



**Empowering a healthy tomorrow**

# Welcome



**Empowering a healthy tomorrow**

# USP Adulterants Database

## Beyond the Looking-Glass

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Dietary Supplements and Herbal Medicines  
United States Pharmacopeial Convention (USP)

GInAS 2017 Meeting  
October 11, 2017

Rockville, Maryland  
USA



- ▶ Introduction to USP
- ▶ USP Adulterants Database
- ▶ Database Demo (time permitting)
- ▶ Challenges of Cheminformatics (bonus)

# Introduction to USP



## Working with Partners

From the standards we create to the partnerships and conversations we foster, our scientists, advocates and network of experts are critical to constructing and reinforcing the foundation for quality in health and healthcare.

## Building a Healthier World



# United States Pharmacopeial Convention



- ▶ Private, not-for-profit organization (since 1820)
- ▶ Establishes and disseminates public written standards for quality, purity, identity, strength, and labeling of medicines, dietary supplements and foods
- ▶ Provides physical Reference Standards in support of tests in the USP–NF, DSC, HMC and FCC
- ▶ Educates manufacturers, practitioners, and others seeking information on quality and USP standards



# USP Adulterants Database\*

\*working title, subject to change





# Adulterants Database Precursors



- ▶ USP Workshops on DS and Food Adulteration (2011 – 2015)
- ▶ USP Expert Panel on Adulteration (July 2013 – Present)
- ▶ USP General Chapter <2251> (Official: August 1, 2016)
- ▶ Dietary Supplements Stakeholder Forums (2011, 2013, 2015)
- ▶ USP Dietary Supplements Strategic Initiative (2014)
- ▶ Taiwan Conference on Adulteration of DS (2015, 2017)

- ▶ Relational database developed in Drupal
- ▶ Five primary entities:
  - Instance of Adulteration (Report)
  - Adulterant
  - Product
  - Primary Company
  - Secondary Company (dba)
- ▶ Numerous Fields for Each Entity



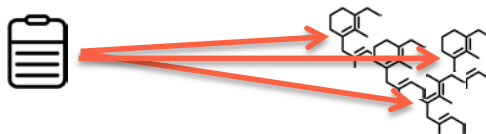
# Adulterants Database – Primary Relationships



- ▶ One-to-one



- ▶ One-to-many

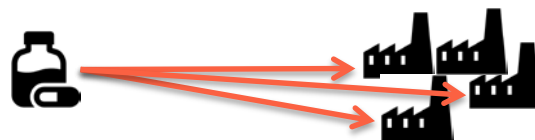


- ▶ One-to-one



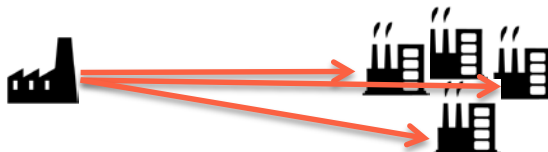
[Recall]

- ▶ One-to-many



[Mfg, Dist, Retailer]

- ▶ One-to-many



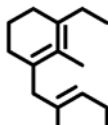
# Adulterants Database – Snapshot



1200 Reports

## Reference Source Type

- Agency Report (1109)
- Journal Article (73)
- Website (39)
- Application Note (4)
- Media - Broadcast (1)
- Media - Electronic (1)



2001 Compounds

## Adulterant Functions

- stimulant (260)
- androgen/anabolic (191)
- opioid analgesic (144)
- narcotic (126)
- erectogenic (118)
- synthetic cannabinoid (94)
- antiinflammatory (86)
- antihypertensive (84)
- cathinone (83)
- analgesic (72)

Show more



1050 Products

## Intended Use(s)

- Sexual Enhancement (458)
- Weight Loss (386)
- Sports Performance Enhancement (156)
- Antirheumatic (25)
- Other (21)
- Psychoactive Substance (3)
- Sleep Aid (2)
- Antidiabetic (1)



700 Companies

## Company

- r thomas marketing llc (26)
- bodybuilding.com, llc (24)
- novacare, llc (24)
- hi-tech pharmaceuticals, inc. (18)
- a & h focal, inc. (15)
- atlas operations, inc. (13)
- organic herbal supply, inc. (13)
- usplabs, llc (11)
- bee extremely amazed llc (10)
- shh trading pte. ltd (10)
- mynicknaxs, llc. (9)
- universal abc beauty supply international, inc. (8)
- vmg global inc. (8)

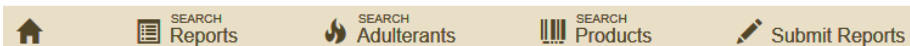
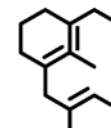
# Adulterants Database – Data Sources



Primary data streams:

1. Product-focused “**Agency reports**”:
  - a. FDA (USA)
  - b. Health Canada
  - c. TGA (Australia)
  - d. HSA (Singapore)
  - e. National agencies of Hong Kong, South Korea, Japan, Taiwan, Czech Republic, etc.
2. Compound-focused databases: SWGDRUG (US DEA), NIST (USA), Project [RESPONSE](#) (Europe), [Forendex](#), etc.
3. Peer-Reviewed Literature – original and review articles. Typically, target a specific adulterant (e.g., structure elucidation), a class of adulterants, or describe a particular analytical methodology.
4. Media reports – industry press, online publications, conventional print media, TV and radio broadcasts. Limited in number and used to provide additional context.
5. Specialized documents – court proceedings, scientific reports, application notes, etc.

# Adulterant Record – Disambiguation



## Sulfosildenafil

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### Names & Synonyms

#### Synonyms:

Thiosildenafil, Sildenafil thione, Thiodenafil

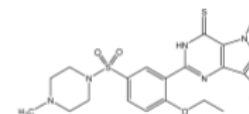
### Identification Codes

CAS Number:	479073-79-5 <a href="#">ⓘ</a>
UNII Code:	HRL3FWK7XV <a href="#">ⓘ</a>
InChi Key:	LJUBVCQVNMSTQ-UHFFFAOYSA-N <a href="#">ⓘ</a>
KEGG Code:	<a href="#">Search KEGG Databases</a> <a href="#">ⓘ</a>
PubChem ID:	10228242 <a href="#">ⓘ</a>
ATC Code:	<a href="#">Search ATC</a> <a href="#">ⓘ</a>

**Samples** Three kinds of products (five products in all) were purchased at an porno shop in Japan or via the internet (from October to December 2007). These products were composed of 2 or 10 sand-colored tablets (13—15 mg of product per tablet).

### Affected foreign products

Product	Undeclared Ingredient
Maxidus capsules	<ul style="list-style-type: none"> <li>sulfohydroxyhomosildenafil</li> </ul>
Chao Jimengnan SuperPowerful Man tablets	<ul style="list-style-type: none"> <li>sulfosildenafil</li> <li>tadalafil</li> </ul>
Fu Yuan Chun capsules	<ul style="list-style-type: none"> <li>tadalafil</li> </ul>
Qing Tian Zhu tablets	<ul style="list-style-type: none"> <li>sildenafil</li> </ul>



thiodenafil

# Adulterant Record – Features

## Phenolphthalein

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### Names & Synonyms

**Chemical Name (IUPAC):** 3,3-bis(4-Hydroxyphenyl)-2-benzofuran-1-one

**Synonyms:**

3,3-bis(4-Hydroxyphenyl)-1(3H)-isobenzofuranone, 3,3-bis(4-Hydroxyphenyl)-2-benzofuran-1(3H)-one, 3,3-Bis(4-hydroxyphenyl)phthalide, 3,3-bis(p-Hydroxyphenyl)phthalide, alpha-di(p-Hydroxyphenyl)phthalide

**Other Names:**

Agoral, Alophen, Chocolax, Colax, Doxan, Doxidan, Espotabs, Euchessina, Evac-q-kwik, Evac-q-tabs, Evac-u-gen, Evac-v-lax, Ex-lax, Feen-a-mint, Femilax, Koprol, Laxin, Laxogen, LILLO, Medilax, Phenolax, Phthalimetten, Phthalin, Prulet, Purga, Purgen, Purgophen, Spulmako-lax, Trilax

### Identification Codes

**CAS Number:** 77-09-8

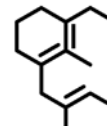
**UNII Code:** 6QK969R2IF

**InChi Key:** KJFMBFZCATUALV-UHFFFAOYSA-N

**KEGG Code:** D05456

**PubChem ID:** 4764

**ATC Code:** A06AB04

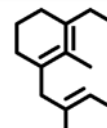


DB May be searched by:

- Any of the synonyms
- Any of the acronyms, trade, commercial or 'street' names
- Any of the chemical identifiers: CAS, UNII, InChI Key, KEGG Code, PubChem ID
- nearly every iteration of the name
- DEA codes and schedules

# Adulterant Record – Features (cont.)

## Tramadol



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### Names & Synonyms

**Chemical Name (IUPAC):** (1R,2R)-2-(Dimethylaminomethyl)-1-(3-methoxyphenyl)cyclohexanol

#### Synonyms:

(+)-Tramadol, 2-[(Dimethylamino)methyl]-1-(3-methoxyphenyl)cyclohexanol, DEA No. 9752, DEA Schedule IV

#### Other Names:

Acema, Actidol, Acty, Acugesic, Adamon, Admadol, Adolonta, Altadol, Amadol, Amanda, Amdol, Ammitran, An-Tian, Ana-Q, Anadol, Analab, Analtram, Anangor, Anatram, Andalpha, Arodol, Arrestadol, Astradol, Atdol, Avdol, Axidol, Axytram, Bei Pin, Bestodol, Bing Ning, Biodalgic, Biodil, Biodol, Biomadol, Biotram, Biotrama, Biotrany, Boldol, Bolodol, Bramadol, By-madiol, Cadol, Calmador, Calmpain, Camadol, Cambidol, Camigesik, Cemadol, Centrasic, Ceparidin, CG-MAC, Cincro Plus, Citra, Cloq, Combiltram, Contradoc, Contram, Contramal, Conzip, Cormadol, Corsadol, Cortram, Cosdol, Crispin, Cromatodol, Cruzac, Cuntrol, D.M.Dol, Da Ma Err, Damadol, Damed, Damol, Darol, Didol, Doctramadol, Dolan, Dolbest, Dolbis, Dolfi, Dolfre, Dolga, Dolgesik, Dolma, Dolmal, Dolmax, Dolmeri, Dolocap, Dolocet, Dolodol, Dolol, Dolomed, Dolonil, Doloran, Dolotral, Dolotram, Dolotramine, Dolpain, Dolpar, Dolpaz, Dols, Dolsic, Dolstar, Doltta, Doltel, Dolwin, Dolzam, Domadol, Dorless, Drobit, Dromadol, Durodor, Durotram, E-Dol, Ecodolor, Eltram, Esgipyrin, Etigesic, Eufindol, Fada Tramadol, Febrex, Feng Tong Ding, Forgesic, Formador, Fortradol, Fraxidol, FS, Gelotradol, Gemadol, GenRX Tramadol, Getpar, Glimadol, Gudil, Haldotram, Haledol, Hetradol, Hua Jie Wei, Hua Qu, Hyperdol, Idol, Imadol, Indolpara, Ingescic Forte, Inodol, Iodol, Ivydol, Ixprim, Jetra, Jpdol, KAlma, Kamadol, Katrasic, Kdol-P, Kedol, Kevtram, Kontram, Lanalget, Le Shi Pu Kang, Leedol, Lexidol, Lucidol, Lumidol, M-Dol, Mabron, Madol, Madola, Mandolgin, Manol, Mapdol-P, Marodol, Medol, Meradol, Meridol, Metazac, Metracop, Microdol, Milador, Minidol, Mipro, Mobiya, Monoalgie, Monocrixo, Muaction, Nettram, Neutram, Nictram, Noax, Nobligan, Nomal, Nonalges, Nopidol, Notil, Novadol, Nufapotram, Nycodol, OC-Dol, Odel, Omodel, Ondol, OPI-OT, Opidol, Opigesic, Orasic, Oratram, Orchidol, Orozumadol, Osdol, Osmadol, Ospidol, Oxxalgan, Ozitram, Pacmadol, Painadol, Paindol, Paine, Painlax, Paratel-P, Patradol, Patral, Paxifar, Paxmax, Pengesic, Penover, Pinorec, Plazadol, Poltram, Postadol, Predalgic, Prontalgin, Prontofort, Protradon, PTR, Qi Zhi, Qimaite, Qu Feng, Qu Ming, Qu Teng, Qu Tong Kang, Qutong, Racetram, Rajdol, Ralgen, Ralivia, Ramadol, Ramax, Redimol, Reildol, Ridil, Rofy, Rotamol, Rui Li Ping, Rybix, Ryzolt, Sayadol, Sefmal, Seminac, Sensitram, Servodol, Siatram, Sigmadol, Simatral, Simudol, Sintradon, Slovadol, Souladol, Soztram, Splint Forte, Sridol, Stemadol, Strom, Supridol, Surgidol, Syllador, T Dol, T-Long, Tacil, Tanadol, Tadol, Tai Mei Ding, Takadol, Takol, Talnex, Tamadol, Tamolan, Tamriv, Tamvrin, Taridol, Taxidol, Taz, TDL, TDX, Tecsadol, Temadol, Tendia, Teramadol, Theradol, Ti Ma Er, Tial, Timarol, Timasen, Tinlol, Tioner, Tiparol, Tlusic, TM-Plus, TMD, Tofdol, To-A, Tolma, Tong Ting, Topalgic, Toptra, Trabar, Trabilin, Trace, Traceta, Tracin-P, Tracine, Tractadol, Tradef, Tradol, Tradolan, Tradolgesic, Tradolor, Tradonal, Tradorec, Tradosik, Tradyl, Trafalash, Tragesic, Tragesik, Trail, Trak, Tral-ac, Tralenil, Tralgiol, Tralgit, Tralic, Tralodie, Tram-Proxyvon, Trama, Tramabene, Tramabeta, Tramabit, Tramacalm, Tramacap, Tramacet, Tramache, Tramacip, Tramacon, Tramaconti, Tramactil Uno, Tramacur, Tramacure, Tramada, Tramader, Tramadex, Tramadin, Tramadis, Tramadoc, Tramadol, Tramadol, Tramadol, Tramadol, Tramadol, Tramadol, Tramadura, Tramaflam, Tramaflash, Tramaforte, Tramag, Tramagem, Tramagesic, Tramagetic, Tramagit, Tramahehexal, -Tramake, Tramakind, Tramaklosidol, Tramal, Tramalan, Tramailek, Tramailex, Tramalgic, Tramalgin, Tramalin, Tramamed, Tramamerck, Tramanil, Tramapine, Tramadere, Tramasindol, Tramasol, Tramaspen, Tramastead, Tramatatas, Tramataur, Tramatiyrol, Tramazac, Trambax, Trambo, Tramcod, Tramcontin, Tramdrop, Tramed, Tramedif, Tramedo, Tramedphano, Tramelene, Tramest, Tramex, Tramgesic, Trami, Tramico, Tramisol, Tramiun, Tramjet, Tramed, Trannom, Tramo, Tramoda, Tramodin, Tramoflex, Tramol, Tramolin, Tramospas, Tramrot, Tramp, Trampias, Tramquel, Tramrod, Tramsars, Tramtor, Tramundal, Tramundin, Tramy, Tranal, Tranat, Trandol, Trandy, Transic, Trany, Tranzen, Trapain, Trapalin, Trapsure, Trasedal, Trasic, Trasik, Travex, Travictol, Trawel, Traxdol, Trazac, Trazodec, TRD, Treat, Tremolo, Tremtec, Trexol, Tridol, Tridural, Trodon, Trofel, Trol, Troma, Tromar, Tromy, Tropidol, Trosic, Truesic, Trumac, Trumip, Trupal, Tydol, Tyvme, Tyssdol, Ubitdol, Ubitdol, Ultracoon, Ultram, Ultramax, Unidol, Unitrama, Unitramarin, Unrendol, Ultramal,

- (could be a lot of) Synonyms
- Chemical Identifiers

### Identification Codes

**CAS Number:** [27203-92-5](#)

**UNII Code:** [39J1LGJ30J](#)

**InChi Key:** [TVYLLZQTGLZFBW-ZBFGGGJFSA-N](#)

**KEGG Code:** [D08623](#)

**PubChem ID:** [33741](#)

**ATC Code:** [N02AX02](#)



# Adulterant Record – Features (*cont.*)

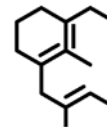
## Other Descriptors

**Adulterant Functions:** analgesic, narcotic

**Adulterant Source:** Synthetic

**Chemical Formula :** C<sub>16</sub>H<sub>25</sub>NO<sub>2</sub>

**Molecular Weight :** 263.381



## References

### Monograph(s):

**Monograph:** USP - Tramadol Hydrochloride

**Attachment:** [usp\\_-\\_tramadol\\_hydrochloride.pdf](#)

**Monograph:** USP - Tramadol Hydrochloride Compounded Oral Suspension

**Attachment:** [usp\\_-\\_tramadol\\_hydrochloride\\_compounded\\_oral\\_suspension.pdf](#)

**Monograph:** USP - Tramadol Hydrochloride Tablets

**Attachment:** [usp\\_-\\_tramadol\\_hydrochloride\\_tablets.pdf](#)

**Monograph:** USP - Tramadol Hydrochloride Extended-Release Tablets

**Attachment:** [usp\\_-\\_tramadol\\_hydrochloride\\_extended-release\\_tablets.pdf](#)

**Monograph:** USP - Tramadol Hydrochloride Compounded Oral Suspension, Veterinary

**Attachment:** [usp\\_-\\_tramadol\\_hydrochloride\\_compounded\\_oral\\_suspension\\_veterinary.pdf](#)

### Reference Standard(s):

**Reference Standard:** USP Tramadol Hydrochloride RS

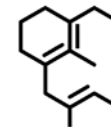
**Item Number:** 1672600

### Other Reference(s):

SWGDRUG [SWGDRUG](#), WHO - Critical Review (2014) [WHO - Critical Review \(2014\)](#), Wikipedia [Wikipedia](#), DrugBank [DrugBank](#), m/z Cloud [m/z Cloud](#), Designer Drugs Online [Designer Drugs Online](#), DEA Schedule [DEA Schedule](#), Tramadol—A True Natural Product? [Tramadol—A True Natural Product?](#), Occurrence of the Synthetic Analgesic Tramadol in an African Medicinal Plant [Occurrence of the Synthetic Analgesic Tramadol in an African Medicinal Plant](#), Occurrence of the Synthetic Analgesic Tramadol (Supporting Information) [Occurrence of the Synthetic Analgesic Tramadol \(Supporting Information\)](#)

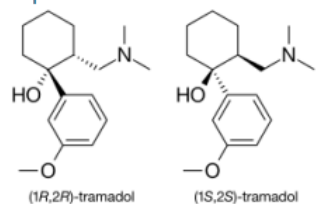
- Other attributes: functions, formula, molecular weight
- References to compendial sources whenever appropriate
- Sources of Reference Materials whenever available
- References to other sources, databases, online resources, research literature

# Adulterant Record – Features (*cont.*)



## Additional Information

[Expand in a new window](#)



Search for Reports containing: Tramadol

**Attachment(s):** 6\_1\_tramadol\_update.pdf  
 tramadol-a\_true\_natural\_product.pdf  
 occurrence\_of\_the\_synthetic\_analgesic\_tramadol\_in\_an\_african\_medicinal\_plant\_2013.pdf  
 occurrence\_of\_the\_synthetic\_analgesic\_tramadol\_in\_an\_african\_medicinal\_plant\_2013\_-\_supporting\_info.pdf

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- Technically, the database is equipped to accept any file, this is just underutilized for now. [e.g., NMR FIDs]

- Additional Information: Chemical structure; essentially, any kind of a graphics file, including chromatograms, spectra
- Search for Reports containing Tramadol
- Attachments – relevant and informative, hand-picked: toxicology, pharmacology, analysis

# Product Record – Features

## Spirodex

[View](#) [Edit](#) [Delete](#)

About

**Intended Uses:** Weight Loss, Sports Performance Enhancement

**Product Ingredients:**  
Caffeine. SPIROBLEND (A proprietary blend consisting of Oxytropis *falcate* extract [whole plant] standardized for biogenic amine content, Camelia *sinensis*, hordenine, Geranium *maculatum* extract [leaves and stems] standardized for 4-methylhexan-2-amine content. Paullinia *cupana* [whole plant] extract standardized for purine content). **Other Ingredients:** Dicalcium Phosphate, Stearic Acid, Magnesium Stearate, Croscarmellose Sodium, Silicon Dioxide, Hydroxypropyl Methylcellulose (E5 and E15), Polyethylene Glycol, Water, Titanium Dioxide (color), FD&C Yellow No. 5.

**Product Website:** Gaspari Nutrition, Spirodex, Mood Enhancing Stimulant Compound, 425 mg, 60 Tablets [Ⓔ](#)

Company Information

Distributor  
[Gaspari Nutrition, Inc.](#)

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Manufacturer  
[Hi-Tech Pharmaceuticals, Inc.](#)

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Product record includes:

- Intended use(s)
- List of declared ingredients as appears on the package
- Link to the product website, if still active
- Information on the companies affiliated with the product: Manufacturer, Distributor, Retailer (this information is not readily available and requires research)

Expand in a new window

**SUPPLEMENT FACTS**

Serving Size: 1 Spirotab  
Servings Per Container: 60

Amount Per Serving	
SP-101-55-23677-01, proprietary blend consisting of:	250 mg
Hydroxy Mucic extract (whole plant), standardized for Irigantol amino content, Cuscuta axillaris, Baccharis, Lactuca, Lactuca extract, Fenugreek, and other ingredients for 4 months of use.	
Contains 100% of the active ingredients	
Contains 100 mg	

\*Daily values are not established.

Other ingredients: Dicalcium Phosphate, Stearic Acid, Magnesium Stearate, Croscarmellose Sodium, Microcrystalline Cellulose, Polyethylene Glycol, Hydroxypropyl Methylcellulose (E5 and E7), Polyethylene Glycol, Hydroxypropyl Methylcellulose, Povidone, Polysorbate 80, Polysorbate 20, Polysorbate 40, Polysorbate 60, Polysorbate 80, Polysorbate 100, Polysorbate 120, Polysorbate 140, Polysorbate 160, Polysorbate 180, Polysorbate 200, Polysorbate 220, Polysorbate 240, Polysorbate 260, Polysorbate 280, Polysorbate 300, Polysorbate 320, Polysorbate 340, Polysorbate 360, Polysorbate 380, Polysorbate 400, Polysorbate 420, Polysorbate 440, Polysorbate 460, Polysorbate 480, Polysorbate 500, Polysorbate 520, Polysorbate 540, Polysorbate 560, Polysorbate 580, Polysorbate 600, Polysorbate 620, Polysorbate 640, Polysorbate 660, Polysorbate 680, Polysorbate 700, Polysorbate 720, Polysorbate 740, Polysorbate 760, Polysorbate 780, Polysorbate 800, Polysorbate 820, Polysorbate 840, Polysorbate 860, 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Polysorbate 7500, Polysorbate 7520, Polysorbate



- Images of the product packaging
- Supplement Facts panel, preferably with legible list of ingredients
- Images of the individual dosage units, specifically highlighting any features
- Link to the database records referencing the product
- Magnification and full-sized images

# Report – Features



## Report 25276

[View](#) [Edit](#) [Delete](#) [Workflow History](#)

### Discovery Information

#### Reference Source Information

**Reference Source Type:** Agency Report

**Specific Subject or Title of Reference Source:**

Gadget Island, Inc. Dba Gear Isle Issues Voluntary Nationwide Recall of Dietary Supplements Due to Undeclared Active Pharmaceutical Ingredients

**Reporting Agency:** United States - Food and Drug Administration (FDA)

**Reference Source URL:** [Reference Source Information Online](#) 

**Reference Source Date:** Sep 20, 2017

### Adulterated Product Information

#### Adulterants and products

**Product:** [Grande X](#)

**Adulterant(s):**

[Sildenafil](#), [Tadalafil](#), [Desmethylcarbodenafil](#)

Report record includes:

- Report number (could be searched on)
- Reference type (agency report, article, app note, etc.)
- Title of the reference
- Link to the original URL
- Date the original notice, or journal article, was published
- Product found to be adulterated
- The list of adulterants

# Report – Features (cont.)



Report record includes:

- Company conducting the recall
- Specific features of the recalled product: UPC code, description of the packaging configuration and the unit dose features
- Concurrent recall notices issued by other agencies
- Copies of the relevant recall-related notices as pdfs

## Recall Information

**Recall Firm:** Gadget Island, Inc.

<b>UPC Code:</b>	640793555440
<b>Container Type:</b>	Blister card
<b>Containers per Package:</b>	30
<b>Doses/Servings per Container:</b>	1
<b>Dosage/Serving Size:</b>	1 Capsule
<b>Unit Dose Form/Type:</b>	Hard-shell capsule
<b>Unit Dose Color:</b>	gold

[California Department of Public Health](#)

## Additional Information

**Attachments:** 2017-09-20\_-\_fda\_-\_gadget\_island.pdf  
 2017-09-20\_-\_fda\_-\_cdph-\_gadget\_island.pdf  
 2017-10-04\_-\_fda\_-\_recall\_-\_gadget\_island.pdf

## Administrative Information

**Workflow:** Approved

# Company Record – Features

Hi-Tech Pharmaceuticals, Inc.

View Edit Delete

## Doing Business As:

Applied Lifescience Research (ALR) Industries, Inc.  
Advanced Performance Supplements (APS) Nutrition  
LG Sciences  
FormuTech Nutrition  
Innovative Labs  
iForce Nutrition  
Sports One  
Nittany Pharmaceuticals, Inc.  
Prime Nutrition  
Tribravus Enterprises, LLC.

## Company Address and Contact Information

### Address

<b>Address Type:</b>	Mailing Address
<b>Street Address:</b>	6015 B Unity Drive
<b>City:</b>	Norcross
<b>State/Province:</b>	GA
<b>Zip/Postal Code:</b>	30071
<b>Country:</b>	United States of America (the)

### Contact Information

#### Phone(s):

<b>Phone Type:</b>	Toll-free
<b>Phone Number:</b>	<a href="tel:+18888557919">+1 (888) 855-7919</a>



Company record includes:

- List of 'brands', 'labels', aliases (dba) under which the products appear
- Address(es) verified by specialized websites (BBB, Bloomberg, Corporation Wiki, Bizapedia, Manta, etc.)
- Contact Information (phone numbers, email)

# Company Record – Features (cont.)



## Other Information

### URL(s):

[Hi-Tech Pharmaceuticals](#)  
[About Hi-Tech Pharmaceuticals](#)  
[Hi-Tech Pharmaceuticals Wins Crucial Court Motions Against Harvard Doctor, Dr. Pieter Cohen, in a Slander Lawsuit Seeking \\$200 M](#)  
[Hi-Tech Pharmaceuticals acquires co-ownership of Prime Nutrition](#)  
[The Truth Behind Hi-Tech Pharmaceuticals with Jared Wheat \(Video\)](#)  
[Feature on Jared Wheat, CEO and President of Hi-Tech Pharma](#)  
[CNBC - Feature on Jared Wheat](#)  
[Press Release: Hi-Tech Pharmaceutical Sues Pieter A. Cohen for \\$50 Million in Compensatory Damages](#)  
[Press Release: Hi-Tech Pharmaceuticals Acquires Top Secret Nutrition Adding to its Premier Line Up of Sports Nutrition Brands](#)

### Notes/Comments:

In 2015, Hi-Tech Pharmaceuticals acquired a handful of inventive brands, including iForce Nutrition, Nittany Pharmaceuticals, Advanced Pharmaceuticals and Nutritionals, FormuTech Nutrition, LG Sciences, and Innovative Laboratories.

[Jared Robert Wheat](#) - CEO, President, and Chairman

[Stephen D. Smith](#) - Executive VP

[John Brandon Schopp](#) - Director of Contract Manufacturing

[Timothy Fulmer](#) - Corporate Counsel/Legal

### Attachment:

[red-yeast-rice-indictment-dmaa-no-sell-order-20171004.pdf](#)  
[red-yeast-rice-indictment-2-2017-0928.pdf](#)  
[red-yeast-rice-indictment-20170928.pdf](#)

Company record includes:

- Links to business and relevant public information about the company
- Trademarks registered by the company and company owners
- Company principals and their relevant business endeavors, including other business ventures
- Documents relevant to the company's business (here: court documents)



# Challenges to Overcome



- ▶ Significant data fragmentation.
- ▶ A lot of intentionally misleading and frequently unverifiable information: lists of nonexistent ingredients, ridiculous claimed amounts, made-up company addresses, 'formulation' changes are frequent, and that may include the adulterants.
- ▶ The fleeting nature of web data: recalled products and entire sites typically disappear within hours of the published notifications. Need to resort to Google Cache and Wayback Machine to get useful descriptive information.
- ▶ Adulterants and product names may appear in different languages:
  - the translated product names may be unrecognizable to the original language carriers ('Old Chinese')
  - Adulterants may persist for a long time in one language without being translated into others. Ergo, the same adulterant may be 'discovered' numerous times and persist for a long time as 'parallel' entities with duplicative chemical identifiers
  - Difficulties with relying on 'machine translation' – Thebacon (dihydrocodeinone enol acetate)
- ▶ Counterfeit adulterated products
- ▶ Challenges in cheminformatics – roughly 10% of the records in the database required reconciliation: names, CAS registry numbers, InChI Keys may be for other stereoisomers, or hydrates, or salts

# Proposed Solutions / Improvements



- ▶ Rapid exchange of new adulterant information. Work with FDA SRS to issue UNII; make chemical characterization data available via a common platform as soon as practicable, coordinate confirmatory analysis by other labs if the sample amount permits this
- ▶ Make product information available: full package, closeup of unit dosage forms, *etc.*
- ▶ Expanded analysis details – to the extent possible, including chromatograms and spectra, experimental conditions including equipment specifics, settings, parameters, *etc.*
- ▶ Make content of peer-reviewed journal publications available, *e.g.*, through Creative Commons mechanisms. Share data.

# Acknowledgements



- ▶ Lynn Haas
- ▶ Michael Lynch
- ▶ Gabriel Giancaspro
- ▶ George Wang
- ▶ Dennis Gorecki
- ▶ Nam-Cheol Kim



# *In memoriam*



Mark Roman, PhD  
1968 - 2014

# USP Biannual Adulteration Workshop

February 27-28, 2018

Rockville, Maryland



**Empowering a healthy tomorrow**

# Questions



**Empowering a healthy tomorrow**

# Stay Connected

(301) 230-6303 | [ANB@usp.org](mailto:ANB@usp.org)



**Empowering a healthy tomorrow**

# Challenges of Cheminformatics\*

\*bonus

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# Fosinopril



## Fosinopril



**PubChem CID:** 55891

**Chemical Names:** Fosinopril; Staril; Acecor; 98048-97-6 Monopril; C30H46NO7P

**Molecular Formula:** C<sub>30</sub>H<sub>46</sub>NO<sub>7</sub>P

**Molecular Weight:** 563.672 g/mol

**InChI Key:** BIDNLKIURFRQP-FKDWWROVSA-N

## Fosinopril



**PubChem CID:** 3420

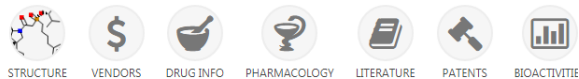
**Chemical Names:** Fosinopril; 98048-97-6 AC1L1FW8; Sotretinoil; SCHE

**Molecular Formula:** C<sub>30</sub>H<sub>46</sub>NO<sub>7</sub>P

**Molecular Weight:** 563.672 g/mol

**InChI Key:** BIDNLKIURFRQP-UHFFFAOYSA-N

## Fosinopril



**PubChem CID:** 9601226

**Chemical Names:** Fosinopril; Fosenopril; UNII-R43D2573WO; Monopril; 98048-97-6

**Molecular Formula:** C<sub>30</sub>H<sub>46</sub>NO<sub>7</sub>P

**Molecular Weight:** 563.672 g/mol

**InChI Key:** BIDNLKIURFRQP-XYGFDPSESA-N

## Fosinopril



**PubChem CID:** 45357796

**Chemical Names:** Fosinopril; Fosinopril [INN:BAN]; UNII-R43D2573WO;

**Molecular Formula:** C<sub>30</sub>H<sub>46</sub>NO<sub>7</sub>P

**Molecular Weight:** 563.672 g/mol

**InChI Key:** BIDNLKIURFRQP-FLODCBCLSA-N

## Fosinopril



**PubChem CID:** 6708482

**Chemical Names:** Fosinopril; Fosinopril [INN:BAN]; Fosenopril; Fosinopril (INN);

**Molecular Formula:** C<sub>30</sub>H<sub>46</sub>NO<sub>7</sub>P

**Molecular Weight:** 563.672 g/mol

**InChI Key:** BIDNLKIURFRQP-AJTMIRJISA-N

## Fosinopril



**PubChem CID:** 9872634

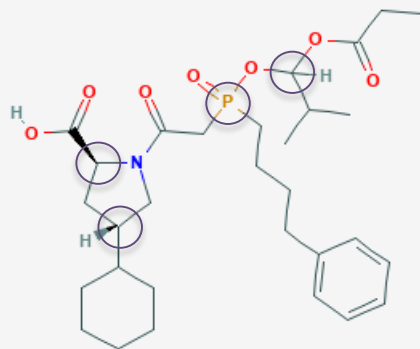
**Chemical Names:** Fosinopril; SCHEMBL13575746; BIDNLKIURFI phenylbutylphosphinyl]acetyl]-, (4S)- [More](#)

**Molecular Formula:** C<sub>30</sub>H<sub>46</sub>NO<sub>7</sub>P

**Molecular Weight:** 563.672 g/mol

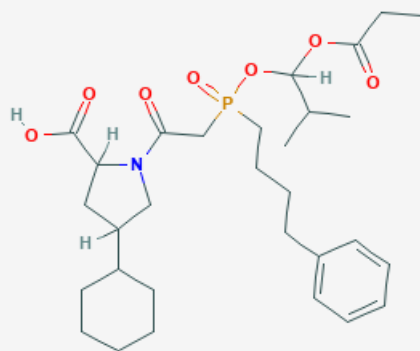
**InChI Key:** BIDNLKIURFRQP-VOARXEPJSA-N

# Fosinopril



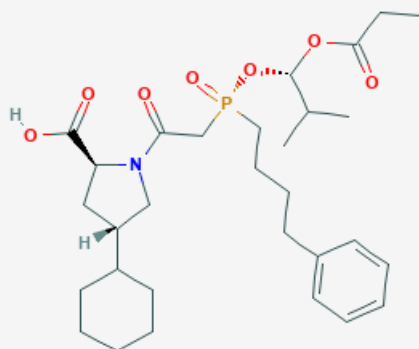
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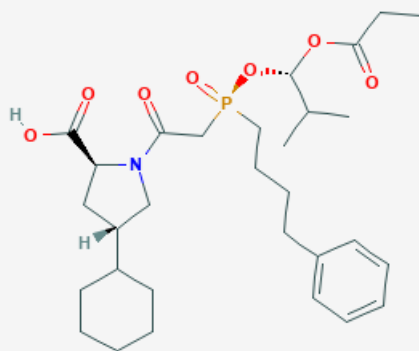
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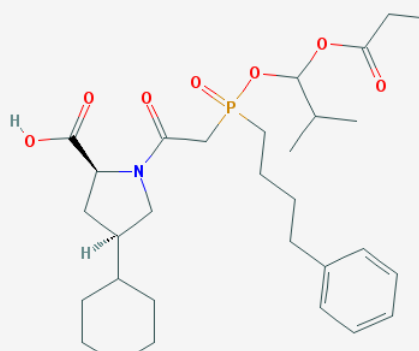
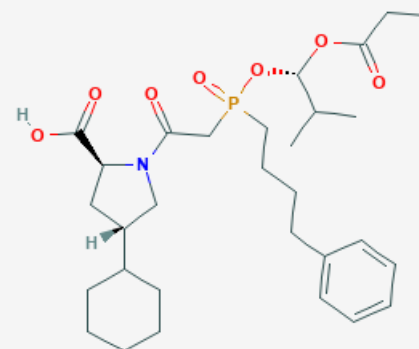
BIOACTIVITE

rit; 98048-97-6;



S

O;



# Esmolol



## ESMOLOL



STRUCTURE



VENDORS



DRUG INFO



PHARMACOLOGY



LITERATURE



PATENTS

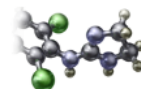


BIOACTIVITIES

<b>PubChem CID:</b>	59768
<b>Chemical Names:</b>	ESMOLOL; 81147-92-4; Brevibloc; (+-)-Esmolol; Esmolol [INN:BAN]; 103598-03-4
<b>Molecular Formula:</b>	C <sub>16</sub> H <sub>25</sub> NO <sub>4</sub>
<b>Molecular Weight:</b>	295.379 g/mol
<b>InChI Key:</b>	AQNDDEOPVVGCPG-UHFFFAOYSA-N



TOXNET > ChemIDplus > Substance



**ChemIDplus**  
A TOXNET DATABASE  
[Lite](#) • [Browse](#) • [Advanced](#)

Start New Query

**Substance Name:** Esmolol [INN:BAN]

RN: 81147-92-4

UNII: MDY902UXSR

InChIKey: AQNDDEOPVVGCPG-UHFFFAOYSA-N

### 3.3 Other Identifiers



#### 3.3.1 CAS

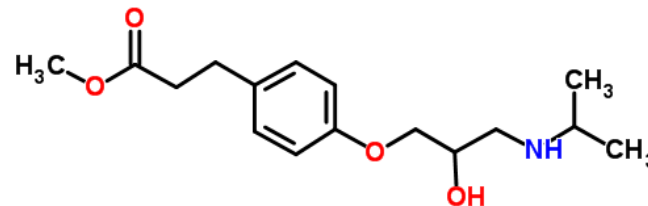


81147-92-4

from ChemIDplus, EPA DSStox

103598-03-4

from DrugBank, Human Metabolome Database



### Registry Numbers

#### CAS Registry Number

81147-92-4

#### FDA UNII

MDY902UXSR

#### Other Registry Numbers

103598-03-4

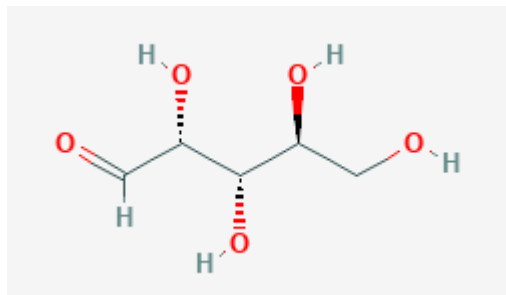
84057-94-3

#### Related Registry Number

81161-17-3 (Hydrochloride)

Listed CAS may be that  
of a hydrate or a salt

# Arabinose and Aspirin



## 3.3 Other Identifiers



### 3.3.1 CAS



147-81-9

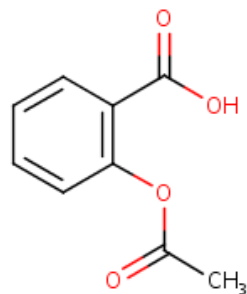
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5328-37-0

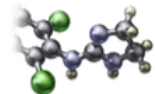
from ChemIDplus, DrugBank, EPA DSSTox

20235-19-2

from European Chemicals Agency - ECHA



TOXNET > ChemIDplus > Substance



**ChemIDplus**  
A TOXNET DATABASE  
Lite • Browse • Advanced

Start New Query

**Substance Name: Aspirin [USP:BAN:JAN]**

RN: 50-78-2

UNII: R16CO5Y76E

InChIKey: BSYNRYMUTXBXSQ-UHFFFAOYSA-N

## Registry Numbers

### CAS Registry Number

50-78-2

### FDA UNII

R16CO5Y76E

### Other Registry Numbers

11126-35-5

11126-37-7

2349-94-2

26914-13-6

98201-60-6

ACHIRAL

# ジメチルジチオデナフィル (Dimethyldithiodenafil)



報道発表資料 2017年08月22日 福祉保健局

## 医薬品成分を含有する製品の発見について

都では、いわゆる健康食品による健康被害発生の未然防止のため、都内で販売等される製品の調査及び成分検査を行っています。今般、下記5製品の成分検査を行ったところ、医薬品成分である「イブプロフェン」、「シルデナフィル」及び「ジメチルジチオデナフィル」が検出されました。

いわゆる健康食品において医薬品成分を含むものは医薬品とみなされ、厚生労働大臣の承認を受けずに製造販売することは、「医薬品、医療機器等の品質、有効性及び安全性の確保等に関する法律」(以下、「医薬品医療機器等法」という。))で禁止されています。

なお、これまでに当該製品による健康被害発生の報告は受けていません。

## 製品概要

品名	形状	検出成分
スーパーイヌトウキ	カプセル	イブプロフェン
蔵秘強腎王	丸剤	シルデナフィル
Dark Horse 黒馬	カプセル	シルデナフィル
ROCK SOLID	カプセル	ジメチルジチオデナフィル
PRO enhance	カプセル	ジメチルジチオデナフィル

### ROCK SOLID

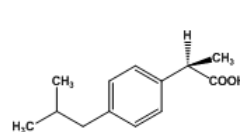


### PRO enhance



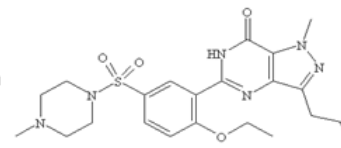
(4)	表示内容	品名	ROCK SOLID
		名称	エゾウコギ抽出物含有食品
		輸入者	オリンド美粧株式会社 神奈川県横浜市青葉区荏田町1151-40 102
		原材料名	エゾウコギ、セイヨウシロヤナギ、ナツメ、カイエン、イラクサ、カボチャ種子、オーツ麦
	形状	カプセル	
	検出成分	1カプセル中「ジメチルジチオデナフィル」を61ミリグラム検出	

(5)	表示内容	品名	PRO enhance
		名称	高麗人参濃縮含有加工食品
		販売者	オリンド美粧株式会社 神奈川県横浜市青葉区荏田町1151-40-102
		原材料名	高麗人参、フォーチ、ゴツコラ、ノコギリヤシ、メンソール
	形状	カプセル	
	検出成分	1カプセル中「ジメチルジチオデナフィル」を61ミリグラム検出	

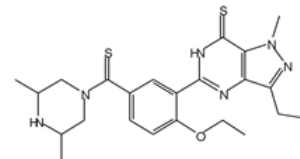


及び鏡像異性体

【イブプロフェン】



【シルデナフィル】



【ジメチルジチオデナフィル】

# ジメチルジチオデナフィル (Dimethyldithiodenafil)



報道発表資料 Welfare and health department, 22 August 2017

## On the discovery of products containing pharmaceutical ingredients

In the capital, in order to prevent the occurrence of health damage caused by so-called health foods, we conduct surveys of products sold in the city and inspection of ingredients.

As a result of conducting the ingredient tests of the following 5 products, the pharmaceutical ingredients "ibuprofen", "sildenafil" and "dimethyldithiodenafil" were detected.

Those containing pharmaceutical ingredients in so-called health foods are regarded as pharmaceuticals, and manufacturing and selling without the approval of the Minister of Health, Labor and Welfare is a "law on securing quality, efficacy and safety of pharmaceuticals, medical devices, etc." (Hereinafter referred to as the "Medical Equipment and Medical Equipment Act, etc.").

In addition, we have not received any report on the occurrence of health damage by the product so far.

## Product Summary

Item name	shape	Detectable component
Super Inu	capsule	Ibuprofen
Secret kidney king	Pill	Sildenafil
Dark Horse uma	capsule	Sildenafil
ROCK SOLID	capsule	Dimethyldithiodenafil
PRO enhance	capsule	Dimethyldithiodenafil

### ROCK SOLID



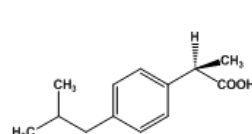
### PRO enhance



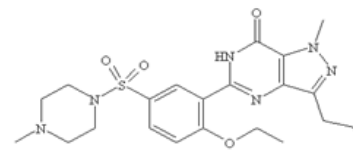
」が検出され

医療機器等の品

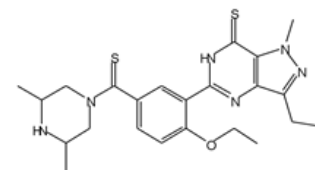
(Four)	Display content	Item name	ROCK SOLID
		name	Food containing Ezo Bogi extract
		Importer	Orind Make Incorporated Kanagawa prefecture Yokohama-shi Aoba-ku Eida-cho 1151-40 102
		Raw material name	Ezo Houkogi, Seiyushi Willi, Jujube, Cayenne, Nettle, pumpkin seed, Oats
(Five)	Display content	shape	capsule
		Detectable component	61 milligram detection of "dimethyldithiodenafil" in 1 capsule
		Item name	PRO enhance
		name	Processed food containing concentrated ginseng
(Five)	Display content	Seller	Orind Make Incorporated Kanagawa prefecture Yokohama-shi Aoba-ku Eida cho 1151-40-102
		Raw material name	Ginseng, Fort, Gotzkola, Saw Palmetto, Menthol
		shape	capsule
		Detectable component	61 milligram detection of "dimethyldithiodenafil" in 1 capsule



【Ibuprofen】

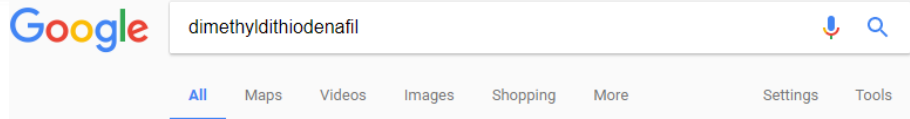


【Sildenafil】



【Dimethyldithiodenafil】

# ジメチルジチオデナフィル (Dimethyldithiodenafil)



About 34 results (0.83 seconds)

Did you mean: **dimethyl dithio denafil**

Lambda = RUSH 'LADY PAPIILLON' **카르 - !!!** here 안 안전 처  
<https://m.mfds.go.kr/renewal/.../menuForward.jsp? ...> ▼ Translate this page  
Jan 19, 2016 - 무허가 의 식당 인 'Lambda = RUSH', 'LADY PAPIILLON' 에서 **Dimethyldithiodenafil** 이 검출 에 [제품 정보] \* 제품 1 - 제품 예: Lambda = RUSH

Partial revision of "Criteria on Scope of Pharmaceuticals"  
<https://search.e-gov.go.jp/servlet/PcmFileDownload? seqNo ...> - Translate this page  
ATP. Adenosine-5'-triphosphate. Dimethyl dithiodenafil **dimethyldithiodenafil** . Name. Other name etc .. Remarks etc .. Remarks. Olive bear. Aobana / Tsukikisa / Gyokubuna / Commelina.

**PDF** Medicine Genesis 1012 No. 1 .pdf (133KB)  
[www.pref.tokushima.jp/docs/2016042200481 /.../ 20161012001.pdf ...](http://www.pref.tokushima.jp/docs/2016042200481 /.../ 20161012001.pdf ...) ▼ Translate this page  
Oct 12, 2016 - Acid. Attachment 2 of 3. Others (chemical substances etc.) Table Hydrobromide Dextromethorphan Next, add as follows. Dimethyldithiocarbamate de. Nafiru. **Dimethyldithiodenafil** .

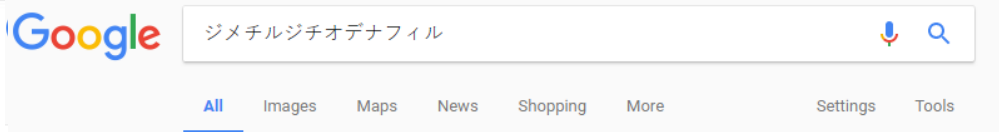
**PDF** January 2017 issue No. 267 - Hiroshima Prefecture Pharmaceutical A...  
[www.hiroyaku.or.jp/pdf/journal/No 267.pdf](http://www.hiroyaku.or.jp/pdf/journal/No 267.pdf) ▼ Translate this page  
Jan 1, 2017 - Attachment 2 of 3. Following addition of dehydrotromethorphan hydrobromide of other (chemical substances etc.) as follows: Dimethyldithiocarbamate Dinah fill. **Dimethyldithiodenafil** .

**PDF** About revision of criteria on the scope of pharmaceuticals - Ministry o...  
<https://kouseikyoku.mhlw.go.jp/.../20161012iyakuhinnohani.pdf> ▼ Translate this page  
Oct 12, 2016 - Acid. Attachment 2 of 3. Others (chemical substances etc.) Table Hydrobromide Dextromethorphan Next, add as follows. Dimethyldithiocarbamate de. Nafiru. **Dimethyldithiodenafil** .

제공 기관스 검색 X - 스마트 컨슈머 - 소비자 종합 정보망  
[smartconsumer.go.kr/user/is /.../ MoreViewSearchBbsList2.do? ...](http://smartconsumer.go.kr/user/is /.../ MoreViewSearchBbsList2.do? ...) Capt ... ▼ Translate this page  
국발 사유 무허 가 의 식당 인 'lambda = rush' 'lady papillon' 에서 **dimethyldithiodenafil** 이 검출 를 . 미, 아 세트 이미 펜 펜 성명 버유 중성 에서 유 사실 국발 2015-07-14.

Products with this adulterant have been documented in Japan and Korea since at least late 2015, *i.e.*, for almost two years. Meanwhile, there appears to be no mention of this compound in the English-language literature.

# ジメチルジチオデナフィル (Dimethyldithiodenafil)



About 462 results (0.35 seconds)

Attention to unapproved drugs including sildenafil (ingredients similar to s...  
[hfnf.nih.gov/contents/detail3132.html](https://hfnf.nih.gov/contents/detail3132.html) ▼ Translate this page

Dec 18, 2015 - Analysis of the product sold on the internet revealed that sildenafil-like ingredient ( **dimethyldithiodenafil** (designated as a pharmaceutical ingredient by the Ministry of Health, Labor and Welfare on December 18, 2013), hydroxythio Homosildenafil) was detected.

<sup>[PDF]</sup> About finding products containing pharmaceutical ingredients - Minist...

[www.mhlw.go.jp/file/04...11126000.../tokyo-press-kidora.pdf](https://www.mhlw.go.jp/file/04...11126000.../tokyo-press-kidora.pdf) ▼ Translate this page

Dec 18, 2015 - **dimethyldithiodenafil** "was detected (designated by the Ministry of Health, Labor and Welfare as a pharmaceutical ingredient on December 18, 2015). "Hydroxythiohomosildenafil", which has been conventionally designated as a pharmaceutical ingredient, was also detected from one product among them.

Please pay attention to health foods etc where pharmaceutical ingredient...

[www.pref.okayama.jp/page/detail-86420.html](https://www.pref.okayama.jp/page/detail-86420.html) ▼ Translate this page

(3) Shouty MORE. **Dimethyldithiocarbamate Dinah fill** . **Dimethyldithiocarbamate Dinah fill** . **Dimethyl dithio Dinah fill** , hydroxy thio homo sildenafil. H27.12.18, Tokyo [PDF file / 313KB]. 勃王KING Star. Hydroxy thio homo sildenafil. Chiodenafil. H 27. 12.18 ...

What is homo thiodenafil - chemical substance dictionary Weblio dictionary

[www.weblio.jp>learning> chemical substance dictionary](https://www.weblio.jp>learning>chemical%20substance%20dictionary) ▼ Translate this page

Weblio dictionary> academic discourse> chemical substance dictionary> meaning and explanation of homo **thio denafil** 1 - **methy**l - 3 - propyl - 5 - [2 - ethoxy - 5 - (4 - ethylpiperazinylsulfonyl) phenyl] - 1 H - pyrazolo [4,3-d] pyrimidin-7 (6H) -thione , 1- **methy**l -3-propyl-5- [2-ethoxy-5- (4-ethylpiperazino ...

Detection of pharmaceutical ingredients from health food | - Mario Clinic

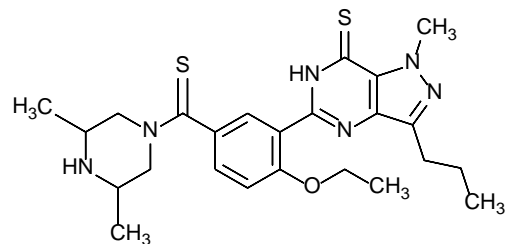
[marioclinic.com/info/](https://marioclinic.com/info/) Detection of pharmaceutical ingredients from health food / ▼ Translate this page

Aug 25, 2017 - which is the main component of Viagra has a "sildenafil" or similar chemical structure " **dimethyl dithio Dinah fill** is due to the product has been manufactured and sold which contains". Recently in the United States as "Desmethyl - Carbodia Phil", still sildenafil ...

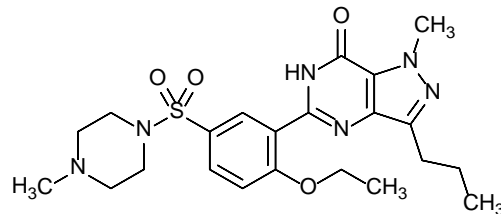
Note that the number of relevant searches on the Japanese spelling exceeds that in English more than ten-fold. We may conclude that this adulterant is fairly well-known in Japan.



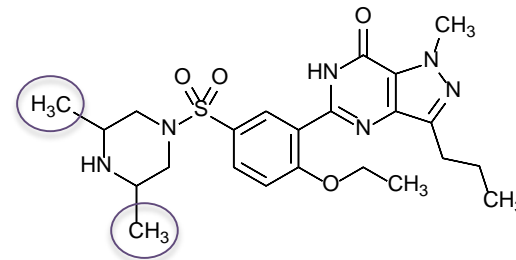
# ジメチルジチオデナフィル (Let's be Chemists!)



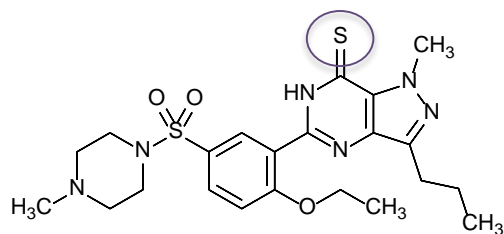
ジメチルジチオデナフィル



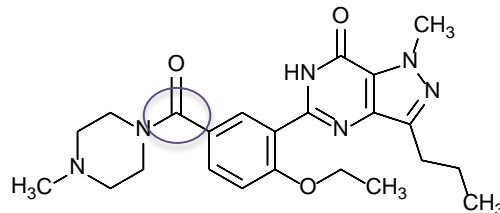
Sildenafil



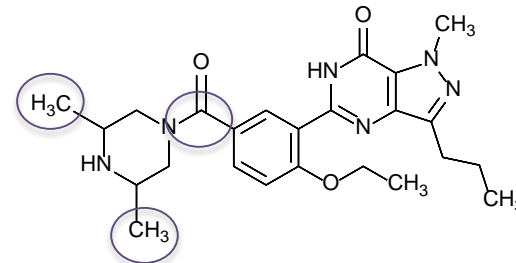
Dimethylsildenafil



Thiodenafil

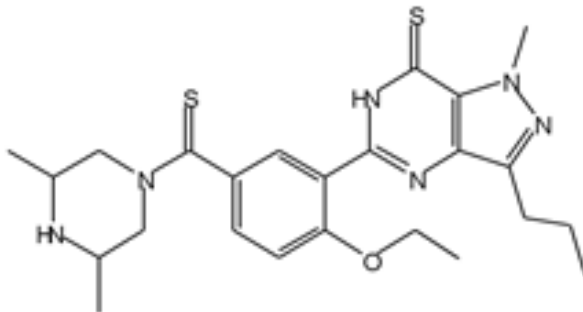


Carbodenafil



Dimethylcarbodenafil

# ジメチルジチオデナフィル (Let's be Chemists!)



ジメチルジチオデナフィル

Dithiodimethylcarbodenafil

## Searched:

- SciFinder (CAS – Chemical Abstracts)
- structure and sub-structure searches in available databases (check out [MolView!](#))
- nearly every iteration of the name



# ジメチルジチオデナフィル (Let's be Chemists!)



Dithiodimethylcarbodenafil



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2 results (0.84 seconds)

Did you mean: **Dithio Dimethyl Carbodenafil**

Phosphodiesterase-5 inhibitors and their analogues as adulterants of ...

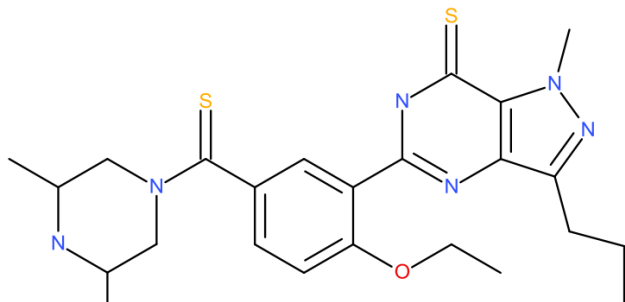
[www.tandfonline.com/doi/full/10.1080/19440049.2017.1336674?src=recsys](http://www.tandfonline.com/doi/full/10.1080/19440049.2017.1336674?src=recsys)

Jun 29, 2017 ... dioxohongdenafil (14), dithiodesmethylcarbodenafil (15), **dithiodimethylcarbodenafil** (16), hydroxychlorodenafil (20), hydroxyhomosildenafil ...

Phosphodiesterase-5 inhibitors and their analogues as adulterants of ...

[www.tandfonline.com/doi/pdf/10.1080/19440049.2017.1336674?needAccess=true](http://www.tandfonline.com/doi/pdf/10.1080/19440049.2017.1336674?needAccess=true)

May 27, 2017 - 15. Dithiodesmethylcarbodenafil. C23H30N6OS2. 9.933. 471.1996. 343.07, 371.10, 414.14. 16. **Dithiodimethylcarbodenafil**. C24H32N6OS2.



Dithio-dimethylcarbodenafil



Journal  
**Food Additives & Contaminants: Part A**  
Volume 34, 2017 - Issue 7

Enter keywords, authors, DOI etc.

53

Views

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CrossRef citations

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Original Articles

## Phosphodiesterase-5 inhibitors and their analogues as adulterants of herbal and food products: analysis of the Malaysian market, 2014–16

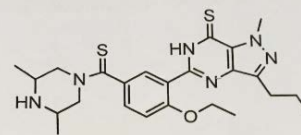
Nur Baizura Bujang, Chin Fei Chee, Choon Han Heh, Noorsaadah Abd. Rahman & Michael J. C. Buckle

Pages 1101-1109 | Received 07 Feb 2017, Accepted 27 May 2017, Accepted author version posted online: 05 Jun 2017, Published online: 29 Jun 2017

Download citation | <http://dx.doi.org/10.1080/19440049.2017.1336674>



### Certificate of Analysis



Name:	<b>Sildenafil Related Compound</b>
Molecular Weight:	484.68
Molecular Formula:	C24H32N6OS2
Storage Condition:	Store at 0-5 °C.
Lot No.:	0001-169
Effective Date:	<b>September 04, 2013</b>
Retest Date:	September, 2016



- ▶ Compound ジメチルジチオデナフィル, known to the Japanese and Korean chemists for about two years, and referred to as dimethyldithiodenafil, has not been seen in the English-language research and enforcement sources. It was not registered with CAS, and was not found in any of the surveyed online databases.
- ▶ Same compound, with no assigned chemical identifiers, has been made commercially available by CacheSyn, Inc. – the research chemicals supplier – for at least four years (since 2013), as ‘Sildenafil Related Compound’, without a name, CAS or any other registration.
- ▶ Researchers in Malaysia used the commercial standard from CacheSyn that they termed – systematically correctly - dithiodimethylcarbodenafil
- ▶ To a typical layperson surveying literature, or even a relatively well-informed laboratory scientist, it is difficult to impossible to connect the following without extensive digging:

ジメチルジチオデナフィル = dimethyldithiodenafil = dithiodimethylcarbodenafil = ‘Sildenafil Related Compound’

# Conclusion



- ▶ Correct chemical nomenclature is the cornerstone of successful chemical analysis, indispensable in conducting meaningful analytical work and disseminating its outcomes within the scientific community;
- ▶ USP Database scientists invest significant effort in maintaining the chemical nomenclature accurate. USP is collaborating with the US FDA Substance Registration System chemists to attain maximum accuracy in chemical records collected in the USP database, as well as in other online resources such as FDA SRS, PubChem, ChemIDplus, GInAS (Global Ingredient Archival System) and Wikipedia;
- ▶ Upon verification of the chemical information for the newly discovered chemical entities, SRS scientists issue a unique ingredient identifier (UNII) – a non-proprietary, free, unique, unambiguous, non-semantic, alphanumeric identifier based on a substance's molecular structure and/or descriptive information. UNII codes help remove nomenclatural ambiguity frequently associated with CAS Registry Numbers;
- ▶ USP strives to make the Adulterants Database resource useful to practicing chemists and envisions its role as a convenient platform for exchanging essential analytical data about adulterating compounds, both established and new.

# Thank You



**Empowering a healthy tomorrow**