications to the basic amphetamine structure.

## Parent Compounds

| Item No. | Product Name                                      |
|----------|---|
| 27889    | N-Acetylmethamphetamine                           |
| ISO60188 | ( $\pm$ )-Amphetamine (hydrochloride) (CRM) *     |
| 11079    | 6-APB (hydrochloride)                             |
| 11456    | 5-APDB (hydrochloride)                            |
| 13868    | Cathine   |
| 26596    | $\alpha$ -ethyl 2C-D (hydrochloride)              |
| 27184    | N-benzyl-3,4-DMA (hydrochloride)                  |
| 29859    | N-(1-methylpentyl)-3,4-DMA (hydrochloride)        |
| 13885    | DOI (hydrochloride)                               |
| 27747    | DOPR (hydrochloride)                              |
| 25266    | 2-Fluoroethamphetamine (hydrochloride)            |
| 25811    | 4-Fluoroethamphetamine (hydrochloride)            |
| 14109    | 5-MAPB (hydrochloride)                            |
| ISO60189 | ( $\pm$ )-MDA (hydrochloride) (CRM) *             |
| ISO60190 | 3,4-MDMA (hydrochloride) (CRM) *                  |
| 9001944  | 6-chloro-MDMA (hydrochloride)                     |
| 9002345  | N-hydroxy MDMA (hemioxalate)                      |
| ISO60168 | ( $\pm$ )-Methamphetamine (hydrochloride) (CRM) * |
| 26615    | (+)-Methamphetamine (hydrochloride) (CRM) *       |
| 26616    | (-)-Methamphetamine (hydrochloride) (CRM) *       |
| 11161    | Methiopropamine (hydrochloride)                   |
| 14205    | N-Propylamphetamine (hydrochloride)               |

\* Compound also available as a neat solid

## Common Modifications of the Amphetamine Core



### Amino group can be:

- Mono-alkylated (with methyl, ethyl, etc.) to form a secondary amine
- Di-alkylated (symmetrically or asymmetrically) with alkyl groups to form a tertiary amine

### Phenyl ring can be:

- Mono-substituted or multi-substituted with alkyl groups, alkoxy groups, halogens, etc.
- Fused with another ring system such as methylenedioxy, furan, pyrrole, etc.

## Metabolites

| Item No. | Product Name  |
|----------|---|
| 9001830  | 4-hydroxy Amphetamine (hydrochloride)                     |
| 9002853  | 4-hydroxy Amphetamine Glucuronide (trifluoroacetate salt) |
| 19208    | N-Formylamphetamine (CRM)                                 |
| 14195    | HMMA (hydrochloride)                                      |
| 9002128  | 4-Hydroxymethamphetamine (hydrochloride)                  |
| 14196    | 4-hydroxy-3-Methoxyamphetamine (hydrochloride)            |
| 9001345  | 4-Methylmethamphetamine (hydrochloride)                   |
| 15915    | Ritalinic Acid  |
| 22604    | 3-Trifluoromethylamphetamine (hydrochloride)              |

Discover Our Article Series: Stimulant Use and Abuse: From Past to Present  
[www.caymanchem.com/amphetamines](http://www.caymanchem.com/amphetamines)

# Cathinones

## Parent Compounds

### Alkylated Cathinones

| Item No. | Product Name  |
|----------|---|
| 27728    | $\alpha$ -Butylaminohexanophenone (hydrochloride)           |
| 18912    | 4-Chloroethcathinone (hydrochloride)                        |
| 24432    | 4-chloro-N,N-Dimethylcathinone (hydrochloride)              |
| 20661    | $\alpha$ -Ethylaminohexanophenone (hydrochloride)           |
| 15609    | 4-methyl- $\alpha$ -Ethylaminopentiophenone (hydrochloride) |
| 27327    | N-ethyl Heptedrone (hydrochloride)                          |
| 19383    | 4-chloro Pentedrone (hydrochloride)                         |
| 25670    | 4-methyl Pentedrone (hydrochloride) (CRM) *                 |

\* Compound also available as a neat solid

### Methylenedioxy Cathinones

| Item No. | Product Name   |
|----------|--|
| 20801    | N,N-Diethylpentylone (hydrochloride)                 |
| 29672    | Eutylone (hydrochloride) (CRM) *                     |
| 25315    | N-ethyl Hexylone (hydrochloride)                     |
| 27078    | N-propyl Hexylone (hydrochloride)                    |
| 27240    | bk-MDEA (hydrochloride) (CRM) *                      |
| 9001330  | 3,4-Methylenedioxy-N-benzylcathinone (hydrochloride) |
| 20891    | Methylone (hydrochloride) (CRM) *                    |
| 26701    | N-butyl Pentylone (hydrochloride)                    |
| 24337    | N-ethyl Pentylone (hydrochloride) (CRM) *            |
| 27082    | N-isobutyl Pentylone (hydrochloride)                 |

\* Compound also available as a neat solid

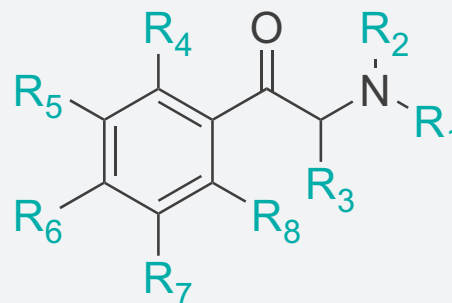
### Pyrrolidinyl-Substituted Cathinones

| Item No. | Product Name   |
|----------|--|
| 16361    | 3,4-Methylenedioxy- $\alpha$ -Pyrrolidinohexanophenone (hydrochloride) |
| 14762    | PV8 (hydrochloride)  |
| 18818    | 4'-fluoro- $\alpha$ -Pyrrolidinohexanophenone (hydrochloride)          |
| 21682    | $\alpha$ -Pyrrolidinohexanophenone (hydrochloride)                     |
| 22808    | $\alpha$ -Pyrrolidinopentiophenone (hydrochloride) (CRM) *             |
| 9002179  | 4'-chloro- $\alpha$ -Pyrrolidinopropiophenone (hydrochloride)          |
| 28879    | 4'-chloro- $\alpha$ -Pyrrolidinoveralphenone (hydrochloride) (CRM) *   |

\* Compound also available as a solid

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## Functional Group Additions to Cathinone Core



- $R_1$  = hydrogen, alkyl group, or incorporated in cyclic structure with  $R_2$
- $R_2$  = hydrogen, alkyl group, or incorporated in cyclic structure with  $R_1$
- $R_3$  = any alkyl or alkoxy group
- $R_4$ - $R_8$  = hydrogen, one or multiple substitutions, including halide, haloalkyl, alkoxy, alkyl, or incorporated in a ring structure

## Metabolites

| Item No. | Product Name  |
|----------|---|
| 14756    | Mephedrone metabolite (hydrochloride) (( $\pm$ )-Ephedrine stereochemistry)                 |
| 9001434  | Mephedrone metabolite (hydrochloride) (( $\pm$ )-Pseudoephedrine stereochemistry)           |
| 10518    | 3,4-Methylenedioxy Pyrovalerone metabolite 1 (hydrochloride)                                |
| 14758    | 4-Methylethcathinone metabolite (hydrochloride) (( $\pm$ )-Ephedrine stereochemistry)       |
| 9001436  | 4-Methylethcathinone metabolite (hydrochloride) (( $\pm$ )-Pseudoephedrine stereochemistry) |
| 14093    | $\alpha$ -Pyrrolidinopentiophenone metabolite 1 (trifluoroacetate salt)                     |

## Isotopically Labeled Standards

| Item No. | Product Name  |
|----------|---|
| 22487    | Bupropion- $d_9$ (hydrochloride) (CRM) *                          |
| 28819    | Butylone- $d_3$ (hydrochloride) (CRM) *                           |
| 26246    | Mephedrone- $d_3$ (hydrochloride) (CRM)                           |
| 10679    | 3,4-Methylenedioxy Pyrovalerone- $d_8$ (hydrochloride)            |
| 18732    | Methylone- $d_3$ (hydrochloride) (CRM)                            |
| 19204    | $\alpha$ -Pyrrolidinopentiophenone- $d_8$ (hydrochloride) (CRM) * |

\* Compound also available as a neat solid

# Phenethylamines, Arylcyclohexylamines, & More

## Phenethylamines

| Item No. | Product Name                                |
|----------|---|
| 18351    | 5-AEDB (hydrochloride)                      |
| 11734    | 2C-B (hydrochloride)                        |
| 14141    | 3,4-Dimethoxyphenethylamine (hydrochloride) |
| 29754    | N,N-Dimethylphenethylamine (hydrochloride)  |
| 14107    | Escaline (hydrochloride)                    |
| 21351    | Homarylamine (hydrochloride)                |
| 22239    | N-methyl Homarylamine (hydrochloride)       |
| 21626    | Hordenine                                   |
| 19927    | Metaescaline (hydrochloride)                |
| 15967    | 25B-NBF (hydrochloride)                     |
| 15969    | 25C-NBF (hydrochloride)                     |
| 14066    | 25I-NBF (hydrochloride)                     |
| 18328    | 25B-NBOH (hydrochloride)                    |
| 14815    | 25C-NBOH (hydrochloride)                    |
| 14909    | 25I-NBOH (hydrochloride)                    |
| 11946    | 25D-NBOMe (hydrochloride)                   |
| 14065    | 25G-NBOMe (hydrochloride)                   |
| ISO60135 | 25H-NBOMe (hydrochloride) (CRM) *           |
| 9001991  | 25P-NBOMe (hydrochloride)                   |
| 19926    | Proscaline (hydrochloride)                  |

\* Compound also available as a neat solid

## Piperazines

| Item No. | Product Name  |
|----------|---|
| 25523    | BZP (hydrochloride) (CRM) *                           |
| 14793    | 2C-B-BZP (hydrochloride)                              |
| 29116    | 1-(2-Chloro-3-fluorophenyl)piperazine (hydrochloride) |
| 14296    | 2,3-Dichlorophenylpiperazine (hydrochloride)          |
| 21954    | 1-(2-Fluorophenyl)piperazine (hydrochloride)          |
| 11204    | 1-(4-Fluorophenyl)piperazine (hydrochloride)          |
| 11736    | MBZP (hydrochloride)                                  |
| 11205    | 1-(3-Trifluoromethylphenyl)piperazine (hydrochloride) |
| 18165    | Trimetazidine (hydrochloride)                         |

\* Compound also available as a neat solid

## Arylcyclohexylamines & Metabolites

| Item No. | Product Name                                  |
|----------|---|
| 11737    | Benocyclidine                                 |
| 25688    | Deschloroketamine (hydrochloride) (CRM) *     |
| 19786    | 2-fluoro Deschloroketamine (hydrochloride)    |
| 26401    | Deschloronorketamine (hydrochloride)          |
| 29118    | 2-fluoro Deschloronorketamine (hydrochloride) |
| 19389    | Ketamine (hydrochloride) (CRM) *              |
| 26316    | (R)-Ketamine (hydrochloride) (CRM) *          |
| 26317    | (S)-Ketamine (hydrochloride) (CRM) *          |
| 14105    | deschloro-N-ethyl-Ketamine (hydrochloride)    |
| 26877    | 3-hydroxy PCE (hydrochloride)                 |
| 9001355  | 3-methoxy PCE (hydrochloride)                 |
| ISO60194 | PCP (hydrochloride) (CRM) *                   |
| 14421    | 3-hydroxy PCP (hydrochloride)                 |
| 28958    | 3-methoxy PCP (hydrochloride) (CRM) *         |
| 11136    | 4-methoxy PCP (hydrochloride)                 |
| 20563    | 1-(1-Phenylcyclohexyl)-4-hydroxypiperidine    |
| 20565    | trans-4-phenyl-4-Piperidinocyclohexanol       |
| 19263    | Rolicyclidine (hydrochloride)                 |
| 17014    | Tenocyclidine (hydrochloride)                 |
| 19794    | Tiletamine (hydrochloride)                    |

\* Compound also available as a neat solid

## Cocaine, Tropanes, & Metabolites

| Item No. | Product Name                         |
|----------|--------------------------------------|
| ISO60186 | Benzoylcegonine (CRM) *              |
| 20860    | Benzoylcegonine-d <sub>3</sub> (CRM) |
| 28820    | Cocaethylene (CRM)                   |
| ISO60176 | Cocaine (CRM) *                      |
| 19423    | Cocaine-d <sub>3</sub> (CRM)         |
| 20062    | 2'-hydroxy Cocaine                   |
| 18057    | 3-p-FBT (hydrochloride)              |
| 17977    | RTI-31                               |
| 14108    | Scopolamine (hydrobromide)           |

\* Compound also available as a neat solid

View a complete list of stimulants at [www.caymanchem.com/forensics](http://www.caymanchem.com/forensics)

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