

Standard Method Performance Requirements for Determination of Phosphodiesterase Type 5 (PDE5) Inhibitors in Dietary Ingredients and Supplements

Intended Use: Reference Method for Dispute Resolution or Routine Use

1 Purpose

AOAC Standard Method Performance RequirementsSM (SMPRs) describe the minimum recommended performance characteristics to be used during the evaluation of a method. The evaluation may be an on-site verification, a single-laboratory validation, or a multi-site collaborative study. SMPRs are written and adopted by AOAC stakeholder panels composed of representatives from industry, regulatory organizations, contract laboratories, test kit manufacturers, and academic institutions. AOAC SMPRs are used by AOAC expert review panels in their evaluation of validation study data for method being considered for *Performance Tested MethodsSM* or AOAC *Official Methods of AnalysisSM*, and can be used as acceptance criteria for verification at user laboratories. [Refer to Appendix F: *Guidelines for Standard Method Performance Requirements, Official Methods of Analysis of AOAC INTERNATIONAL* (2012) 19th Ed., AOAC INTERNATIONAL, Gaithersburg, MD, USA.]

2 Applicability

Quantitative method for phosphodiesterase type 5 (PDE5) in dietary ingredients and supplements for use in testing laboratories by trained technicians.

3 Analytical Technique

Any analytical technique(s) that measures the analytes of interest and meets the following method performance requirements is/are acceptable.

4 Definitions

Dietary ingredients.—A vitamin; a mineral; an herb or other botanical; an amino acid; a dietary substance for use by man to supplement the diet by increasing total dietary intake; or a concentrate, metabolite, constituent, extract, or combination of any of the above dietary ingredients. {United States Federal Food Drug and Cosmetic Act §201(ff) [U.S.C. 321 (ff)]}

Dietary supplements.—A product intended for ingestion that contains a “dietary ingredient” intended to add further nutritional value to (supplement) the diet. Dietary supplements may be found in many forms such as tablets, capsules, softgels, gelcaps, liquids, or powders.

Limit of quantitation (LOQ).—The minimum concentration or mass of analyte in a given matrix that can be reported as a quantitative result.

PDE5 inhibitors.—For the purposes of this SMPR: PDE5 inhibitors are defined as avanafil, lodenafil carbonate, mirodenafil, sildenafil, tadalafil, udenafil, or vardenafil; or any of their analogs. Refer to the *Supplemental List of Known PDE5 Inhibitors*.

Quantitative method.—Method of analysis which response is the amount of the analyte measured either directly (enumeration in

Table 1. Method performance requirements

Type of study	Parameter	Minimum acceptable criteria
Single-laboratory validation	Analytical range	50–500 000 ppm
	Limit of quantitation (LOQ)	≤50 ppm
	Repeatability (RSD_r)	≤20%
	Recovery	70 to 120% of mean spiked recovery over the analytical range
Multi-laboratory validation	Reproducibility (RSD_R)	≤30%

a mass or a volume), or indirectly (color, absorbance, impedance, etc.) in a certain amount of sample.

Repeatability.—Variation arising when all efforts are made to keep conditions constant by using the same instrument and operator and repeating during a short time period. Expressed as the repeatability standard deviation (SD_r); or % repeatability relative standard deviation (% RSD_r).

Reproducibility.—The standard deviation or relative standard deviation calculated from among-laboratory data. Expressed as the reproducibility standard deviation (SD_R); or % reproducibility relative standard deviation (% RSD_R).

Recovery.—The fraction or percentage of spiked analyte that is recovered when the test sample is analyzed using the entire method.

5 Method Performance Requirements

See Table 1.

6 System Suitability Tests and/or Analytical Quality Control

Suitable methods will include blank check samples, and check standards at the lowest point and midrange point of the analytical range.

7 Reference Material(s)

Refer to Annex F: *Development and Use of In-House Reference Materials* in Appendix F: *Guidelines for Standard Method Performance Requirements, Official Methods of Analysis of AOAC INTERNATIONAL* (2012) 19th Ed., AOAC INTERNATIONAL, Gaithersburg, MD, USA (http://www.eoma.aoac.org/app_f.pdf)

ISO Guide 34:2009 *General requirements for the competence of reference material producers*

8 Validation Guidance

All target compounds in Annex I and ideally in all matrices in Annex II shall be evaluated.

Appendix D: *Guidelines for Collaborative Study Procedures to Validate Characteristics of a Method of Analysis, Official Methods of Analysis of AOAC INTERNATIONAL* (2012) 19th Ed., AOAC INTERNATIONAL, Gaithersburg, MD, USA (http://www.eoma.aoac.org/app_d.pdf)

Appendix F: *Guidelines for Standard Method Performance Requirements, Official Methods of Analysis of AOAC INTERNATIONAL* (2012) 19th Ed., AOAC INTERNATIONAL, Gaithersburg, MD, USA (http://www.eoma.aoac.org/app_f.pdf)

Appendix K: *Guidelines for Dietary Supplements and Botanicals, Official Methods of Analysis of AOAC INTERNATIONAL* (2012)

8 Maximum Time-to-Result

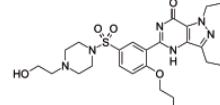
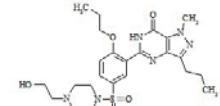
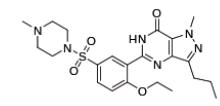
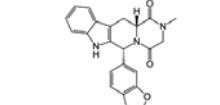
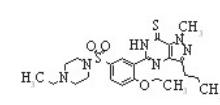
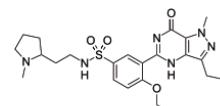
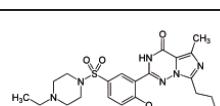
No maximum time.

*Approved by Stakeholder Panel on Dietary Supplements (SPDS).
 Final Version Date: September 5, 2014. Effective Date: October 16, 2014.*

ANNEX I Target Compound Panel

Analyte	CAS No.	Formula	Structure
Acetaminotadalafil	1446144-71-3	C ₂₃ H ₂₀ N ₄ O ₅	
Acetildenafil	831217-01-7	C ₂₅ H ₃₄ N ₆ O ₃	
Avanafil (sold under the brand names <i>Stendra</i> and <i>Spedra</i>)	330784-47-9	C ₂₃ H ₂₆ ClN ₇ O ₃	
Homosildenafil	642928-07-2	C ₂₃ H ₃₂ N ₆ O ₄ S	
Hydroxyacetildenafil	147676-56-0	C ₂₅ H ₃₄ N ₆ O ₄	
Hydroxyhomosildenafil	139755-85-4	C ₂₃ H ₃₂ N ₆ O ₅ S	
Hydroxythiohomosildenafil	479073-82-0	C ₂₃ H ₃₂ N ₆ O ₄ S ₂	
Lodenafil carbonate (sold under the brand name <i>Helleva</i> in Brazil)	398507-55-6	C ₄₃ H ₅₄ N ₁₂ O ₉ S ₂	

ANNEX I
Target Compound Panel (*continued*)

Analyte	CAS No.	Formula	Structure
Mirodenafil (sold under the trade name of <i>Mvix</i>)	862189-95-5	C ₂₆ H ₃₇ N ₅ O ₅ S	
Propoxyphenyl hydroxyhomosildenafil	139755-87-6	C ₂₄ H ₃₄ N ₆ O ₅ S	
Sildenafil (sold under the brand names <i>Viagra</i> and <i>Revatio</i> , and other various brand names)	139755-83-2	C ₂₂ H ₃₀ N ₆ O ₄ S	
Tadalafil (sold under the brand names <i>Cialis</i> and <i>Adcirca</i>)	171596-29-5	C ₂₂ H ₁₉ N ₃ O ₄	
Thiohomosildenafil	479073-80-8	C ₂₃ H ₃₂ N ₆ O ₃ S ₂	
Udenafil (sold under the brand name <i>Zydena</i>)	268203-93-6	C ₂₅ H ₃₆ N ₆ O ₄ S	
Vardenafil (sold under the brand names <i>Levitra</i> , <i>Staxyn</i> , and <i>Vivanza</i>)	224785-90-4	C ₂₃ H ₃₂ N ₆ O ₄ S	

ANNEX II
Matrixes

Tablets

Capsules (both the content and the capsule shells)

Softgels

Gelcaps

Liquids

Powders

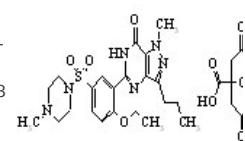
Extracts

Supplemental List of Known PDE5 Inhibitors (as of July 2014)

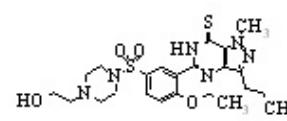
1. Standards available from Cachesyn <http://www.cachesyn.com/> which include the majority of characterized PDE-5i analogues and all of the parent drugs including catalog numbers. (Some structure images not available)

Sildenafil Related Compounds (commercial standards available) – includes deuterated standards.

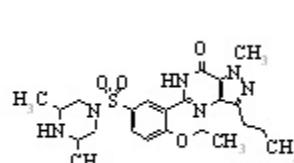
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O7 M.W. 474.59
192.13
CSTS061



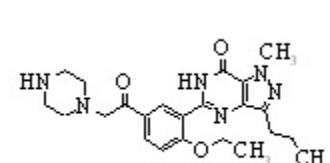
Hydroxythiohomosildenafil
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520.68
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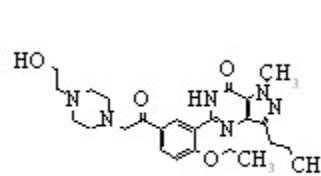
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488.61
CSTS0612



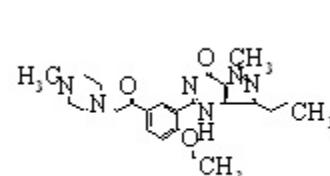
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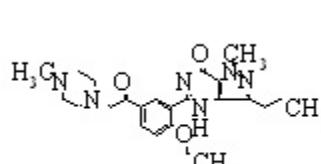
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482.59
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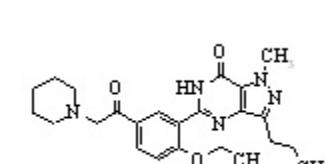
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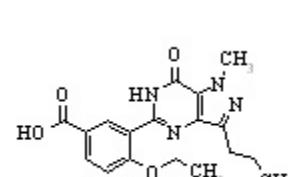
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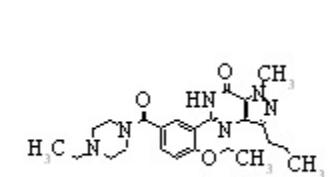
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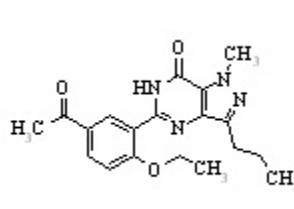
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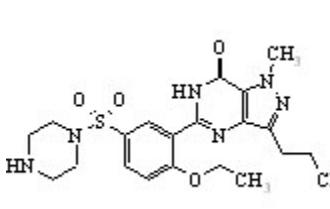
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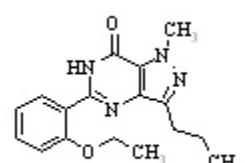
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354.41
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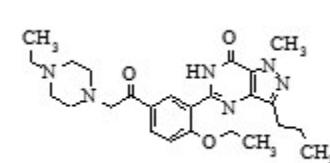
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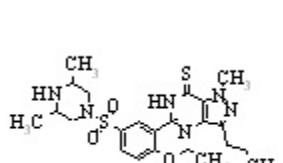
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312.37
CSTS0620



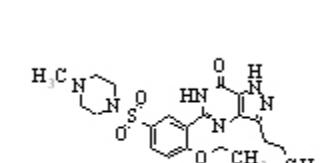
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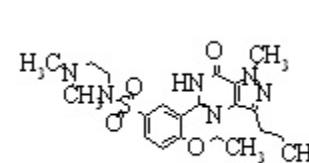
Thiodimethyl Sildenafil
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504.68
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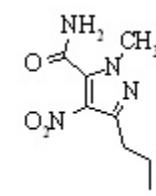
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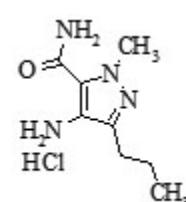
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CSTS0624



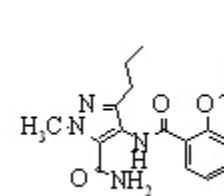
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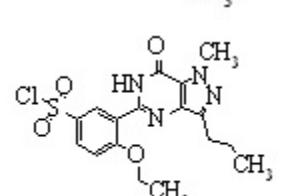
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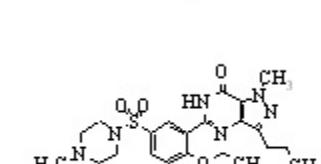
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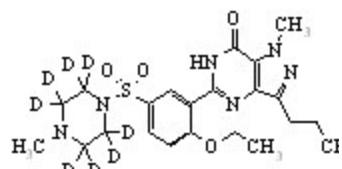
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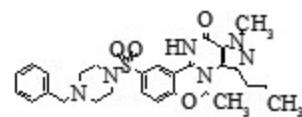
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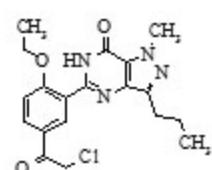
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CSTS063



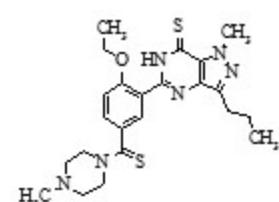
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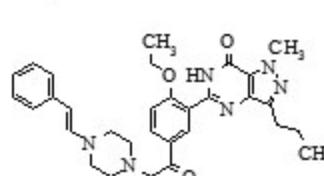
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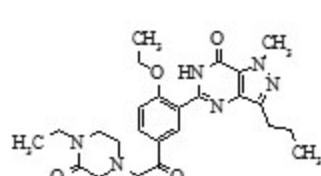
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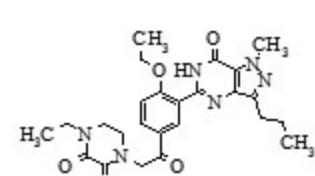
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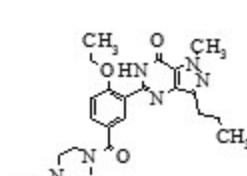
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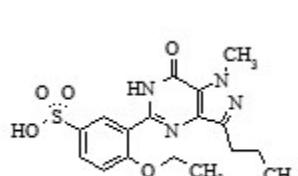
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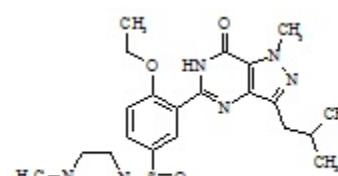
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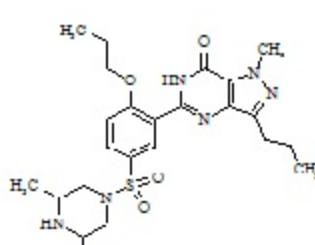
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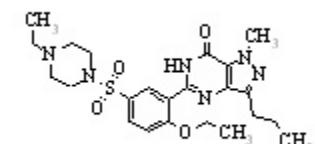
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CAS No. N/A
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CSTS0646



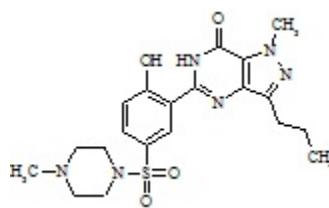
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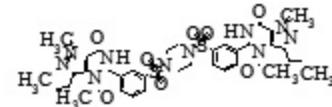
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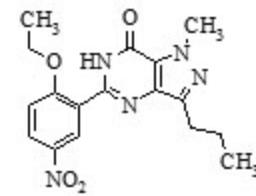
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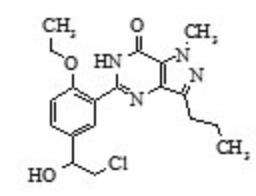
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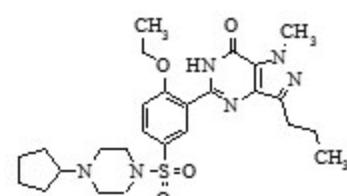
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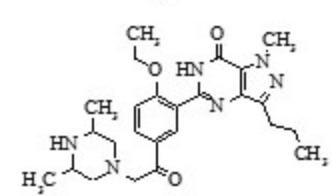
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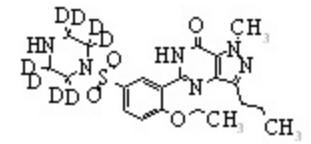
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CSTS0636



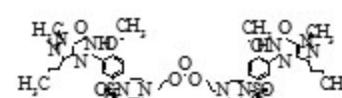
Dimethylacetildenafil
CAS No. N/A
C25H34N6O3 M.W. 466.59
CSTS0638



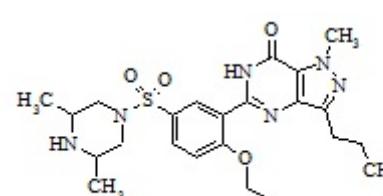
N-Desmethyl sildenafil-d8
CAS No. 139755-82-1 (non-d)
C21H20N6O4SD8 M.W. 468.61
CSTS064



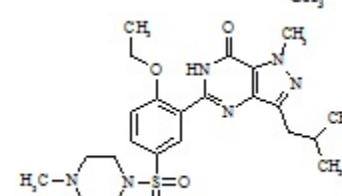
Lodenafilcarbonate
CAS No. N/A
C47H62N12O11S2 M.W. 1035.22
CSTS0641



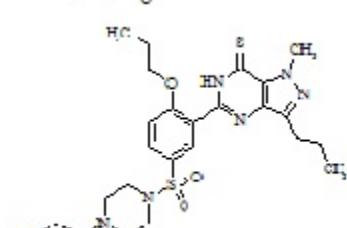
Sildenafil analogue
C24H34N6O4S M.W. 502.64
CSTS0643



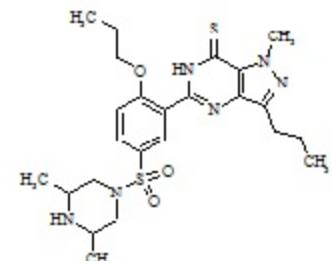
Nitroso-prodenafil
CAS No. N/A
C27H35N9O5S2 M.W. 629.77
CSTS0645



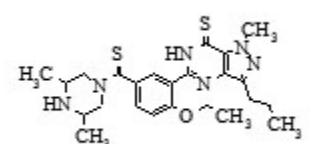
Sildenafil Analogue I
CAS No. N/A
C24H34N6O4S2 M.W. 534.70
CSTS0647



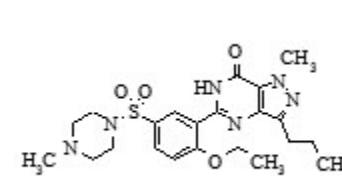
Sildenafil Analogue III
CAS No. N/A
C24H34N6O3S2 M.W. 518.70
CSTS0649



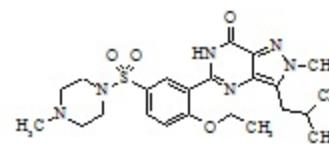
Sildenafil Related Compound
C24H32N6O5S2 M.W. 484.69
CSTS0650



Sildenafil
C22H30N6O4S M.W. 474.59
CSTS0652



Sildenafil Impurity A
Related Compound
(Isomer of Isobutyl Sildenafil)
C23H32N6O4S M.W.
488.61
CSTS0653



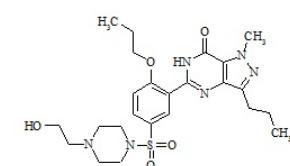
Sildenafil Impurity ((1-methyl-4-Nitro -3-n-propyl pyrazole-5- carboxylic acid)
C8H11N3O4 M.W. 213.19
CSTS0654

no image of structure available

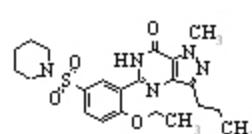
Sildenafil N-Oxide
C22H30N6O5S M.W.
490.59
CSTS0655

no image of structure available

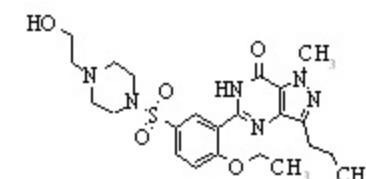
Propoxyphenyl-Hydroxyhomosildenafil
CAS No. N/A
C24H34N6O5S M.W. 518.64
CSTS0656



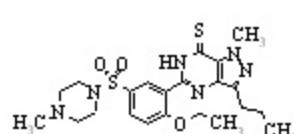
Norneosildenafil
C22H29N5O4S M.W.
459.57
CSTS066



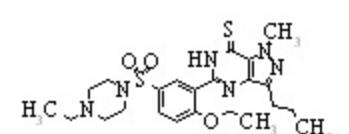
Hydroxyhomosildenafil
C23H32N6O5S M.W. 504.61
CSTS067



Thiosildenafil
C22H30N6O3S2 M.W.
490.65
CSTS068

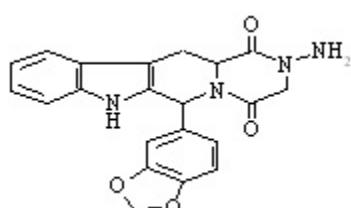


Thiohomosildenafil
C23H32N6O3S2 M.W. 504.68
CSTS069

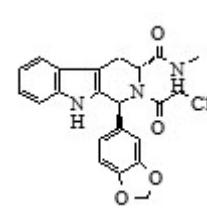


Tadalafil Related Compounds (commercial standards available) – includes deuterated standards.

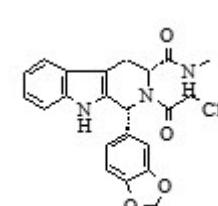
Aminotadalafil
C21H18N4O4 M.W.
390.40
CSTT101



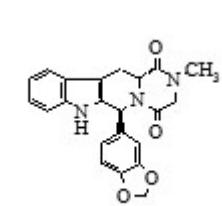
Tadalafil Impurity C
CAS No. NA
C22H20ClN3O4
M.W. 425.88
CSTT1010



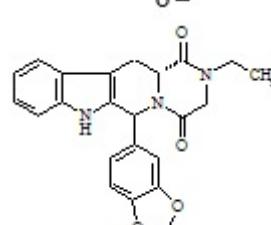
Tadalafil Impurity D
CAS No. NA
C22H20ClN3O4 M.W. 425.88
CSTT1011



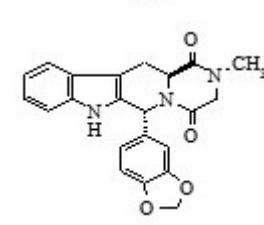
Tadalafil Impurity E
C22H19N3O4 M.W. 389.41
CSTT1012



N-Ethyl Tadalafil
CAS No. N/A
C23H21N3O4 M.W. 403.44
CSTT1013



6R,12S-Tadalafil
C22H19N3O4 M.W. 389.41
CSTT1014



Tadalafil Hydroxylactam Impurity
C22H19N3O6 M.W. 421.41
CSTT1015

no image of structure available

Tadalafil Amino Hemiketal Impurity
C22H19N3O6 M.W. 421.41
CSTT1016

no image of structure available

Tadalafil Spiro-urethane Impurity
C21H18N3O6 M.W. 408.39
CSTT1017

no image of structure available

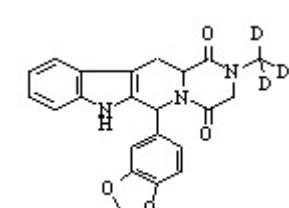
Tadalafil Hydroxyquinoline Impurity
C22H17N3O5 M.W. 403.40
CSTT1018

no image of structure available

Tadalafil Ketolactam Impurity
C22H21N3O6 M.W. 423.43
CSTT1019

no image of structure available

Tadalafil-d3
C22H16N3O4D3 M.W. 392.43
CSTT102



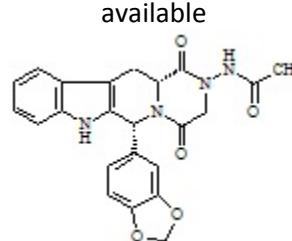
Tadalafil Spiro-oxindole Impurity
C22H19N3O5 M.W. 405.41
CSTT1020

no image of structure available

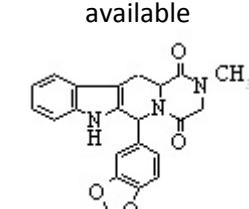
Tadalafil Impurity B (6S,12aS)
C22H19N3O4 M.W. 389.41
CSTT1021

no image of structure available

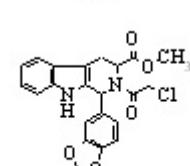
Acetaminotadalafil
CAS No. N/A
C23H20N4O5 M.W. 432.44
CSTT1022



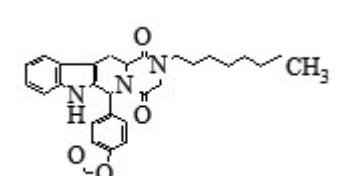
Tadalafil
C22H19N3O4 M.W. 389.41
CSTT103



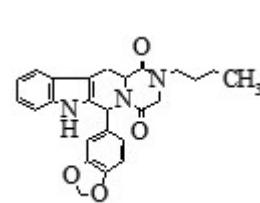
Chloropretadalafil
C22H19ClN3O5 M.W. 426.86
CSTT104



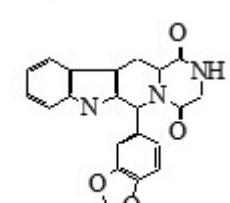
N-Octyl-nortadalafil
C29H33N3O4 M.W. 487.60
CSTT105



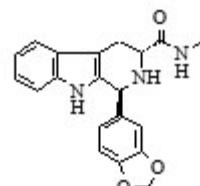
N-Butyl Tadalafil
C25H25N3O4 M.W. 431.50
CSTT106



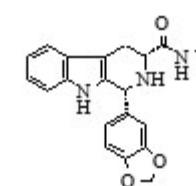
Nortadalafil
C21H17N3O4 M.W. 375.39
CSTT107



Tadalafil Impurity A
CAS No. NA
C20H19N3O3 M.W. 349.39
CSTT108

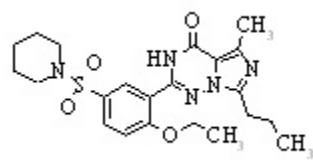


Tadalafil Impurity B
CAS No. NA
C20H19N3O3 M.W. 349.39
CSTT109



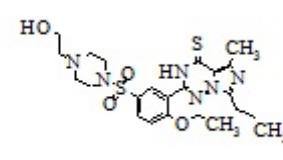
Vardenafil Related Compounds (commercial standards available) – includes deuterated standards.

Pseudovardenafil
ii
C22H29N5O4S
M.W. 459.57
CSTV051

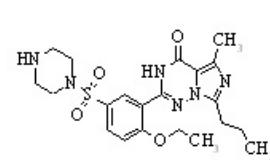


no image of structure available

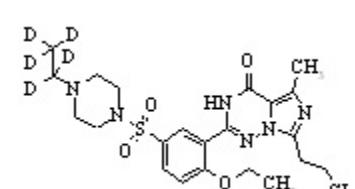
Hydroxythio Vardenafil
C23H32N6O4S
2 M.W. 520.68
CSTV0510



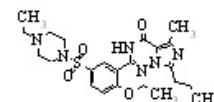
N-Desethyl Vardenafil
C21H28N6O4S M.W. 460.56
CSTV052



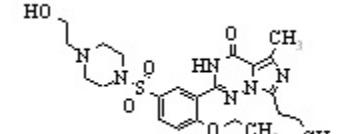
Vardenafil-d5
C23H27N6O4SD5 M.W. 493.64
CSTV053



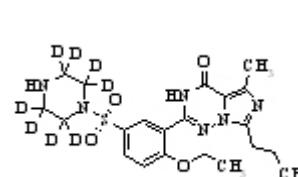
Vardenafil HCl
CAS No. 224785-90-4
C23H32N6O4S M.W. 488.61
CSTV054



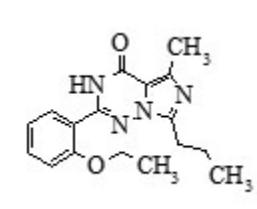
Hydroxy Vardenafil
C23H32N6O5S M.W. 504.61
CSTV055



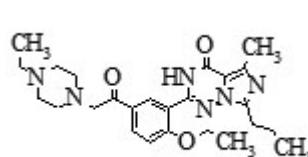
N-Desethyl Vardenafil-d8
CAS No. V-052
C21H28N6O4S M.W. 460.56
CSTV056



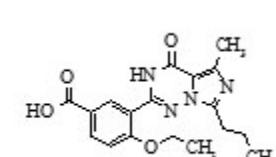
2-(2-Ethoxyphenyl)-5-methyl-7-propyl-3H-imidazo[5,1-f][1,2,4]triazin-4-one
C17H20N4O2 M.W. 312.37
CSTV057



Acetylvardenafil
C25H34N6O3 M.W. 466.59
CSTV058

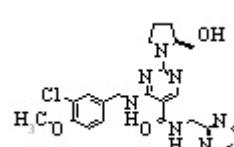


Norneovardenafil
CAS No. N/A
C18H20N4O4 M.W. 356.38
CSTV059

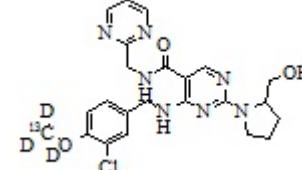


Avanafil Related Compounds (commercial standards available) – includes deuterated standards.

Avanafil
CAS No. 330784-47-9
C23H26CIN7O3 M.W. 483.96
CSTA291

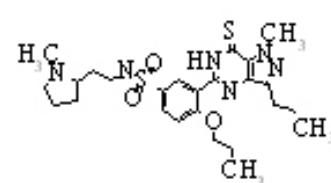


Avanafil-13CD3
C22H23CIN7O313CD3 M.W. 487.97
CSTA292



Udenafil

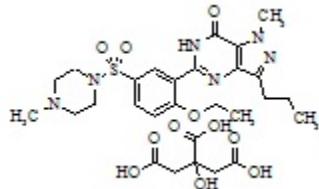
Udenafil
CAS No. 268203-93-6
C25H36N6O4S M.W. 516.67
CSTU031



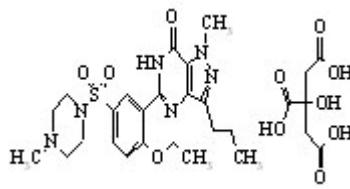
2. Standards available from TLC Pharmachem <http://www.tlcpharmachem.com> which include the majority of characterized PDE-5i analogues and all of the parent drugs including catalog numbers. (Some structure images not available)

Sildenafil Related Compounds (commercial standards available) – includes deuterated standards.

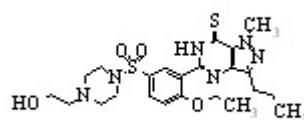
Sildenafil Citrate
CAS No. 171599-83-0
C22H30N6O4S. C6H8O7 M.W. 474.59
192.13
PF-0017



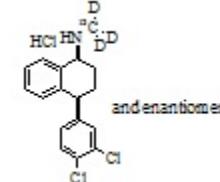
Sildenafil citrate
CAS No. 171599-83-0
C22H30N6O4S. C6H8O7 M.W. 474.59
192.13
S-061



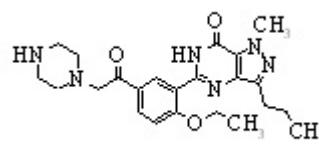
Hydroxythiohomosildenafil
C23H32N6O4S2 M.W. 520.68
S-0611



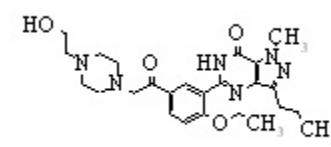
Dimethyl Sildenafil
CAS No. 1416130-63-6
C23H32N6O4S M.W. 488.61
S-0612



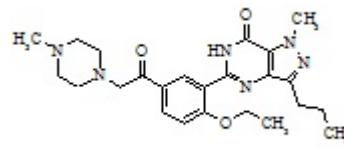
N-Desmethyl Acetildenafil
C23H30N6O3 M.W. 438.53
S-0613



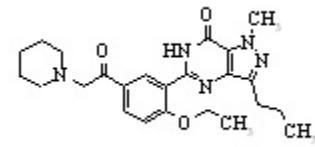
Hydroxyacetildenafil
C25H34N6O4 M.W. 482.59
S-0614



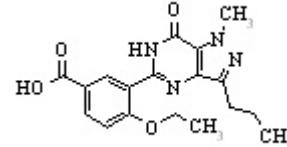
Nor-acetildenafil
CAS No. 949091-38-7
C24H32N6O3 M.W. 452.56
S-0615



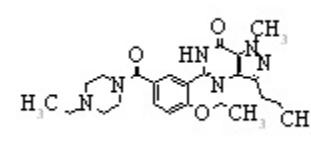
Piperacetildenafil
C24H31N5O3 M.W. 437.55
S-0616



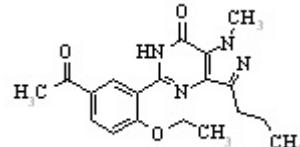
Acetil Acid
C18H20N4O4 M.W. 356.38
S-0617



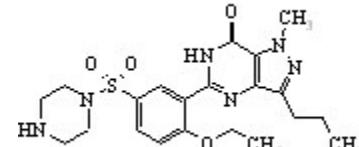
Carbodenafil
C24H32N6O3 M.W. 452.56
S-0618



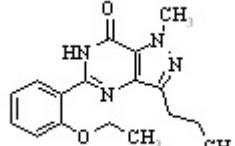
Gendenafil
CAS No. 147676-66-2
C19H22N4O3 M.W. 354.41
S-0619



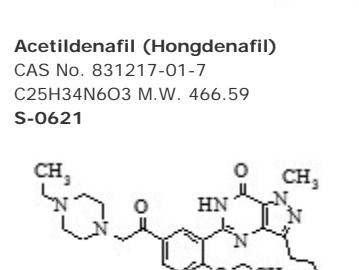
N-Desmethyl Sildenafil
CAS No. 139755-82-1
C21H28N6O4S M.W. 460.56
S-062



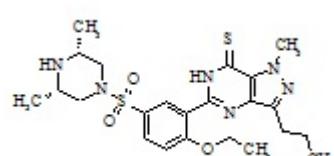
Imidazosagatriazinone
C17H20N4O2 M.W. 312.37
S-0620



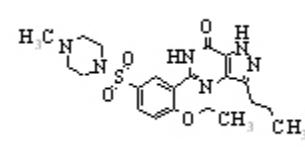
Acetildenafil (Hongdenafil)
CAS No. 831217-01-7
C25H34N6O4 M.W. 466.59
S-0621



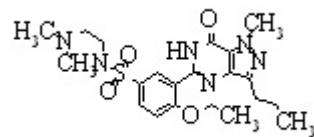
Thiodimethyl Sildenafil (Thioildenafil, Sulfoildenafil)
CAS No. 856190-47-1
C23H32N6O3S2 M.W. 504.68
S-0622



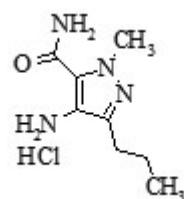
Pyrazole N-desmethyl sildenafil
C21H28N6O4S M.W. 460.56
S-0623



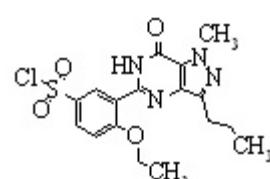
PDE-5 Inhibitor (Sildenafil Related Compound)
C21H30N6O4S M.W. 462.58
S-0624



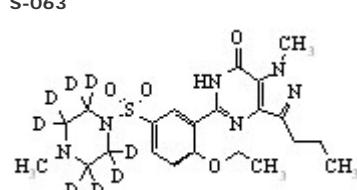
Sildenafil Amine HCl
C8H14N4O.HCl M.W. 182.23 36.46
S-0626



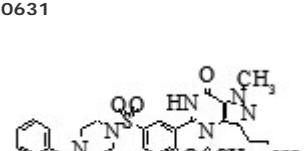
Sildenafil chlorosulfonyl
CAS No. 139756-22-2
C17H19ClN4O4S M.W. 410.88
S-0628



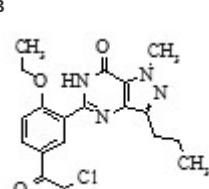
Sildenafil-d8
CAS No. 171599-83-0(non-d)
C22H22D8N6O4S M.W. 482.63
S-063



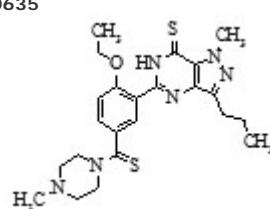
Benzyl Sildenafil
C28H34N6O4S M.W. 550.68
S-0631



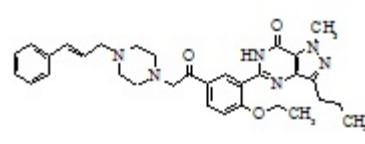
Chlorodenafil
CAS No. N/A
C19H21ClN4O3 M.W. 388.86
S-0633



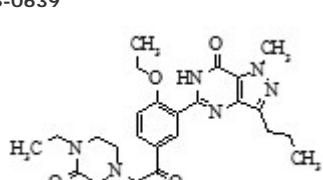
Dithio-desmethyl-carbodenafil
CAS No. N/A
C23H30N6OS2 M.W. 470.66
S-0635



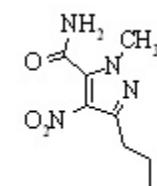
Cinnamylidenafil
CAS No. N/A
C32H38N6O3 M.W. 554.70
S-0637



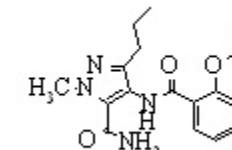
Oxohongdenafil
CAS No. N/A
C25H32N6O4 M.W. 480.57
S-0639



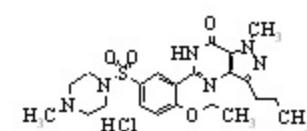
Sildenafil amide
C8H12N4O3 M.W. 212.21
S-0625



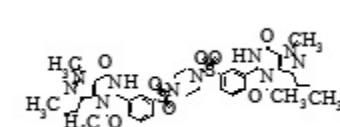
Sildenafil coupled
C17H22N4O3 M.W. 330.39
S-0627



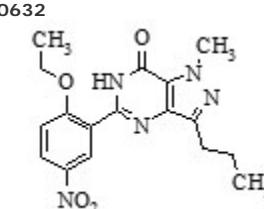
Sildenafil HCl
C22H30N6O4S.HCl M.W. 474.59 36.46
S-0629



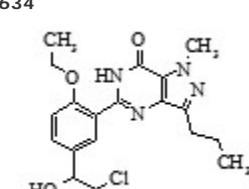
Sildenafil Dimer Impurity
C38H46N10O8S2 M.W. 834.98
S-0630



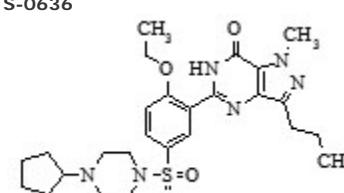
Nitrodenafil
CAS No. N/A
C17H19N5O4 M.W. 357.37
S-0632



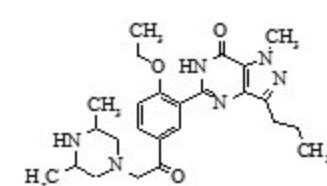
Hydroxychlorodenafil
CAS No. N/A
C19H23ClN4O3 M.W. 390.87
S-0634



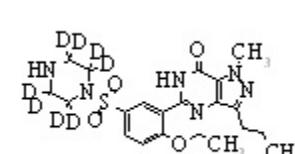
Cyclopentynafil
CAS No. N/A
C26H36N6O4S M.W. 528.68
S-0636



Dimethylacetildenafil
CAS No. N/A
C25H34N6O3 M.W. 466.59
S-0638

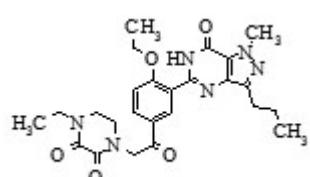


N-Desmethyl sildenafil-d8
CAS No. 1185168-06-2
C21H20N6O4SD8 M.W. 468.61
S-064

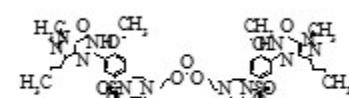


Dioxohongdenafil

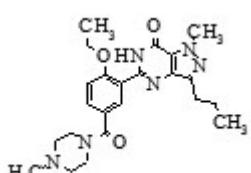
CAS No. N/A
C25H30N6O5 M.W. 494.56
S-0640

**Lodenafilcarbonate**

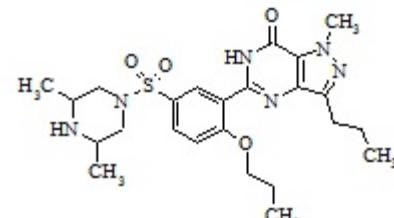
CAS No. N/A
C47H62N12O11S2 M.W. 1035.22
S-0641

**Desmethyl Carbodenafil**

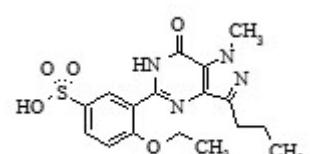
C23H30N6O3 M.W. 438.53
S-0642

**Sildenafil analogue**

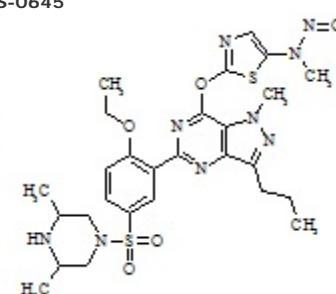
C24H34N6O4S M.W. 502.64
S-0643

**Demethylpiperazinyl Sildenafil Sulfonic Acid**

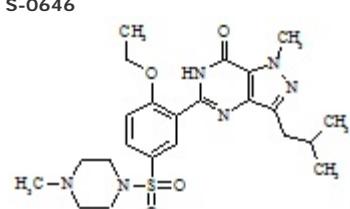
C17H20N4O5S M.W. 392.44
S-0644

**Nitroso-prodenafil**

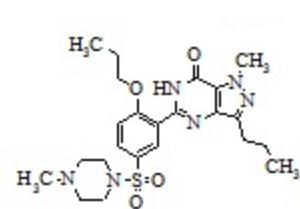
CAS No. N/A
C27H35N9O5S2 M.W. 629.77
S-0645

**Sildenafil Impurity A (Isobutyl Sildenafil)**

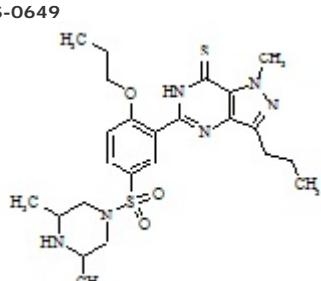
CAS No. 1391053-95-4
C23H32N6O4S M.W. 488.61
S-0646

**Propoxyphenyl Sildenafil**

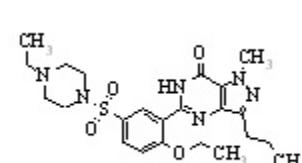
CAS No. 877777-10-1
C23H32N6O4S M.W. 488.61
S-0648

**Sildenafil Analogue III**

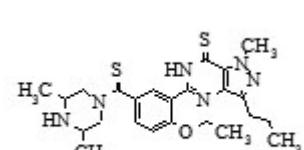
CAS No. N/A
C24H34N6O3S2 M.W. 518.70
S-0649

**Homosildenafil**

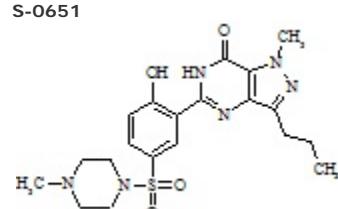
CAS No. 642928-07-2
C23H32N6O4S M.W. 488.61
S-065

**Sildenafil Related Compound**

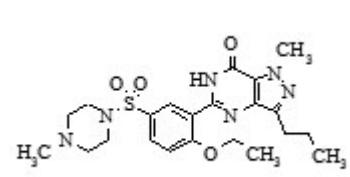
C24H32N6O5S2 M.W. 484.69
S-0650

**O-Desethyl Sildenafil (Sildenafil Impurity C)**

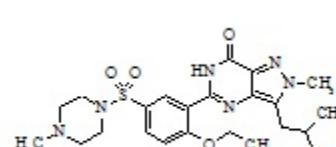
CAS No. N/A
C20H26N6O4S M.W. 446.53
S-0651

**Sildenafil**

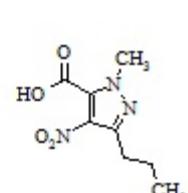
C22H30N6O4S M.W. 474.59
S-0652

**Sildenafil Impurity A Related Compound (Isomer of Isobutyl Sildenafil)**

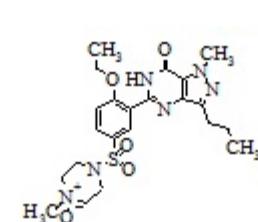
C23H32N6O4S M.W. 488.61
S-0653

**Sildenafil Impurity ((1-methyl-4-Nitro -3-n-propyl pyrazole-5- carboxylic acid)**

C8H11N3O4 M.W. 213.19
S-0654

**Sildenafil N-Oxide**

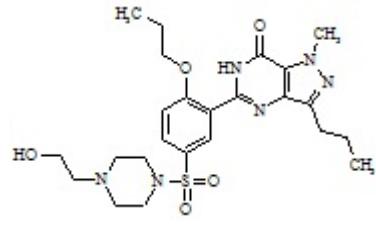
C22H30N6O5S M.W. 490.59
S-0655



Propoxyphenyl-Hydroxyhomosildenafil

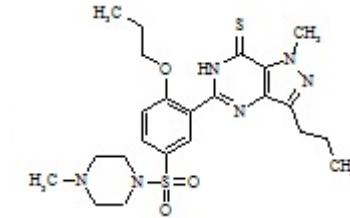
CAS No. N/A
C24H34N6O5S M.W. 518.64

S-0656

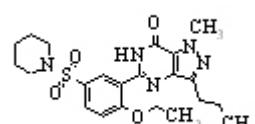
**Propoxyphenyl-Thiosildenafil**

CAS No. N/A
C23H32N6O3S2 M.W. 504.68

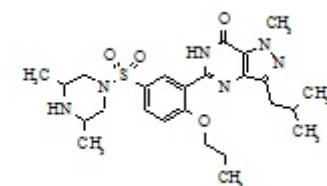
S-0658

**Norneosildenafil**

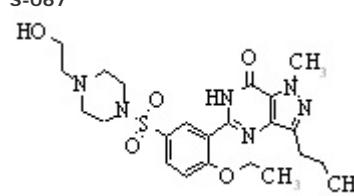
C22H29N5O4S M.W. 459.57
S-066

**Sildenafil Related Compound 2**
C25H36N6O4S M.W. 516.67

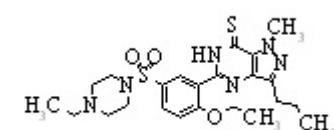
S-0661

**Hydroxyhomosildenafil**
C23H32N6O5S M.W. 504.61

S-067

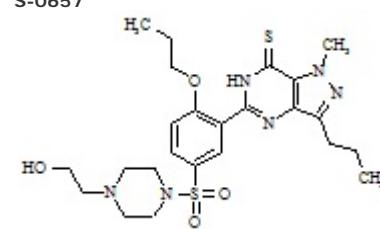
**Thiohomosildenafil**

C23H32N6O3S2 M.W. 504.68
S-069

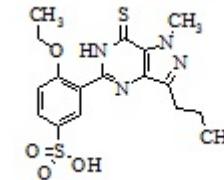
**Sildenafil Analogue I (Propoxyphenyl-Thiohydroxyhomosildenafil)**

CAS No. 479073-90-0
C24H34N6O4S2 M.W. 534.70

S-0657

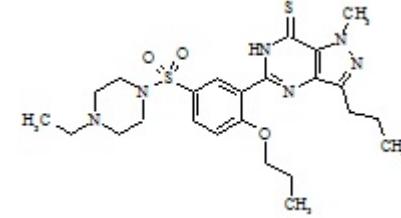
**Depiperazinothiosildenafil**

C17H20N4O4S2 M.W. 408.50
S-0659

**Propoxyphenyl Thiohomosildenafil**

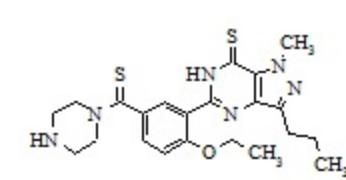
CAS No. 479073-88-6
C24H34N6O3S2 M.W. 518.70

S-0660

**Dithio-Desethyl-Carbodenafil**

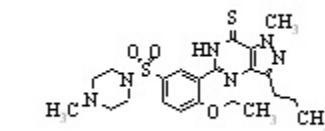
CAS No. N/A
C22H28N6O5S2 M.W. 456.64

S-0662

**Thiosildenafil**

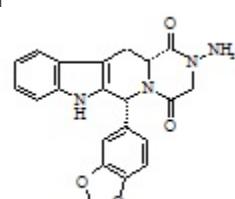
CAS No. 479073-79-5
C22H30N6O3S2 M.W. 490.65

S-068

**Tadalafil Related Compounds (commercial standards available) – includes deuterated standards.****Aminotadalafil**

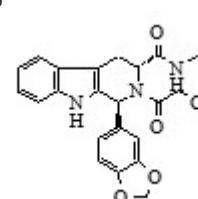
CAS No. 385769-84-6
C21H18N4O4 M.W. 390.40

T-101

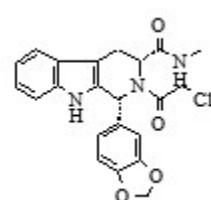
**Tadalafil Impurity C**

CAS No. NA
C22H20C1N3O4 M.W. 425.88

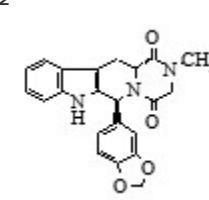
T-1010

**Tadalafil Impurity D**

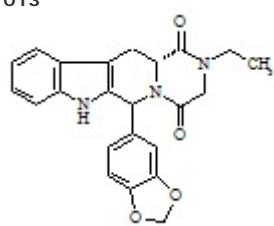
CAS No. NA
C22H20C1N3O4 M.W. 425.88
T-1011

**Tadalafil Impurity E (6S, 12R)**

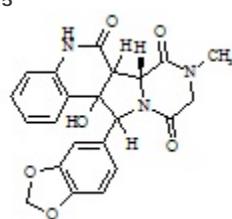
CAS No. 171596-28-4
C22H19N3O4 M.W. 389.41
T-1012



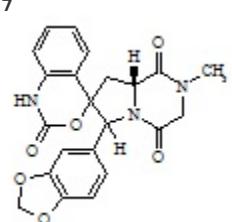
N-Ethyl Tadalafil
CAS No. N/A
C23H21N3O4 M.W. 403.44
T-1013



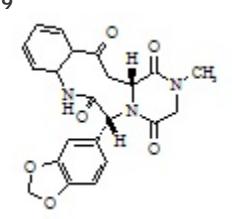
Tadalafil Hydroxylactam Impurity
C22H19N3O6 M.W. 421.41
T-1015



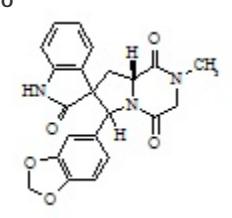
Tadalafil Spiro-urethane Impurity
C22H19N3O6 M.W. 421.41
T-1017



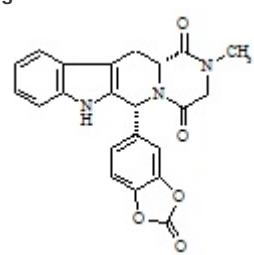
Tadalafil Ketolactam Impurity
CAS No. 1346605-38-6
C22H19N3O6 M.W. 421.41
T-1019



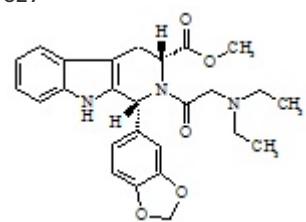
Tadalafil Spiro-oxindole Impurity
C22H19N3O5 M.W. 405.41
T-1020



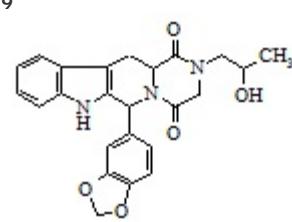
Tadalafil Oxo Impurity
CAS No. 1346602-17-2
C22H17N3O5 M.W. 403.40
T-1023



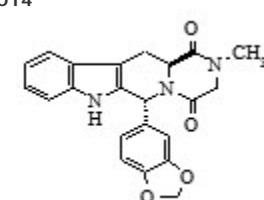
Tadalafil Related Compound
CAS No. N/A
C26H29N3O5 M.W. 463.54
T-1027



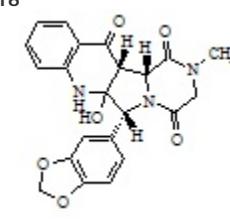
2-Hydroxypropyltadalafil
C24H23N3O5 M.W. 433.47
T-1029



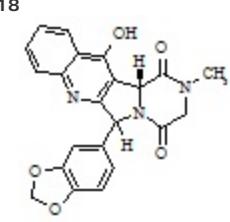
6R,12S-Tadalafil
CAS No. 171596-27-3
C22H19N3O4 M.W. 389.41
T-1014



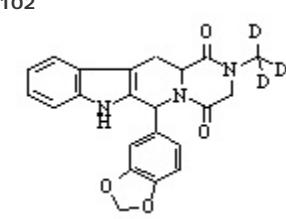
Tadalafil Aminohemiketal Impurity
C22H19N3O6 M.W. 421.41
T-1016



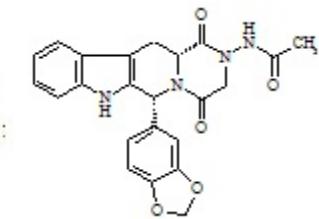
Tadalafil Hydroxyquinoline Impurity
C22H17N3O5 M.W. 403.40
T-1018



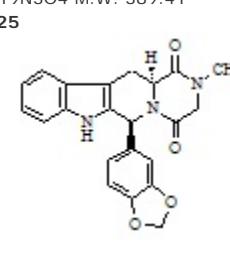
Tadalafil-d3
CAS No. 960226-55-5
C22H16N3O4D3 M.W. 392.43
T-102



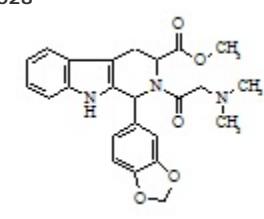
Acetaminotadalafil
CAS No. N/A
C23H20N4O5 M.W. 432.44
T-1022



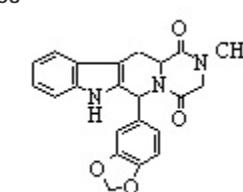
Tadalafil EP Impurity B (ent-tadalafil)
CAS No. 629652-72-8
C22H19N3O4 M.W. 389.41
T-1025



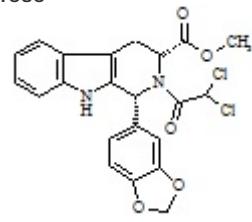
Tadalafil Related Compound 2
C24H25N3O5 M.W. 435.48
T-1028



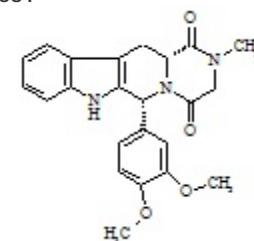
Tadalafil
CAS No. 171596-29-5
C22H19N3O4 M.W. 389.41
T-103



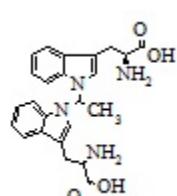
Tadalafil Dichloro Impurity
CAS No. N/A
C22H18Cl₂N₂O₅ M.W. 461.31
T-1030



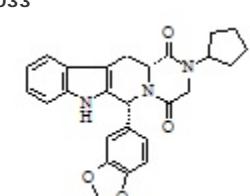
Tadalafil Dimethoxy Impurity
CAS No. 1356345-67-9
C23H23N₃O₄ M.W. 405.46
T-1031



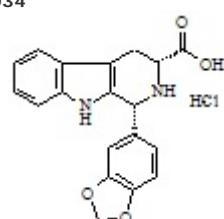
Tadalafil Impurity (1,1'-Ethylidenebistryptophan)
C24H26N₄O₄ M.W. 434.50
T-1032



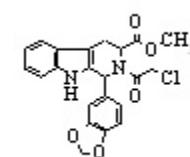
Tadalafil Related Impurity 1
CAS No. N/A
C26H25N₃O₄ M.W. 443.51
T-1033



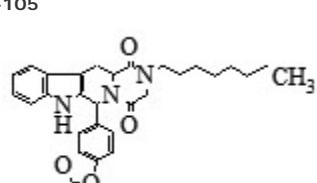
Tadalafil Acid Impurity
CAS No. N/A
C19H16N₂O₄ HCl M.W. 336.35 36.46
T-1034



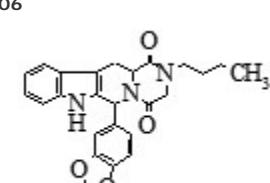
Chloropretadalafil
C22H19ClN₂O₅ M.W. 426.86
T-104



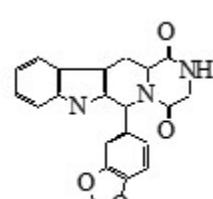
N-Octyl-nortadalafil
C29H33N₃O₄ M.W. 487.60
T-105



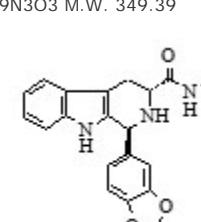
N-Butyl Tadalafil
C25H25N₃O₄ M.W. 431.50
T-106



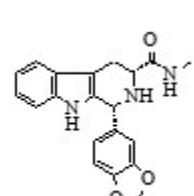
Nortadalafil
C21H17N₃O₄ M.W. 375.39
T-107



Tadalafil Impurity A
CAS No. NA
C20H19N₃O₃ M.W. 349.39
T-108

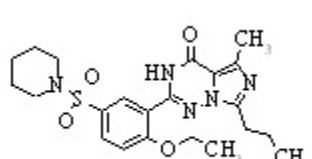


Tadalafil Impurity B
CAS No. NA
C20H19N₃O₃ M.W. 349.39
T-109

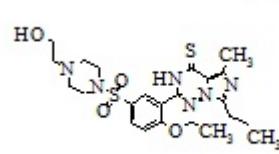


Vardenafil Related Compounds (commercial standards available) – includes deuterated standards.

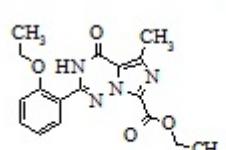
Pseudovardenafil
CAS No. 224788-34-5
C22H29N₅O₄S M.W. 459.57
V-051



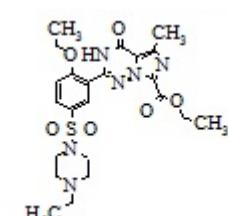
Hydroxythio Vardenafil
C23H32N₆O₄S₂ M.W. 520.68
V-0510



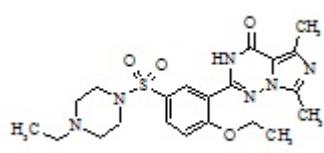
Vardenafil Impurity 1
CAS No. 1417529-67-9
C17H18N₄O₄ M.W. 342.36
V-0511



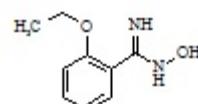
Vardenafil Impurity 2
CAS No. 1417529-69-1
C23H30N₆O₆S M.W. 518.60
V-0512



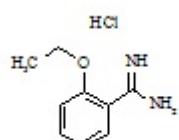
Vardenafil Impurity 3
C21H28N6O4S M.W. 460.56
V-0513



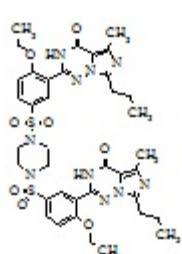
Vardenafil Impurity (2-Ethoxy-N-Hydroxy Benzamidine)
CAS No. 879-57-2
C9H12N2O2 M.W. 180.21
V-0514



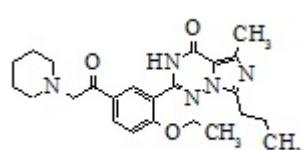
Vardenafil Impurity (2-Ethoxy Benzamidine Hydrochloride)
CAS No. 18637-00-8
C9H12N2O HCl M.W. 164.21 36.46
V-0515



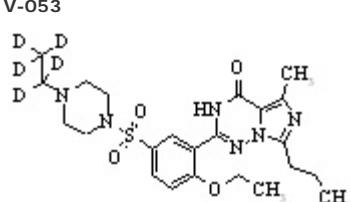
Vardenafil Dimer
C38H46N10O8S2 M.W. 834.98
V-0517



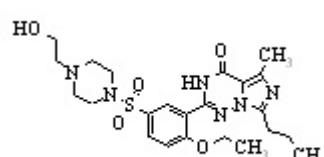
Vardenafil Acetyl Analogue
CAS No. N/A
C24H31N5O3 M.W. 437.55
V-0519



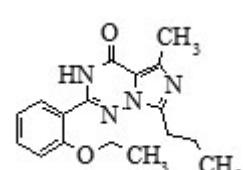
Vardenafil-d5
C23H27N6O4SD5 M.W. 493.64
V-053



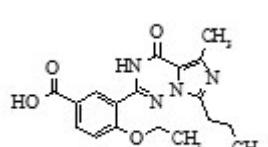
Hydroxy Vardenafil
C23H32N6O5S M.W. 504.61
V-055



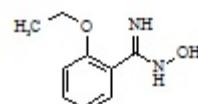
2-(2-Ethoxyphenyl)-5-methyl-7-propyl-3H-imidazo[5,1-f][1,2,4]triazin-4-one
C17H20N4O2 M.W. 312.37
V-057



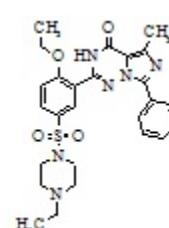
Norneovardenafil
CAS No. N/A
C18H20N4O4 M.W. 356.38
V-059



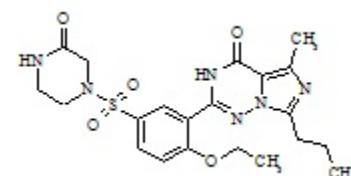
Vardenafil Impurity (2-Ethoxy-N-Hydroxy Benzamidine)
CAS No. 879-57-2
C9H12N2O2 M.W. 180.21
V-0514



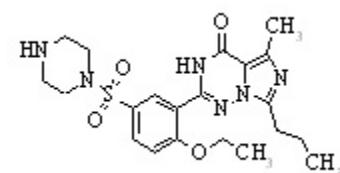
Vardenafil Benzoyl Impurity
C26H30N6O4S M.W. 522.63
V-0516



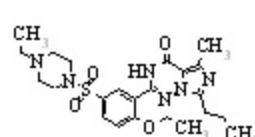
Vardenafil Oxopiperazine
C21H26N6O5S M.W. 474.54
V-0518



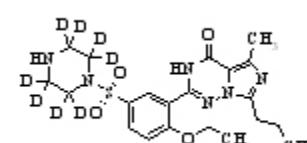
N-Desethyl Vardenafil
CAS No. 448184-46-1
C21H28N6O4S M.W. 460.56
V-052



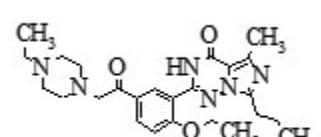
Vardenafil HCl
CAS No. 224785-90-4
C23H32N6O4S M.W. 488.61
V-054



N-Desethyl Vardenafil-d8
CAS No. 448184-46-1 (Unlabelled)
C21H28N6O4S M.W. 460.56
V-056

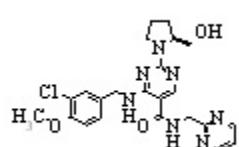


Acetylvardenafil
C25H34N6O3 M.W. 466.59
V-058

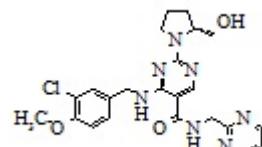


Avanafil Related Compounds (commercial standards available) – includes deuterated standards.

Avanafil
CAS No. 330784-47-9
C23H26CIN7O3 M.W. 483.96
A-291

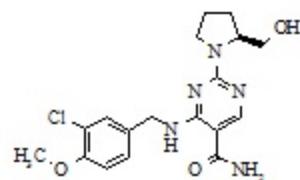


Avanafil Impurity 8 (R-Avanafil)
CAS No. N/A
C22H26CIN7O3 M.W. 483.96
A-2910

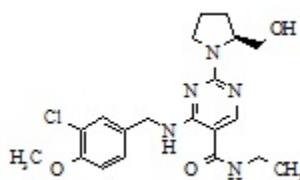


Avanafil Impurity 9
C18H17CIN6O3 M.W. 400.83
A-2911

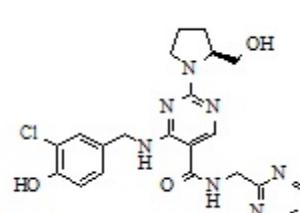
Avanafil impurity 1
C18H22CIN5O3 M.W. 391.86
A-293



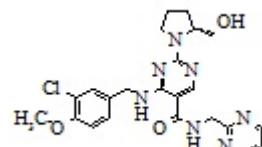
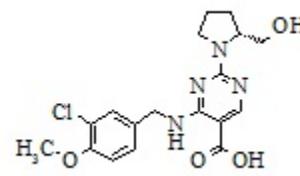
Avanafil impurity 3
C20H26CIN5O3 M.W. 419.91
A-295



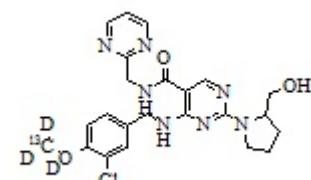
Avanafil impurity 5
C22H24CIN7O3 M.W. 469.93
A-297



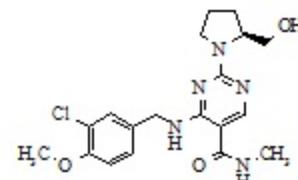
Avanafil Impurity 7
CAS No. N/A
C18H21CIN4O4 M.W. 392.85
A-299



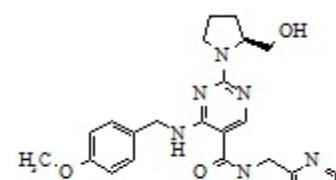
Avanafil-13CD3
C22H23CIN7O313CD3 M.W. 487.97
A-292



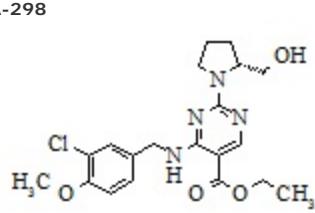
Avanafil impurity 2
C19H24CIN5O3 M.W. 405.89
A-294



Avanafil impurity 4
C23H27N7O3 M.W. 449.52
A-296

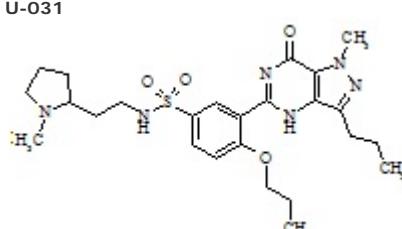


Avanafil Impurity 6
CAS No. N/A
C20H25CIN4O4 M.W. 420.90
A-298

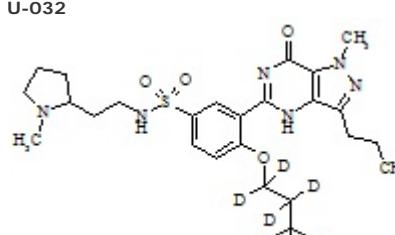


Udenafil Related Compounds (commercial standards available) – includes deuterated standards.

Udenafil
CAS No. 268203-93-6
C25H36N6O4S M.W. 516.67
U-031



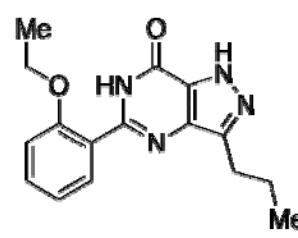
Udenafil-d7
CAS No. N/A
C25H29N6O4SD7 M.W. 523.71
U-032



3. Standards available from Toronto Research Chemicals <http://www.trc-canada.com/> which include the majority of characterized PDE-5i analogues and all of the parent drugs including catalog numbers. (Some structure images not available)
NOTE: Includes some compounds that are discontinued from TRC.

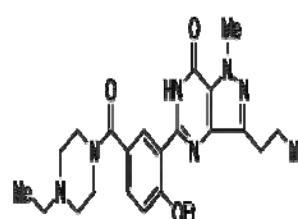
Sildenafil Related Compounds (commercial standards available) – includes deuterated standards.

 Click on image to enlarge	<p>Catalogue #: D476330 Chemical Name: 2,4-Dimethyl-5-oxazolecarboxylic Acid CAS Number: 2510-37-4 Mol. Formula: C6H7NO3 Synonyms: 2,4-Dimethyl-1,3-oxazole-5-carboxylic Acid; 2,4-Dimethyloxazole-5-carboxylic Acid; 5-Carboxy-2,4-dimethyloxazole</p>
 Click on image to enlarge	<p>Catalogue #: D479775 Chemical Name: Dinitrodenafil CAS Number: Mol. Formula: C17H18N6O6 Synonyms: 5-(2-Ethoxy-3,5-dinitrophenyl)-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one;</p>
 Click on image to enlarge	<p>Catalogue #: E891000 Chemical Name: 4-(2-Ethoxybenzamido)-1-methyl-3-n-propylpyrazole-5-carboxamide CAS Number: 139756-03-9 Mol. Formula: C17H22N4O3 Synonyms: 4-[(2-Ethoxybenzoyl)amino]-1-methyl-3-propyl-1H-pyrazole-5-carboxamide;</p>
 Click on image to enlarge	<p>Catalogue #: E891010 Chemical Name: 4-[(2-Ethoxybenzoyl)amino]-1-methyl-5-propyl-1H-pyrazole-3-carboxamide CAS Number: 501120-38-3 Mol. Formula: C17H22N4O3 Synonyms: 4-(2-Ethoxybenzamido)-1-methyl-5-propyl-1H-pyrazole-3-carboxamide</p>
 Click on image to enlarge	<p>Catalogue #: E892530 Chemical Name: 5-[2-Ethoxy-5-[(4-methyl-1-piperazinyl)thioxomethyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidine-7-thione CAS Number: 1333233-46-7 Mol. Formula: C23H30N6OS2 Synonyms: 5-[2-Ethoxy-5-[(4-methyl-1-piperazinyl)thioxomethyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-Pyrazolo[4,3-d]pyrimidine-7-thione; Dithiodesmethylcarbodenafil</p>
 Click on image to enlarge	<p>Catalogue #: E892710 Chemical Name: 5-(2-Ethoxyphenyl)-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidine-7-thione CAS Number: 479074-06-1 Mol. Formula: C17H20N4OS Synonyms: 5-(2-Ethoxyphenyl)-1,4-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidine-7-thione</p>
 Click on image to enlarge	<p>Catalogue #: E892725 Chemical Name: 5-(2-Ethoxyphenyl)-1-methyl-3-n-propyl-1,6-dihydro-7H-pyrazolo[4,3-d]pyrimidin-7-one CAS Number: 139756-21-1 Mol. Formula: C17H20N4O2 Synonyms: UK 088800; "Imidazosagatiazinone"</p>
 Click on image to enlarge	<p>Catalogue #: E892730 Chemical Name: 5-(2-Ethoxyphenyl)-2,6-dihydro-2-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one CAS Number: 501120-40-7 Mol. Formula: C17H20N4O2 Synonyms:</p>



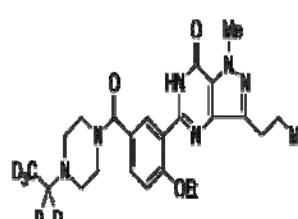
Catalogue #: E892765
Chemical Name: 5-(2-Ethoxyphenyl)-3-propyl-1,6-dihydro-7H-pyrazolo[4,3-d]pyrimidin-7-one
CAS Number: 139756-30-2
Mol. Formula: C16H18N4O2
Synonyms: 5-(2-Ethoxyphenyl)-1,6-dihydro-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one; Des(4-methylpiperazin-1-ylsulfonyl) Desmethylsildenafil

[Click on image to enlarge](#)



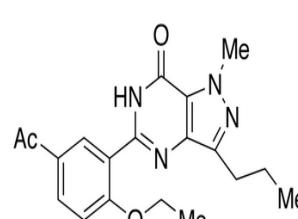
Catalogue #: F685400
Chemical Name: Fondenafil
CAS Number: 944241-52-5
Mol. Formula: C24H32N6O3
Synonyms: 5-[2-Ethoxy-5-[(4-ethyl-1-piperazinyl)carbonyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one; Carbodenafil;

[Click on image to enlarge](#)



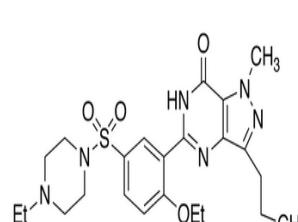
Catalogue #: F685402
Chemical Name: Fondenafil-d5
CAS Number:
Mol. Formula: C24H27D5N6O3
Synonyms: 5-[2-Ethoxy-5-[(4-ethyl-d5-1-piperazinyl)carbonyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one;

[Click on image to enlarge](#)



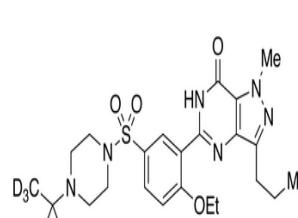
Catalogue #: G349960
Chemical Name: Gendenafil
CAS Number: 147676-66-2
Mol. Formula: C19H22N4O3
Synonyms: 5-(5-Acetyl-2-ethoxyphenyl)-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one; 5-(5-Acetyl-2-ethoxyphenyl)-1-methyl-3-propyl-1,6-dihydro-7H-pyrazolo[4,3-d]pyrimidin-7-one

[Click on image to enlarge](#)



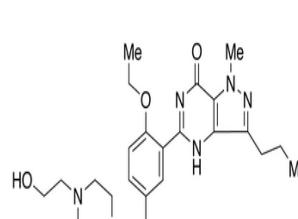
Catalogue #: H615150
Chemical Name: Homo Sildenafil
CAS Number: 642928-07-2
Mol. Formula: C23H32N6O4S
Synonyms: 5-[2-Ethoxy-5-[(4-ethyl-1-piperazinyl)sulfonyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one;

[Click on image to enlarge](#)



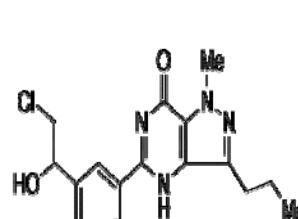
Catalogue #: H615152
Chemical Name: Homo Sildenafil-d5
CAS Number:
Mol. Formula: C23H27D5N6O4S
Synonyms: 5-[2-Ethoxy-5-[(4-(ethyl-d5)-1-piperazinyl)sulfonyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one;

[Click on image to enlarge](#)



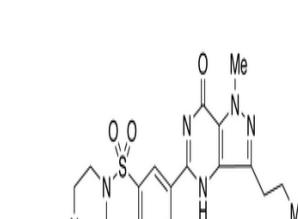
Chemical Name: Hydroxy Acetildenafil
CAS Number: 147676-56-0
Mol. Formula: C25H34N6O4
Synonyms: 5-[2-Ethoxy-5-[2-[4-(2-hydroxyethyl)-1-piperazinyl]acetyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one; Hydroxyhongdenafil;

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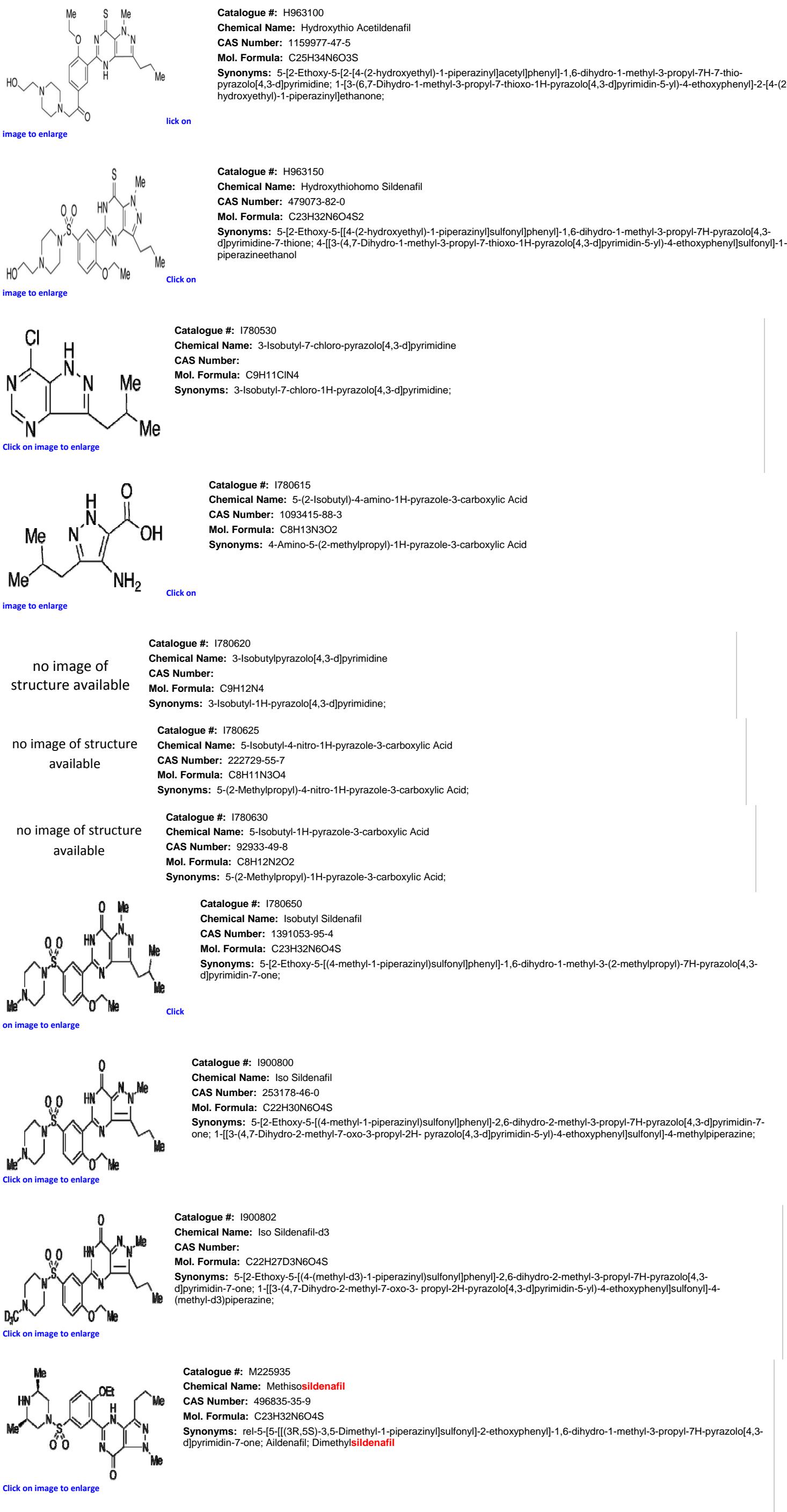
Catalogue #: H825115
Chemical Name: Hydroxy Chlorodenafil
CAS Number: 1391054-00-4
Mol. Formula: C19H23ClN4O3
Synonyms: 5-[5-(2-Chloro-1-hydroxyethyl)-2-ethoxyphenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one

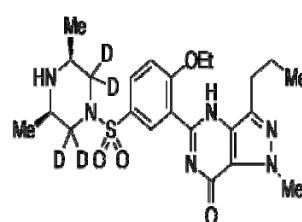
[Click on image to enlarge](#)



Catalogue #: H942840
Chemical Name: Hydroxyhomosildenafil
CAS Number: 139755-85-4
Mol. Formula: C23H32N6O5S
Synonyms: 5-[2-Ethoxy-5-[[4-(2-hydroxyethyl)-1-piperazinyl]sulfonyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one; Lodenafil

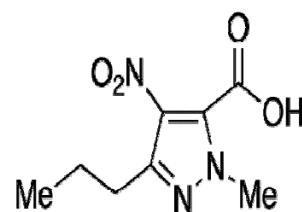
[Click on image to enlarge](#)





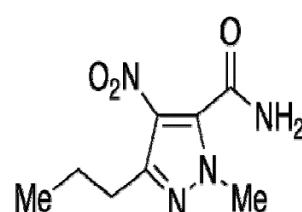
Catalogue #: M225937
Chemical Name: Methiso**sildenafil**-d4
CAS Number:
Mol. Formula: C23H28D4N6O4S
Synonyms: rel-5-[5-[(3R,5S)-3,5-Dimethyl-1-piperazinyl-d4]sulfonyl]-2-ethoxyphenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one; Aildenafil-d4;

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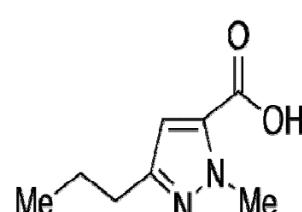
Catalogue #: M320530
Chemical Name: 1-Methyl-4-nitro-3-propyl-1H-pyrazole-5-carboxylic Acid
CAS Number: 139756-00-6
Mol. Formula: C8H11N3O4
Synonyms: 1-Methyl-4-nitro-3-propylpyrazole-5-carboxylic Acid

[Click on image to enlarge](#)



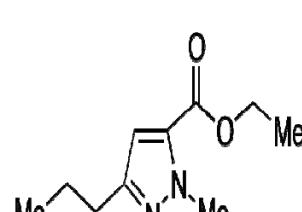
Catalogue #: M320535
Chemical Name: 1-Methyl-4-nitro-3-propylpyrazole-5-carboxamide
CAS Number: 139756-01-7
Mol. Formula: C8H12N4O3
Synonyms: 1-Methyl-4-nitro-3-propyl-1H-pyrazole-5-carboxamide

[Click on image to enlarge](#)



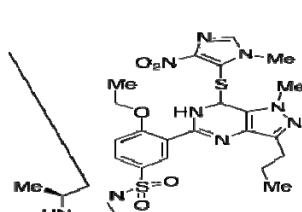
Catalogue #: M320655
Chemical Name: 1-Methyl-3-propyl-1H-pyrazole-5-carboxylic Acid
CAS Number: 139755-99-0
Mol. Formula: C8H12N2O2
Synonyms: 1-Methyl-3-propylpyrazole-5-carboxylic Acid; 2-Methyl-5-propyl-2H-pyrazole-3-carboxylic Acid

[Click on image to enlarge](#)



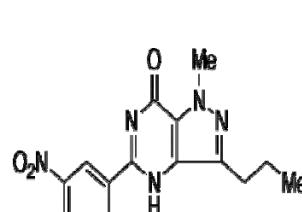
Catalogue #: M320775
Chemical Name: 1-Methyl-3-propyl-1H-pyrazole-5-carboxylic Acid Ethyl Ester
CAS Number: 133261-07-1
Mol. Formula: C10H16N2O2
Synonyms: 1-Methyl-3-propylpyrazole-5-carboxylic Acid Ethyl Ester; Ethyl 1-Methyl-3-propyl-1H-pyrazole-5-carboxylate; Ethyl 1-Methyl-3-propylpyrazole-5-carboxylate

[Click on image to enlarge](#)



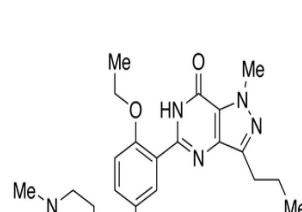
Catalogue #: M820000
Chemical Name: Mutaprodenafil
CAS Number: 138577-30-1
Mol. Formula: C27H37N9O5S2
Synonyms: rel-5-[5-[(3R,5S)-3,5-dimethyl-1-piperazinyl]sulfonyl]-2-ethoxyphenyl]-1-methyl-7-[(1-methyl-4-nitro-1H-imidazol-5-yl)thio]-3-propyl-1H-pyrazolo[4,3-d]pyrimidine

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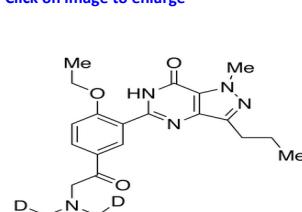
Catalogue #: N493770
Chemical Name: Nitrodenafil
CAS Number: 147676-99-1
Mol. Formula: C17H19N5O4
Synonyms: 5-(2-Ethoxy-5-nitrophenoxy)-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one;

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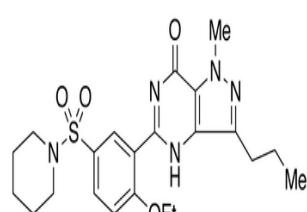
Catalogue #: N660500
Chemical Name: Nor Acetildenafil
CAS Number: 949091-38-7
Mol. Formula: C24H32N6O3
Synonyms: 5-[2-Ethoxy-5-[2-(4-methyl-1-piperazinyl)acetyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one;

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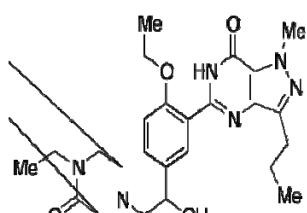
Catalogue #: N660502
Chemical Name: Nor Acetildenafil-d8
CAS Number: 1185117-07-0
Mol. Formula: C24H24D8N6O3
Synonyms: 5-[2-Ethoxy-5-[2-(4-methyl-1-piperazinyl-d8)acetyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one;

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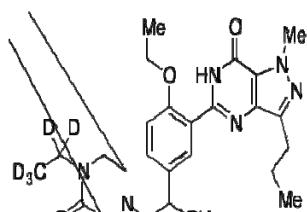
Catalogue #: N824300
Chemical Name: Norneo Sildenafil
CAS Number: 371959-09-0
Mol. Formula: C22H29N5O4S
Synonyms: 5-[2-Ethoxy-5-(1-piperidinylsulfonyl)phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one; 1-[[3-(4,7-Dihydro-1-methyl-7-oxo-3-propyl-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxyphenyl]sulfonyl]piperidine;

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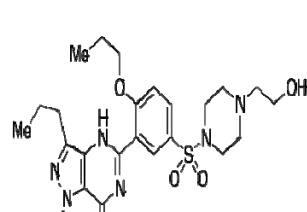
Catalogue #: P480470
Chemical Name: Piperazonifil
CAS Number: 1335201-04-1
Mol. Formula: C25H34N6O4
Synonyms: 5-[2-Ethoxy-5-[2-(4-ethyl-3-oxo-1-piperazinyl)-1-hydroxyethyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one;

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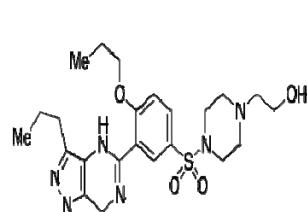
Catalogue #: P480472
Chemical Name: Piperazonifil-d5
CAS Number:
Mol. Formula: C25H29D5N6O4
Synonyms: 5-[2-Ethoxy-5-[2-(4-ethyl-3-oxo-1-piperazinyl)-1-hydroxyethyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one-d5

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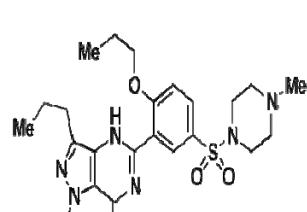
Catalogue #: P831600
Chemical Name: Propoxyphenyl Homohydroxysildenafil
CAS Number: 139755-87-6
Mol. Formula: C24H34N6O5S
Synonyms: 5-[5-[4-(2-Hydroxyethyl)piperazinylsulfonyl]-2-propoxyphenyl]-1-methyl-3-propyl-1,6-dihydro-7H-pyrazolo[4,3-d]pyrimidin-7-one; 4-[[3-(4,7-dihydro-1-methyl-7-oxo-3-propyl-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-propoxyphenyl]sulfonyl]-1-Piperazineethanol

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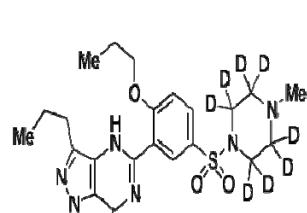
Catalogue #: P831630
Chemical Name: Propoxyphenyl-thiohydroxyhomosildenafil
CAS Number: 479073-90-0
Mol. Formula: C24H34N6O4S2
Synonyms: 1,6-dihydro-5-[5-[4-(2-hydroxyethyl)-1-piperazinylsulfonyl]-2-propoxyphenyl]-1-methyl-3-propyl-7H-Pyrazolo[4,3-d]pyrimidine-7-thione; 4-[[3-(4,7-dihydro-1-methyl-3-propyl-7-thioxo-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-propoxyphenyl]sulfonyl]-1-Piperazineethanol; 5-(5-((4-(2-hydroxyethyl)piperazin-1-yl)sulfonyl)-2-propoxyphenyl)-1-methyl-3-propyl-1H-pyrazolo[4,3-d]pyrimidine-7(4H)-thione

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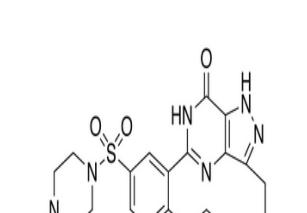
Catalogue #: P831635
Chemical Name: Propoxyphenyl Thiosildenafil
CAS Number: 479073-87-5
Mol. Formula: C23H32N6O3S2
Synonyms: 1,6-Dihydro-1-methyl-5-[5-[(4-methyl-1-piperazinyl)sulfonyl]-2-propoxyphenyl]-3-propyl-7H-pyrazolo[4,3-d]pyrimidine-7-thione; 1-[[3-(4,7-Dihydro-1-methyl-3-propyl-7-thioxo-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-propoxyphenyl]sulfonyl]-4-methyl-piperazine; rel-5-[5-[(3R,5S)-3,5-Dimethyl-1-piperazinyl]sulfonyl]-2-propoxyphenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidine-7-thione

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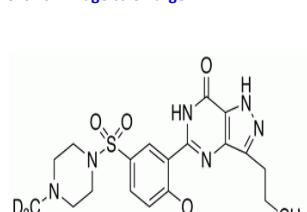
Catalogue #: P831637
Chemical Name: Propoxyphenyl-thiosildenafil-d8
CAS Number:
Mol. Formula: C23H24D8N6O3S2
Synonyms: 1,6-Dihydro-1-methyl-5-[5-[(4-methyl-1-piperazinyl)sulfonyl]-2-propoxyphenyl]-3-propyl-7H-pyrazolo[4,3-d]pyrimidine-7-thione-d8; 1-[[3-(4,7-Dihydro-1-methyl-3-propyl-7-thioxo-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-propoxyphenyl]sulfonyl]-4-methyl-piperazine-d8; rel-5-[5-[(3R,5S)-3,5-Dimethyl-1-piperazinyl]sulfonyl]-2-propoxyphenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidine-7-thione-d8

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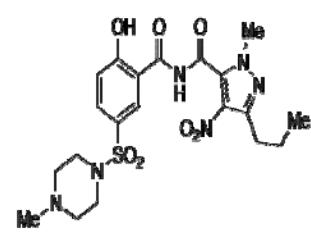
Catalogue #: P842800
Chemical Name: Pyrazole N-Demethyl Sildenafil
CAS Number: 139755-95-6
Mol. Formula: C21H28N6O4S
Synonyms: 1-[[3-(4,7-Dihydroxy-7-oxo-3-propyl-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxyphenyl]sulfonyl]-4-methyl-piperazine; Desmethylsildenafil;

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Catalogue #: P842802
Chemical Name: Pyrazole N-Demethyl Sildenafil-d3
CAS Number:
Mol. Formula: C21H25D3N6O4S
Synonyms: 1-[[3-(4,7-Dihydroxy-7-oxo-3-propyl-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxyphenyl]sulfonyl]-4-(methyl-d3)piperazine; Desmethylsildenafil-d3;

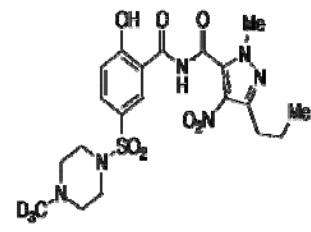
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Catalogue #: P846500
Chemical Name: Pyrazolosalicyloyl Imide
CAS Number:
Mol. Formula: C₂₀H₂₆N₆O₇
Synonyms: N-[2-Hydroxy-5-[(4-methyl-1-piperazinyl)sulfonyl]benzoyl]-1-methyl-4-nitro-3-n-propyl-1H-pyrazol-5-carboxamide; Pyrazolosalicylimide

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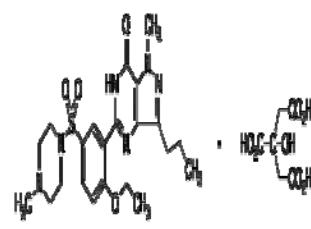
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Catalogue #: P846502
Chemical Name: Pyrazolosalicyloyl Imide-d3
CAS Number:
Mol. Formula: C₂₀H₂₃D₃N₆O₇
Synonyms: N-[2-Hydroxy-5-[(4-methyl-1-piperazinyl)sulfonyl]benzoyl]-1-methyl-4-nitro-3-n-propyl-1H-pyrazol-5-carboxamide-d3; Pyrazolosalicylimide-d3

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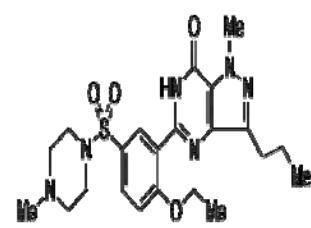
[image to enlarge](#)



Catalogue #: S435000
Chemical Name: Sildenafil Citrate
CAS Number: 171599-83-0
Mol. Formula: C₂₈H₃₈N₆O₁₁S
Synonyms: 1-[[3-(4,7-Dihydro-1-methyl-7-oxo-3-propyl-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxyphenyl]sulfonyl]-4-methylpiperazine Citrate;

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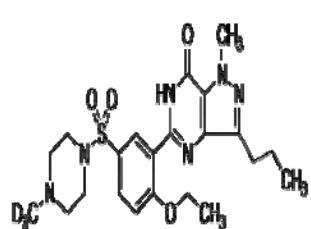
[image to enlarge](#)



Catalogue #: S435001
Chemical Name: Sildenafil
CAS Number: 139755-83-2
Mol. Formula: C₂₂H₃₀N₆O₄S
Synonyms: 1-[[3-(4,7-Dihydro-1-methyl-7-oxo-3-propyl-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxyphenyl]sulfonyl]-4-methylpiperazine; 5-[2-Ethoxy-5-[(4-methyl-1-piperazinyl)sulfonyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one;

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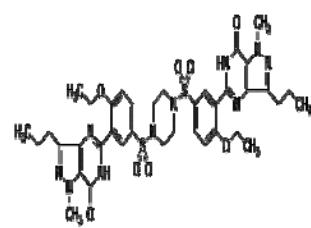


Catalogue #: S435002
Chemical Name: Sildenafil-d3
CAS Number: 1126745-90-1
Mol. Formula: C₂₂H₂₇D₃N₆O₄S
Synonyms: 1-[[3-(4,7-Dihydro-1-methyl-7-oxo-3-propyl-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxyphenyl]sulfonyl]-4-methylpiperazine-d3; 5-[2-Ethoxy-5-[(4-(methyl-d3)-1-piperazinyl)sulfonyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one;

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no image of structure available

Catalogue #: S435003
Chemical Name: Sildenafil-d8
CAS Number: 951385-68-5
Mol. Formula: C₂₂H₂₂D₈N₆O₄S
Synonyms: 5-[2-Ethoxy-5-[(4-methyl-1-piperazinyl-2,2,3,3,5,5,6,6-d8)sulfonyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one; BDD 10402;



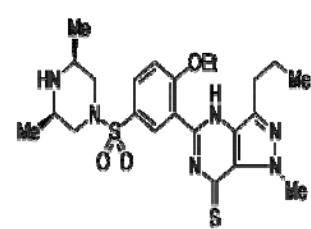
Catalogue #: S435020
Chemical Name: Sildenafil Dimer Impurity
CAS Number:
Mol. Formula: C₃₈H₄₆N₁₀O₈S₂
Synonyms:

[Click](#)

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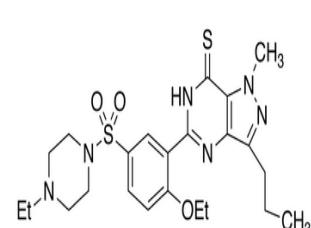
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Catalogue #: S435035
Chemical Name: Sildenafil N-Oxide
CAS Number: 1094598-75-0
Mol. Formula: C₂₂H₃₀N₆O₅S
Synonyms: 5-[2-Ethoxy-5-[(4-methyl-4-oxido-1-piperazinyl)sulfonyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one;



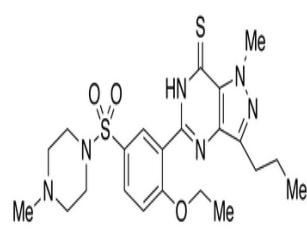
Catalogue #: T344365
Chemical Name: Thioalildenafil
CAS Number: 856190-47-1
Mol. Formula: C₂₃H₃₂N₆O₃S₂
Synonyms: (3R,5S)-rel-1-[[3-(4,7-Dihydro-1-methyl-3-propyl-7-thioxo-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxyphenyl]sulfonyl]-3,5-dimethyl-piperazine; Sulfoalildenafil;

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Catalogue #: T344470
Chemical Name: Thiomoho Sildenafil
CAS Number: 479073-80-8
Mol. Formula: C₂₃H₃₂N₆O₃S₂
Synonyms: 5-[2-Ethoxy-5-[(4-ethyl-1-piperazinyl)sulfonyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidine-7-thione; 1-[[3-(4,7-Dihydro-1-methyl-3-propyl-7-thioxo-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxyphenyl]sulfonyl]-4-ethyl-piperazine

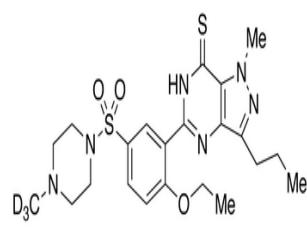
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Catalogue #: T371500
Chemical Name: Thiosildenafil
CAS Number: 479073-79-5
Mol. Formula: C₂₂H₃₀N₆O₃S₂
Synonyms: 5-[2-Ethoxy-5-[(4-methyl-1-piperazinyl)sulfonyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidine-7-thione; 1-[[3-(4,7-Dihydro-1-methyl-3-propyl-7-thioxo-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxyphenyl]sulfonyl]-4-methylpiperazine;

[enlarge](#)

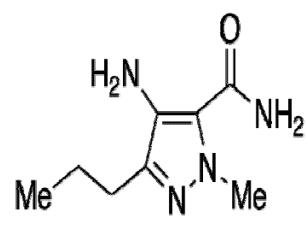
[Click on image to](#)



Catalogue #: T371502
Chemical Name: Thiosildenafil-d3
CAS Number:
Mol. Formula: C₂₂H₂₇D₃N₆O₃S₂
Synonyms: 5-[2-Ethoxy-5-[(4-(methyl-d₃)-1-piperazinyl)sulfonyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidine-7-thione; 1-[[3-(4,7-Dihydro-1-methyl-3-propyl-7-thioxo-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxyphenyl]sulfonyl]-4-(methyl-d₃)piperazine;

[enlarge](#)

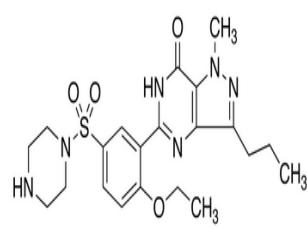
[Click on image to](#)



Catalogue #: A617415
Chemical Name: 4-Amino-1-methyl-3-propyl-1H-pyrazole-5-carboxamide
CAS Number: 139756-02-8
Mol. Formula: C₈H₁₄N₄O
Synonyms: 4-Amino-2-methyl-5-propyl-2H-pyrazole-3-carboxamide;

[enlarge](#)

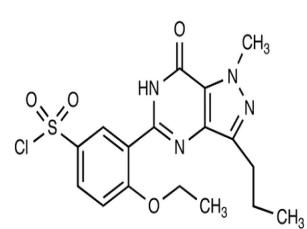
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Catalogue #: D292200
Chemical Name: N-Desmethyl Sildenafil
CAS Number: 139755-82-1
Mol. Formula: C₂₁H₂₈N₆O₄S
Synonyms: 5-[2-Ethoxy-5-(1-piperazinylsulfonyl)phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one; Desmethylsildenafil; UK 103320;

[enlarge](#)

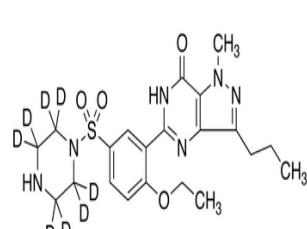
[Click on image to](#)



Catalogue #: C380005
Chemical Name: 5-(5-Chlorosulfonyl-2-ethoxyphenyl)-1-methyl-3-propyl-1,6-dihydro-7H-pyrazolo[4,3-d]pyrimidin-7-one
CAS Number: 139756-22-2
Mol. Formula: C₁₇H₁₉CIN₄O₄S
Synonyms: 3-(4,7-Dihydro-1-methyl-7-oxo-3-propyl-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxy-benzenesulfonyl Chloride;

[enlarge](#)

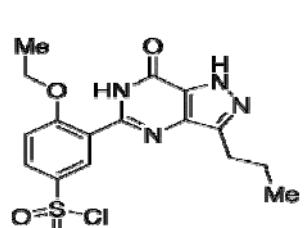
[Click on image to](#)



Catalogue #: D292202
Chemical Name: N-Desmethyl Sildenafil-d8
CAS Number:
Mol. Formula: C₂₁H₂₀D₈N₆O₄S
Synonyms: 5-[2-Ethoxy-5-(1-piperazinylsulfonyl)phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one-d8; Desmethylsildenafil-d8; UK 103320-d8;

[enlarge](#)

[Click on image to](#)



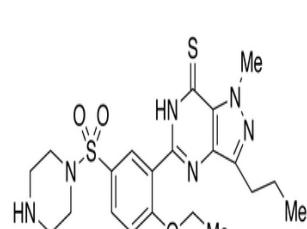
[Click on image to enlarge](#)

[Click on image to](#)

Catalogue #: C383500
Chemical Name: 5-(5-Chlorosulfonyl-2-ethoxyphenyl)-3-propyl-1,6-dihydro-7H-pyrazolo[4,3-d]pyrimidin-7-one
CAS Number: 139756-31-3
Mol. Formula: C₁₆H₁₇CIN₄O₄S
Synonyms: 3-(6,7-Dihydro-7-oxo-3-propyl-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxybenzenesulfonyl Chloride; Des-4-methylpiperazine Desmethylsildenafil Chloride;

[Click on image to enlarge](#)

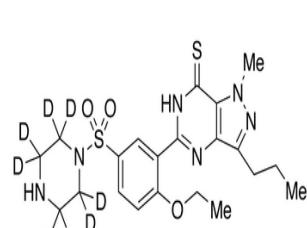
[Click on image to](#)



Catalogue #: D294350
Chemical Name: Desmethyl Thiosildenafil
CAS Number: 479073-86-4
Mol. Formula: C₂₁H₂₈N₆O₃S₂
Synonyms: 5-[2-Ethoxy-5-(1-piperazinylsulfonyl)phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidine-7-thione;

[enlarge](#)

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[Click on image to](#)

[Click on image to](#)

Catalogue #: D294352
Chemical Name: Desmethyl Thiosildenafil-d8
CAS Number: 1215321-44-0
Mol. Formula: C₂₁H₂₀D₈N₆O₃S₂
Synonyms: 5-[2-Ethoxy-5-(1-piperazinyl-d₈-sulfonyl)phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidine-7-thione;

[enlarge](#)

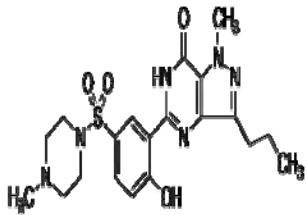
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Catalogue #: D449445
Chemical Name: 3-(6,7-Dihydro-1-methyl-3-propyl-7-thioxo-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxybenzenesulfonyl Chloride
CAS Number: 479074-07-2
Mol. Formula: C17H19ClN4O3S2
Synonyms:

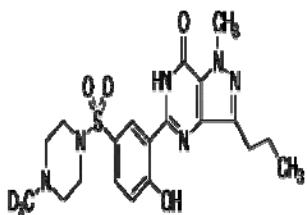
[Click on image](#)

[to enlarge](#)



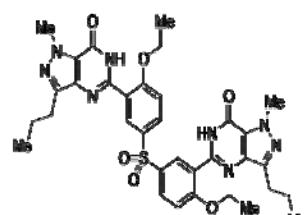
Chemical Name: Desethyl Sildenafil
CAS Number: 139755-91-2
Mol. Formula: C20H26N6O4S
Synonyms: 5-[2-Hydroxy-5-(4-methylpiperazinylsulphonyl)phenyl]1-methyl-3-n-propyl-1,6-dihydro-7H-pyrazolo[4,3-d]pyrimidin-7-one; 5-[2-Hydroxy-5-[[4-(methyl)-1-piperazinyl]sulfonyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one;

[Click on image to enlarge](#)



Catalogue #: D289602
Chemical Name: Desethyl Sildenafil-d3
CAS Number: 1346603-75-5
Mol. Formula: C20H23D3N6O4S
Synonyms: 5-[2-Hydroxy-5-(4-methyl-d3-piperazinylsulphonyl)phenyl]1-methyl-3-n-propyl-1,6-dihydro-7H-pyrazolo[4,3-d]pyrimidin-7-one; 5-[2-Hydroxy-5-[[4-(methyl-d3)-1-piperazinyl]sulfonyl]phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one;

[Click on image to enlarge](#)



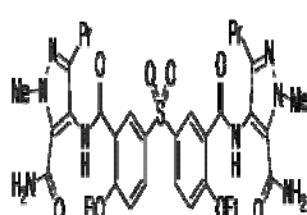
Catalogue #: D231215
Chemical Name: De(methylpiperazinyl) Sildenafil Dimer Impurity
CAS Number: 1346603-48-2
Mol. Formula: C34H38N8O6S
Synonyms: 5-[2-Ethoxy-5-[4-[4-ethoxy-3-(1-methyl-7-oxo-3-propyl-4,7-dihydro-1H-pyrazolo[4,3-d]pyrimidin-5-yl)phenyl]sulfonyl]phenyl]-1-methyl-3-n-propyl-1,6-dihydro-7H-pyrazolo[4,3-d]pyrimidin-7-one;

[image to enlarge](#)

[Click on](#)

no image of structure available

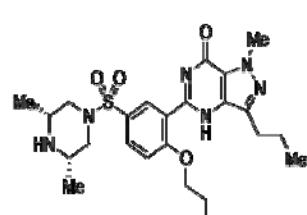
Catalogue #: D231235
Chemical Name: Demethylpiperazinyl Sildenafil Sulfonic Acid
CAS Number:
Mol. Formula: C17H20N4O5S
Synonyms: 3-(4,7-Dihydro-1-methyl-7-oxo-3-propyl-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxybenzenesulfonic Acid;



Catalogue #: A603070
Chemical Name: 3-[[5-Aminocarbonyl-1-methyl-3-propyl-1H-pyrazol-4-yl]amino]carbonyl]-4-ethoxybenzenesulfonyl Dimer
CAS Number:
Mol. Formula: C34H42N8O8S
Synonyms: 3,3'-Sulfonyl Bis[(4-Ethoxy-3-(6,7-dihydro-1-methyl-7-oxo-3-propyl-1H-pyrazolo-pyrimidin-5-yl)benzene)

[image to enlarge](#)

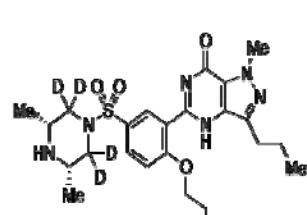
[Click on](#)



Catalogue #: D289495
Chemical Name: O-Desethyl-O-propyl Methiso**sildenafil**
CAS Number: 1391053-82-9
Mol. Formula: C24H34N6O4S
Synonyms: rel-5-[[3R,5S)-3,5-Dimethyl-1-piperazinyl]sulfonyl]-2-propoxyphenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one;

[image to enlarge](#)

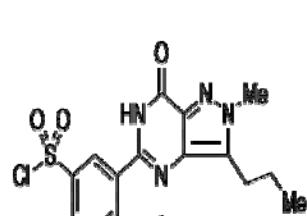
[Click on](#)



Catalogue #: D289497
Chemical Name: O-Desethyl-O-propyl Methiso**sildenafil**-d4
CAS Number:
Mol. Formula: C24H30D4N6O4S
Synonyms: rel-5-[[3R,5S)-3,5-Dimethyl-1-piperazinyl]sulfonyl]-2-propoxyphenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one-d4;

[on image to enlarge](#)

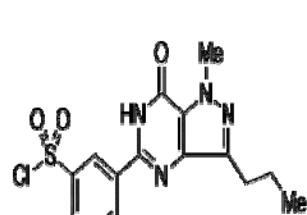
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Catalogue #: D231290
Chemical Name: Demethylpiperazinyl Iso Sildenafil Sulfonyl Chloride
CAS Number: 501120-42-9
Mol. Formula: C17H19ClN4O4S
Synonyms: 3-(6,7-Dihydro-2-methyl-7-oxo-3-propyl-2H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxybenzenesulfonyl Chloride

[Click on image to enlarge](#)

[Click on](#)



Catalogue #: D231300
Chemical Name: Demethylpiperazinyl Desethyl Sildenafil Sulfonyl Chloride
CAS Number: 139756-27-7
Mol. Formula: C15H15ClN4O4S
Synonyms: 3-(6,7-Dihydro-1-methyl-7-oxo-3-propyl-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-hydroxybenzenesulfonyl Chloride; 5-(5-Chlorosulfonyl-2-hydroxyphenyl)-1-methyl-3-propyl-1,6-dihydro-7H-pyrazolo[4,3-d]pyrimidin-7-one

[Click on image to enlarge](#)

[Click on](#)

Catalogue #: A617420
Chemical Name: 4-Amino-1-methyl-3-propyl-1H-pyrazole-5-carboxamide Hydrochloride
CAS Number: 247584-10-7
Mol. Formula: C8H15CIN4O
Synonyms: 4-Amino-2-methyl-5-propyl-2H-pyrazole-3-carboxamide Hydrochloride;

Click on image to enlarge

Catalogue #: C365535
Chemical Name: Chlorodenafil
CAS Number: 1058653-74-9
Mol. Formula: C19H21CIN4O3
Synonyms: 5-[5-(2-Chloroacetyl)-2-ethoxyphenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one;

Click on image to enlarge

Catalogue #: D292205
Chemical Name: N-Desmethyl-N-benzyl Sildenafil
CAS Number:
Mol. Formula: C28H34N6O4S
Synonyms: 5-[2-Ethoxy-5-(1-benzyl-1-piperazinylsulfonyl)phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one; Benzyl Sildenafil;

Click on image to enlarge

Catalogue #: D292207
Chemical Name: N-Desmethyl-N-benzyl Sildenafil-d5
CAS Number:
Mol. Formula: C28H29D5N6O4S
Synonyms: 5-[2-Ethoxy-5-(1-benzyl-d5)-1-piperazinylsulfonyl)phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one; Benzyl Sildenafil-d5;

Click on image to enlarge

Catalogue #: A603110
Chemical Name: 3-[[5-(Aminocarbonyl)-1-methyl-3-propyl-1H-pyrazol-4-yl]amino]carbonyl]-4-propoxy-benzenesulfonyl Chloride
CAS Number: 374776-34-8
Mol. Formula: C18H23CIN4O5S
Synonyms:

Click on image to enlarge

Catalogue #: A603105
Chemical Name: 3-[[5-(Aminocarbonyl)-1-methyl-3-propyl-1H-pyrazol-4-yl]amino]carbonyl]-4-propoxybenzene
CAS Number: 139756-04-0
Mol. Formula: C18H24N4O3
Synonyms: 1-Methyl-4-(2-propoxybenzamido)-3-propylpyrazole-5-carboxamide; 1-Methyl-4-[(2-propoxybenzoyl)amino]-3-propyl-1H-pyrazole-5-carboxamide

Click on image to enlarge

Catalogue #: D231260
Chemical Name: Demethylpiperazinyl 7-Desoxo 7-Thioxosildenafil Sulfonic Acid
CAS Number: 1353018-10-6
Mol. Formula: C17H20N4O4S2
Synonyms: 4-Ethoxy-3-(1-methyl-3-propyl-7-thioxo-6,7-dihydro-1H-pyrazolo[4,3-d]pyrimidin-5-yl)benzenesulfonic Acid

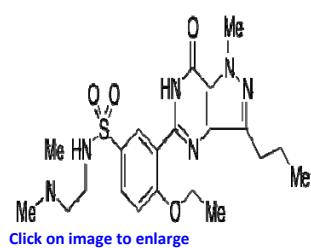
Click on image to enlarge

Catalogue #: D292245
Chemical Name: N-(Desmethyl)-tert-butyl Acetate Sildenafil
CAS Number: 398507-63-6
Mol. Formula: C26H36N6O6S
Synonyms: tert-Butyl 4-((4-Ethoxy-3-(1-methyl-7-oxo-3-propyl-6,7-dihydro-1H-pyrazolo[4,3-d]pyrimidin-5-yl)phenyl)sulfonyl)piperazine-1-carboxylate; 4-[[3-(6,7-Dihydro-1-methyl-7-oxo-3-propyl-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-4-ethoxyphenyl]sulfonyl]-1-piperazinecarboxylic Acid 1,1-Dimethylethyl Ester

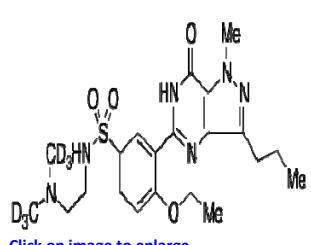
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Catalogue #: D292201
Chemical Name: N-Desmethyl Sildenafil Hemicitrate
CAS Number:
Mol. Formula: C48H64N12O15S2
Synonyms: 5-[2-Ethoxy-5-(1-piperazinylsulfonyl)phenyl]-1,6-dihydro-1-methyl-3-propyl-7H-pyrazolo[4,3-d]pyrimidin-7-one Hemicitrate; Desmethylsildenafil Hemicitrate; UK 103320 Hemicitrate

Click on image to enlarge



Catalogue #: D289520
Chemical Name: Descarbon-sildenafil
CAS Number: 1393816-99-3
Mol. Formula: C21H30N6O4S
Synonyms: 3-(6,7-Dihydro-1-methyl-7-oxo-3-propyl-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-N-[2-(dimethylamino)ethyl]-4-ethoxybenzenesulfonamide



Catalogue #: D289522
Chemical Name: Descarbon-sildenafil-d6
CAS Number:
Mol. Formula: C21H24D6N6O4S
Synonyms: 3-(6,7-Dihydro-1-methyl-7-oxo-3-propyl-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-N-[2-(dimethyl-d6-amino)ethyl]-4-ethoxybenzenesulfonamide

Tadalafil Related Compounds (commercial standards available) – includes deuterated standards.

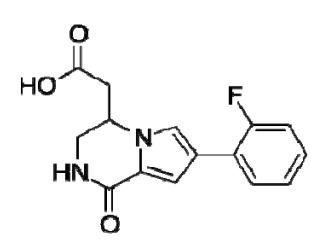


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Catalogue #: F595590
Chemical Name: 7-(2-Fluorophenyl)-1,2,3,4-tetrahydro-1-oxo-pyrrolo[1,2-a]pyrazine-4-acetic Acid
CAS Number: 1170575-17-3
Mol. Formula: C15H13FN2O3
Synonyms:

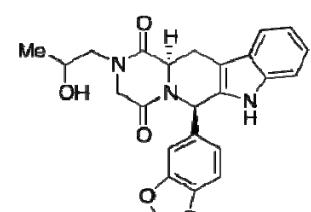
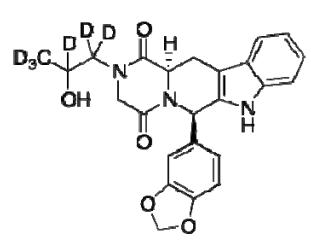


image to enlarge

Catalogue #: H952705
Chemical Name: 2-Hydroxypropyl Nortadalafil
CAS Number: 1353020-85-5
Mol. Formula: C24H23N3O5
Synonyms: (6R,12aR)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-(2-hydroxypropyl)-pyrazino[1 Δ ,2 Δ :1,6]pyrido[3,4-b]indole-1,4-dione;



Click on image to enlarge

Catalogue #: H952707
Chemical Name: 2-Hydroxypropyl-d6 Nortadalafil
CAS Number:
Mol. Formula: C24H17D6N3O5
Synonyms: (6R,12aR)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-(2-hydroxypropyl)-pyrazino[1 Δ ,2 Δ :1,6]pyrido[3,4-b]indole-1,4-dione-d6;

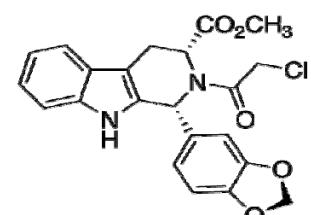
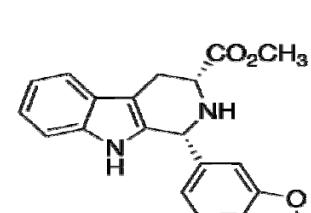


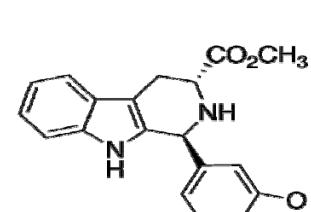
image to enlarge

Catalogue #: M330125
Chemical Name: (1R,3R)-Methyl-1,2,3,4-tetrahydro-2-chloroacetyl-1-(3,4-methylenedioxyphenyl)-9H-pyrido[3,4-b]indole-3-carboxylate (Chloropretadalafil)
CAS Number: 171489-59-1
Mol. Formula: C22H19ClN2O5
Synonyms: (1R,3R)-1-(1,3-Benzodioxol-5-yl)-2-(2-chloroacetyl)-2,3,4,9-tetrahydro-1H-pyrido[3,4-b]indole-3-carboxylic Acid Methyl Ester;



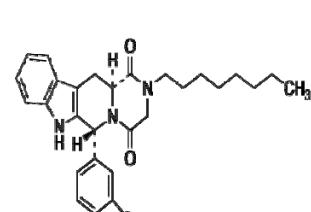
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Catalogue #: M330150
Chemical Name: (1R,3R)-Methyl-1,2,3,4-tetrahydro-1-(3,4-methylenedioxyphenyl)-9H-pyrido[3,4-b]indole-3-carboxylate
CAS Number: 171596-41-1
Mol. Formula: C20H18N2O4
Synonyms: (1R,3R)-1-(1,3-Benzodioxol-5-yl)-2,3,4,9-tetrahydro-1H-pyrido[3,4-b]indole-3-carboxylic Acid Methyl Ester;



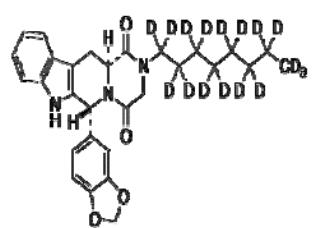
Click on image to enlarge

Catalogue #: M330155
Chemical Name: (1S,3R)-Methyl-1,2,3,4-tetrahydro-1-(3,4-methylenedioxyphenyl)-9H-pyrido[3,4-b]indole-3-carboxylate
CAS Number: 171596-42-2
Mol. Formula: C20H18N2O4
Synonyms: (1S,3R)-1-(1,3-Benzodioxol-5-yl)-2,3,4,9-tetrahydro-1H-pyrido[3,4-b]indole-3-carboxylic Acid Methyl Ester;



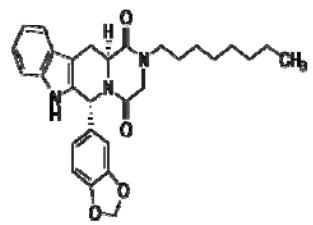
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Catalogue #: O241350
Chemical Name: N-Octyl Nortadalafil
CAS Number: 1173706-35-8
Mol. Formula: C29H33N3O4
Synonyms: (6R,12aR)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-octylpyrazino[1 Δ ,2 Δ :1,6]pyrido[3,4-b]indole-1,4-dione;



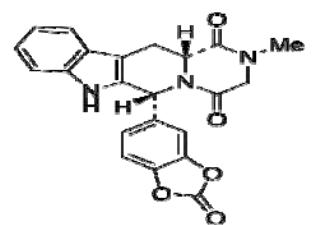
Catalogue #: O241352
Chemical Name: N-Octyl Nortadalafil-d17
CAS Number:
Mol. Formula: C29H16D17N3O4
Synonyms: (6R,12aR)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-(octyl-d17)pyrazino[1 \diamond ,2 \diamond :1,6]pyrido[3,4-b]indole-1,4-dione;

[Click on image to enlarge](#)



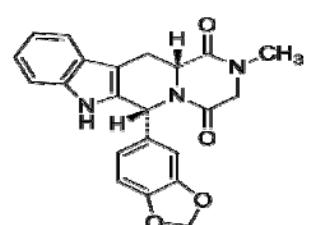
Catalogue #: O241360
Chemical Name: N-Octyl cis-Nortadalafil
CAS Number:
Mol. Formula: C29H33N3O4
Synonyms: (6R,12aS)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-octylpyrazino[1 \diamond ,2 \diamond :1,6]pyrido[3,4-b]indole-1,4-dione;

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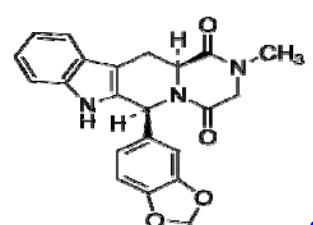
Catalogue #: O870430
Chemical Name: 2'-Oxo Tadalafil
CAS Number:
Mol. Formula: C22H17N3O5
Synonyms: (6R,12aR)-6-(2-Oxo-1,3-benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-methylpyrazino[1 \diamond ,2 \diamond :1,6]pyrido[3,4-b]indole-1,4-dione; 2'-Keto Tadalafil;

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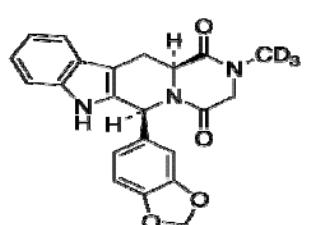
Catalogue #: T004500
Chemical Name: Tadalafil
CAS Number: 171596-29-5
Mol. Formula: C22H19N3O4
Synonyms: (6R,12aR)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-methylpyrazino[1 \diamond ,2 \diamond :1,6]pyrido[3,4-b]indole-1,4-dione; Cialis; GF 196960; IC 351; ICOS 351; Tildenafil; UK 336017;

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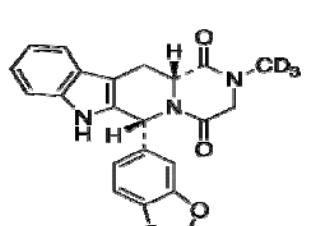
Catalogue #: T004505
Chemical Name: ent-Tadalafil
CAS Number: 629652-72-8
Mol. Formula: C22H19N3O4
Synonyms: (6S,12aS)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-methyl-pyrazino[1 \diamond ,2 \diamond :1,6]pyrido[3,4-b]indole-1,4-dione; L-Tadalafil; L-Tildenafil;

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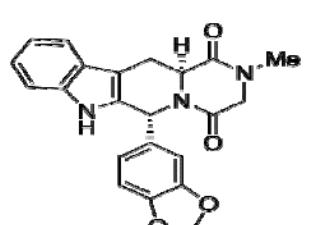
Catalogue #: T004507
Chemical Name: ent-Tadalafil-d3
CAS Number:
Mol. Formula: C22H16D3N3O4
Synonyms: (6S,12aS)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-(methyl-d3)-pyrazino[1 \diamond ,2 \diamond :1,6]pyrido[3,4-b]indole-1,4-dione; L-Tadalafil-d3; L-Tildenafil-d3;

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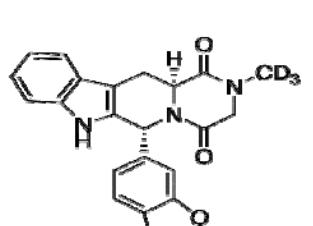
Catalogue #: T004510
Chemical Name: Tadalafil-d3
CAS Number: 960226-55-5
Mol. Formula: C22H16D3N3O4
Synonyms: (6R,12aR)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-(methyl-d3)pyrazino[1 \diamond ,2 \diamond :1,6]pyrido[3,4-b]indole-1,4-dione; Cialis-d3; GF 196960-d3; IC 351-d3; ICOS 351-d3; Tildenafil-d3; UK 336017-d3;

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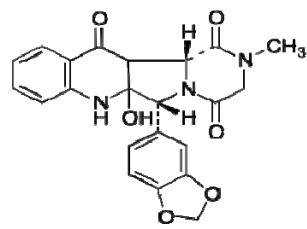
Catalogue #: T004520
Chemical Name: cis-Tadalafil
CAS Number: 171596-27-3
Mol. Formula: C22H19N3O4
Synonyms: (6R,12aS)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-methylpyrazino[1 \diamond ,2 \diamond :1,6]pyrido[3,4-b]indole-1,4-dione; (6R-cis)-6-(1,3-benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-methylpyrazino[1 \diamond ,2 \diamond :1,6]pyrido[3,4-b]indole-1,4-dione;

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Catalogue #: T004522
Chemical Name: cis-Tadalafil-d3
CAS Number:
Mol. Formula: C22H16D3N3O4
Synonyms: (6R,12aS)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-(methyl-d3)pyrazino[1 \diamond ,2 \diamond :1,6]pyrido[3,4-b]indole-1,4-dione; (6R-cis)-6-(1,3-benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-(methyl-d3)pyrazino[1 \diamond ,2 \diamond :1,6]pyrido[3,4-b]indole-1,4-dione;

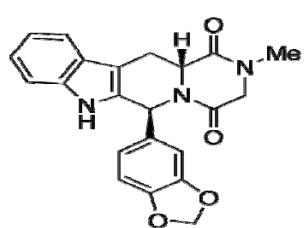
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Catalogue #: T004525
Chemical Name: Tadalafil Hydroxypiperidone
CAS Number:
Mol. Formula: C₂₂H₁₉N₃O₆
Synonyms: Tadalafil Impurity

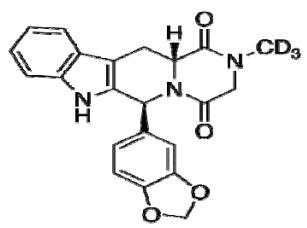
Click on

image to enlarge



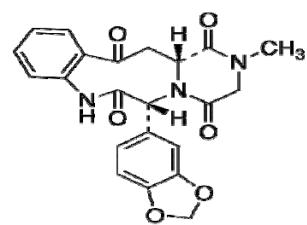
Catalogue #: T004530
Chemical Name: cis-ent-Tadalafil
CAS Number: 171596-28-4
Mol. Formula: C₂₂H₁₉N₃O₄
Synonyms: (6S,12aR)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-methylpyrazino[1♦,2♦:1,6]pyrido[3,4-b]indole-1,4-dione; (6S-cis)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-methylpyrazino[1♦,2♦:1,6]pyrido[3,4-b]indole-1,4-dione;

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Catalogue #: T004532
Chemical Name: cis-ent-Tadalafil-d3
CAS Number:
Mol. Formula: C₂₂H₁₆D₃N₃O₆
Synonyms: 6S,12aR)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-(methyl-d3)pyrazino[1♦,2♦:1,6]pyrido[3,4-b]indole-1,4-dione; (6S-cis)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydro-2-(methyl-d3)pyrazino[1♦,2♦:1,6]pyrido[3,4-b]indole-1,4-dione;

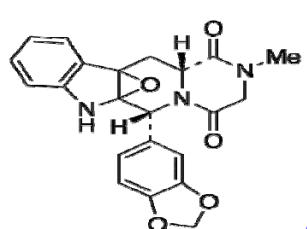
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Catalogue #: T004535
Chemical Name: Tadalafil Ketolactam
CAS Number: 1346605-38-6
Mol. Formula: C₂₂H₁₉N₃O₆
Synonyms: (6R,14aR)-rel-6-(1,3-Benzodioxol-5-yl)-2,3,14,14a-tetrahydro-2-methylpyrazino[1,2-d][1,4]benzodiazonine-1,4,7,13(6H,8H)-tetrone;

Click

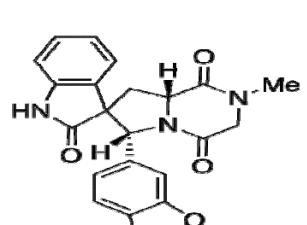
on image to enlarge



Catalogue #: T004540
Chemical Name: Tadalafil Epoxide Discontinued
CAS Number:
Mol. Formula: C₂₂H₁₉N₃O₅
Synonyms: Epoxy Tadalafil;

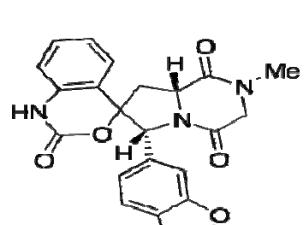
Click on

image to enlarge



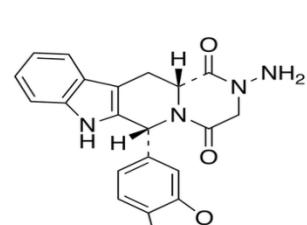
Catalogue #: T004550
Chemical Name: Tadalafil Spiro-oxindole
CAS Number:
Mol. Formula: C₂₂H₁₉N₃O₅
Synonyms: Tadalafil Impurity

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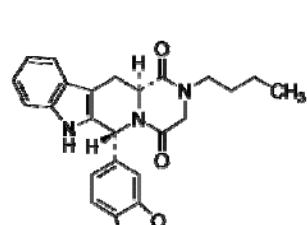
Catalogue #: T004555
Chemical Name: Tadalafil Spiro-2-keto-1,3-oxazine
CAS Number:
Mol. Formula: C₂₂H₁₉N₃O₆
Synonyms: Tadalafil Impurity

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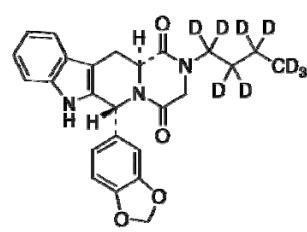
Catalogue #: A629550
Chemical Name: Amino Tadalafil
CAS Number: 385769-84-6
Mol. Formula: C₂₁H₁₈N₄O₄
Synonyms: (6R,12aR)-2-Amino-6-(1,3-benzodioxol-5-yl)-2,3,6,7,12,12a-hexahdropyrazino[1♦,2♦:1,6]pyrido[3,4-b]indole-1,4-dione;

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Catalogue #: B693585
Chemical Name: N-Butyl Nortadalafil
CAS Number: 171596-31-9
Mol. Formula: C₂₅H₂₅N₃O₄
Synonyms: (6R,12aR)-6-(1,3-Benzodioxol-5-yl)-2-butyl-2,3,6,7,12,12a-hexahdropyrazino[1♦,2♦:1,6]pyrido[3,4-b]indole-1,4-dione;

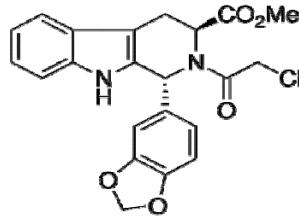
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Catalogue #: B693587
Chemical Name: N-Butyl Nortadalafil-d9
CAS Number:
Mol. Formula: C₂₅H₁₆D₉N₃O₄
Synonyms: (6R,12aR)-6-(1,3-Benzodioxol-5-yl)-2-(butyl-d9)-2,3,6,7,12,12a-hexahydropyrazino[1♦,2♦:1,6]pyrido[3,4-b]indole-1,4-dione;

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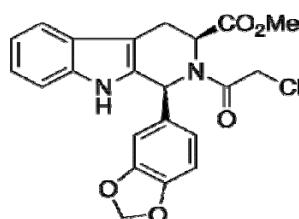
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Catalogue #: B200000
Chemical Name: (1R,3S)-1-(1,3-Benzodioxol-5-yl)-2-(2-chloroacetyl)-2,3,4,9-tetrahydro-1H-pyrido[3,4-b]indole-3-carboxylic Acid Methyl Ester
CAS Number: 629652-44-4
Mol. Formula: C₂₂H₁₉CIN₂O₅
Synonyms:

[Click](#)

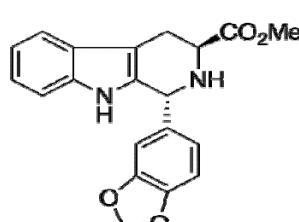
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Catalogue #: B200005
Chemical Name: (1S,3S)-1-(1,3-Benzodioxol-5-yl)-2-(2-chloroacetyl)-2,3,4,9-tetrahydro-1H-pyrido[3,4-b]indole-3-carboxylic Acid Methyl Ester
CAS Number: 629652-42-2
Mol. Formula: C₂₂H₁₉CIN₂O₅
Synonyms:

[Click](#)

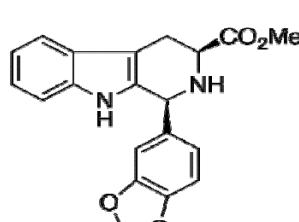
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Catalogue #: B200025
Chemical Name: (1R,3S)-1-(1,3-Benzodioxol-5-yl)-2,3,4,9-tetrahydro-1H-pyrido[3,4-b]indole-3-carboxylic Acid Methyl Ester
CAS Number: 171596-44-4
Mol. Formula: C₂₀H₁₈N₂O₄
Synonyms:

[Click](#)

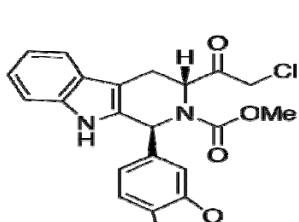
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Catalogue #: B200020
Chemical Name: (1S,3S)-1-(1,3-Benzodioxol-5-yl)-2,3,4,9-tetrahydro-1H-pyrido[3,4-b]indole-3-carboxylic Acid Methyl Ester
CAS Number: 171596-43-3
Mol. Formula: C₂₀H₁₈N₂O₄
Synonyms: (1S-cis)-1-(1,3-benzodioxol-5-yl)-2,3,4,9-tetrahydro-1H-pyrido[3,4-b]indole-3-carboxylic Acid Methyl Ester

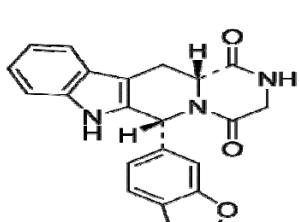
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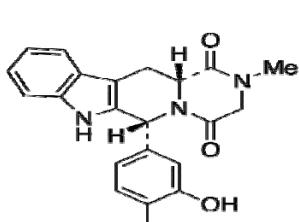
Catalogue #: B121700
Chemical Name: (1S,3R)-1-Benzo[1,3]dioxol-5-yl-2-(2-chloro-acetyl)-2,3,4,9-tetrahydro-1H-b-carboline-3-carboxylic Acid Methyl Ester
CAS Number: 629652-40-0
Mol. Formula: C₂₂H₁₉CIN₂O₅
Synonyms: (1S,3R)-1-(1,3-Benzodioxol-5-yl)-2-(2-chloroacetyl)-2,3,4,9-tetrahydro1H-pyrido[3,4-b]indole-3-carboxylic Acid Methyl Ester; (1S,3R)-1-(1,3-Benzodioxol-5-yl)-2-(chloroacetyl)-2,3,4,9-tetrahydro1H-pyrido[3,4-b]indole-3-carboxylic Acid Methyl Ester;

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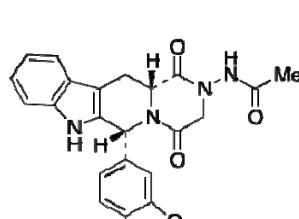
Catalogue #: D293800
Chemical Name: N-Desmethyl Tadalafil
CAS Number: 171596-36-4
Synonyms: (6R,12aR)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydropyrazino[1♦,2♦:1,6]pyrido[3,4-b]indole-1,4-dione; (6R-trans)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydropyrazino[1♦,2♦:1,6]pyrido[3,4-b]indole-1,4-dione; Nortadalafil

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Catalogue #: D291990
Chemical Name: Desmethylene Tadalafil
CAS Number: 171489-03-5
Mol. Formula: C₂₁H₁₉N₃O₄
Synonyms: (6R,12aR)-6-(3,4-dihydroxyphenyl)-2,3,6,7,12,12a-hexahydro-2-methyl-pyrazino[1♦,2♦:1,6]pyrido[3,4-b]indole-1,4-dione; (6R,trans)-6-(3,4-dihydroxyphenyl)-2,3,6,7,12,12a-hexahydro-2-methyl-pyrazino[1♦,2♦:1,6]pyrido[3,4-b]indole-1,4-dione;

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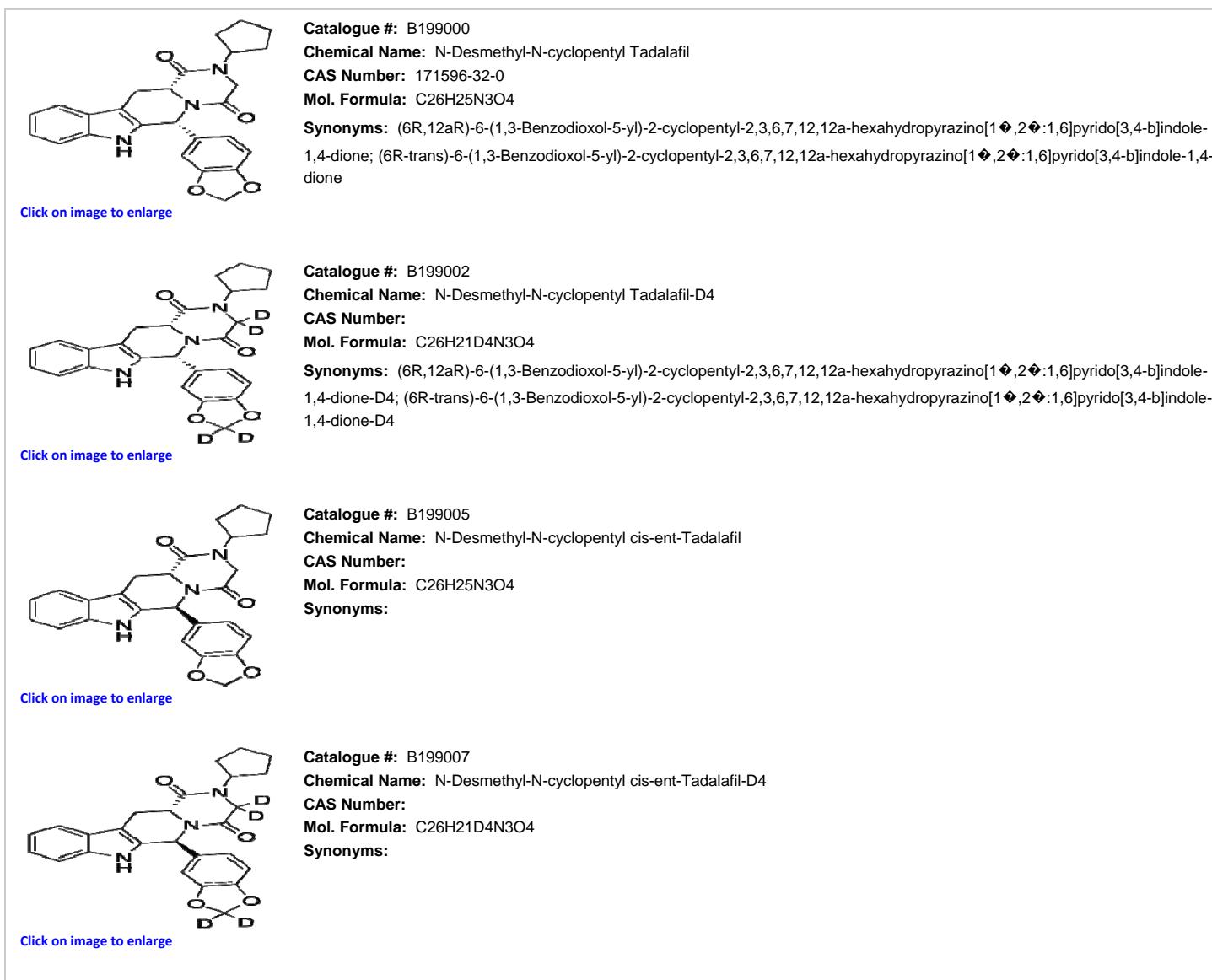


Catalogue #: A161250
Chemical Name: Acetaminotadalafil
CAS Number: 1446144-71-3
Mol. Formula: C₂₃H₂₀N₄O₅
Synonyms: N-[(6R,12aR)-6-(1,3-Benzodioxol-5-yl)-3,4,6,7,12,12a-hexahydro-1,4-dioxopyrazino[1♦,2♦:1,6]pyrido[3,4-b]indol-2(1H)-yl]-acetamide;

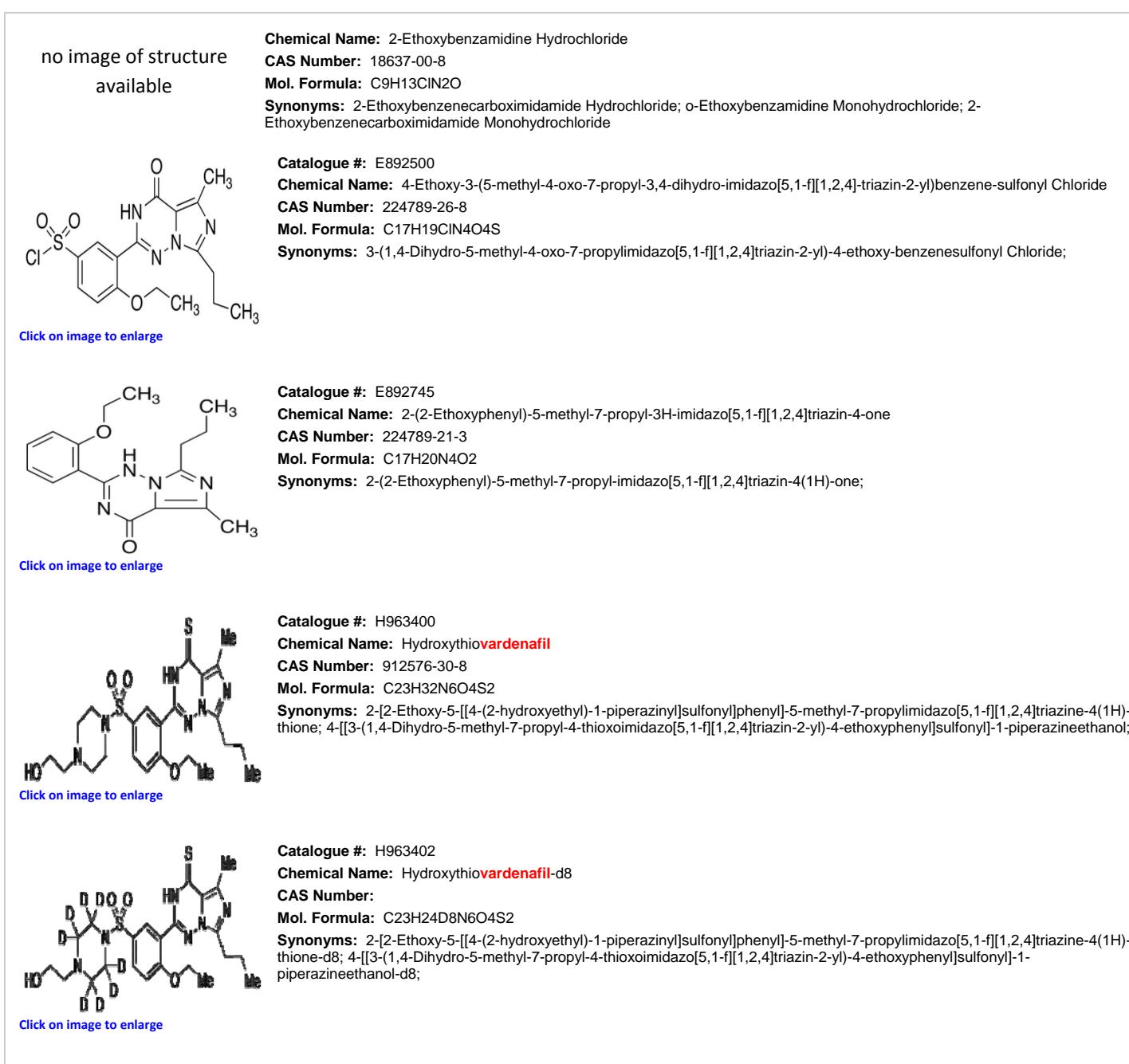
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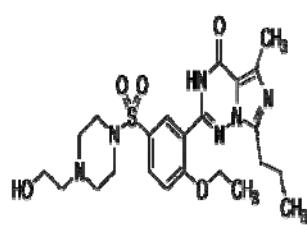
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Catalogue #: D293805
Chemical Name: N-Desmethyl ent-Tadalafil
CAS Number: 929100-66-3
Mol. Formula: C₂₁H₁₇N₃O₄
Synonyms: (6R,12aS)-6-(1,3-Benzodioxol-5-yl)-2,3,6,7,12,12a-hexahydropyrazino[1♦,2♦:1,6]pyrido[3,4-b]indole-1,4-dione



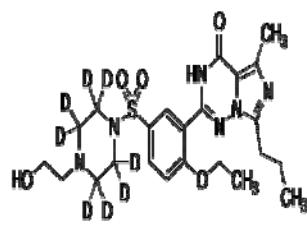
Vardenafil Related Compounds (commercial standards available) – includes deuterated standards.





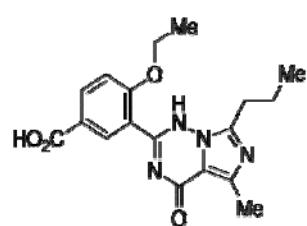
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Catalogue #: H995300
Chemical Name: Hydroxy Vardenafil
CAS Number: 224785-98-2
Mol. Formula: C23H32N6O5S
Synonyms: 2-[2-Ethoxy-5-[(4-(2-hydroxyethyl)-1-piperazinyl)sulfonyl]phenyl]-5-methyl-7-propylimidazo[5,1-f][1,2,4]triazin-4(1H)-one; 4-[[3-(1,4-Dihydro-5-methyl-4-oxo-7-propylimidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxyphenyl]sulfonyl]-1-piperazineethanol;



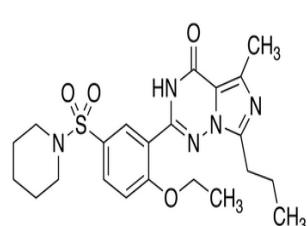
[Click on image to enlarge](#)

Catalogue #: H995302
Chemical Name: Hydroxy Vardenafil-d8
CAS Number:
Mol. Formula: C23H24D8N6O5S
Synonyms: 2-[2-Ethoxy-5-[(4-(2-hydroxyethyl)-1-(piperazinyl-d8)sulfonyl)phenyl]-5-methyl-7-propylimidazo[5,1-f][1,2,4]triazin-4(1H)-one; 4-[[3-(1,4-Dihydro-5-methyl-4-oxo-7-propylimidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxyphenyl]sulfonyl]-1-(piperazine-d8)ethanol;



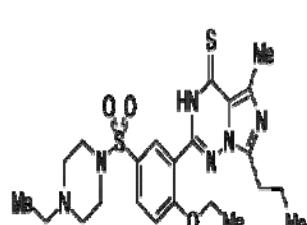
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Chemical Name: Norneo Vardenafil
CAS Number: 358390-39-3
Mol. Formula: C18H20N4O4
Synonyms: 3-(1,4-Dihydro-5-methyl-4-oxo-7-propylimidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxybenzoic Acid;



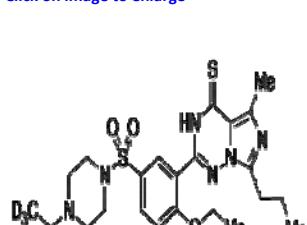
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Catalogue #: P839615
Chemical Name: Pseudo Vardenafil
CAS Number: 224788-34-5
Mol. Formula: C22H29N5O4S
Synonyms: 2-[2-Ethoxy-5-(1-piperidinylsulfonyl)phenyl]-5-methyl-7-propylimidazo[5,1-f][1,2,4]triazin-4(1H)-one; Piperidenafil; **Pseudovardenafil**;



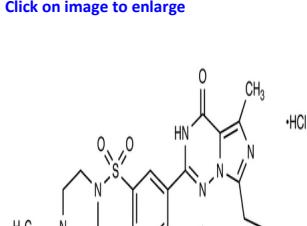
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Catalogue #: T384250
Chemical Name: Thiovardenafil
CAS Number: 912576-24-0
Mol. Formula: C23H32N6O3S2
Synonyms: 2-[2-Ethoxy-5-[(4-ethyl-1-piperazinyl)sulfonyl]phenyl]-5-methyl-7-propylimidazo[5,1-f][1,2,4]triazine-4(1H)-thione; 1-[[3-(1,4-Dihydro-5-methyl-7-propyl-4-thioxoimidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxyphenyl]sulfonyl]-4-ethylpiperazine;



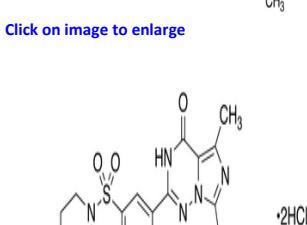
[Click on image to enlarge](#)

Catalogue #: T384252
Chemical Name: Thiovardenafil-d5
CAS Number:
Mol. Formula: C23H27D5N6O3S2
Synonyms: 2-[2-Ethoxy-5-[(4-ethyl-1-piperazinyl)sulfonyl]phenyl]-5-methyl-7-propylimidazo[5,1-f][1,2,4]triazine-4(1H)-thione-d5; 1-[[3-(1,4-Dihydro-5-methyl-7-propyl-4-thioxoimidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxyphenyl]sulfonyl]-4-ethylpiperazine-d5;



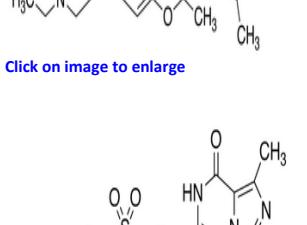
[Click on image to enlarge](#)

Catalogue #: V098000
Chemical Name: Vardenafil, Hydrochloride Salt Discontinued See V098001
CAS Number: 224785-91-5
Mol. Formula: C23H33ClN6O4S
Synonyms: Levitra, Valdenafil



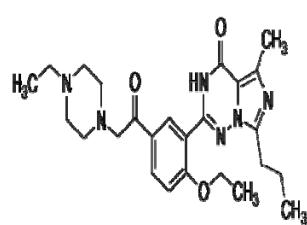
[Click on image to enlarge](#)

Catalogue #: V098001
Chemical Name: Vardenafil Dihydrochloride Salt
CAS Number: 224789-15-5
Mol. Formula: C23H34Cl2N6O4S
Synonyms: 1-[[3-(1,4-Dihydro-5-methyl-4-oxo-7-propylimidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxyphenyl]sulfonyl]-4-ethyl-piperazine; Levitra; Nuviva;



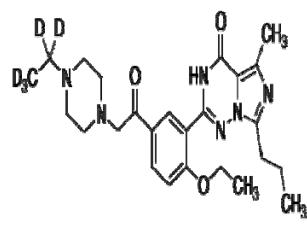
[Click on image to enlarge](#)

Catalogue #: V098002
Chemical Name: Vardenafil-d5
CAS Number: 1189685-70-8
Mol. Formula: C23H27D5N6O4S
Synonyms: 1-[[3-(1,4-Dihydro-5-methyl-4-oxo-7-propylimidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxyphenyl]sulfonyl]-4-(ethyl-d5)-piperazine; Levitra-d5; Nuviva-d5;



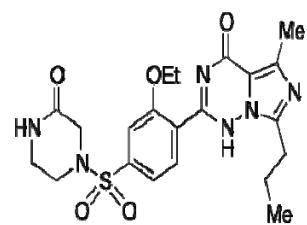
Catalogue #: V098015
Chemical Name: Vardenafil Acetyl Analogue
CAS Number: 1261351-28-3
Mol. Formula: C₂₅H₃₄N₆O₃
Synonyms: 2-[2-Ethoxy-5-[2-(4-ethyl-1-piperazinyl)acetyl]phenyl]-5-methyl-7-propyl-imidazo[5,1-f][1,2,4]triazin-4(1H)-one;

[Click on image to enlarge](#)



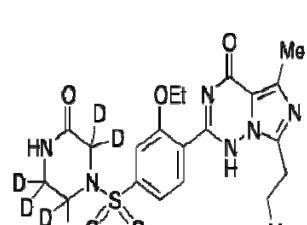
Catalogue #: V098017
Chemical Name: Vardenafil Acetyl-d5 Analogue
CAS Number: 1330171-51-1
Mol. Formula: C₂₅H₂₉D₅N₆O₃
Synonyms: 2-[2-Ethoxy-5-[2-(4-(ethyl-d5)-1-piperazinyl)acetyl]phenyl]-5-methyl-7-propyl-imidazo[5,1-f][1,2,4]triazin-4(1H)-one;

[Click on image to enlarge](#)



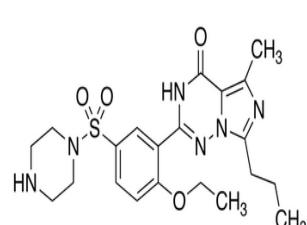
Catalogue #: V098030
Chemical Name: Vardenafil Oxopiperazine (Impurity)
CAS Number: 448184-58-5
Mol. Formula: C₂₁H₂₆N₆O₅
Synonyms: 2-[2-Ethoxy-5-[(3-oxo-1-piperazinyl)sulfonyl]phenyl]-5-methyl-7-propyl-imidazo[5,1-f][1,2,4]triazin-4(1H)-one; 4-[[3-(1,4-Dihydro-5-methyl-4-oxo-7-propylimidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxyphenyl]sulfonyl]-piperazinone

[Click on image to enlarge](#)



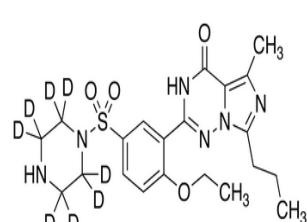
Catalogue #: V098032
Chemical Name: Vardenafil Oxopiperazine-D6 (Impurity)
CAS Number:
Mol. Formula: C₂₁H₂₀D₆N₆O₅
Synonyms: 2-[2-Ethoxy-5-[(3-oxo-1-piperazinyl)sulfonyl]phenyl]-5-methyl-7-propyl-imidazo[5,1-f][1,2,4]triazin-4(1H)-one-D6; 4-[[3-(1,4-Dihydro-5-methyl-4-oxo-7-propylimidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxyphenyl]sulfonyl]-piperazinone-D6

[Click on image to enlarge](#)



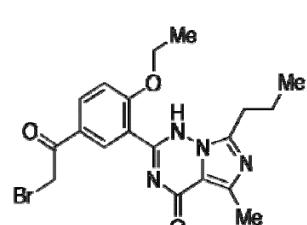
Catalogue #: D289950
Chemical Name: N-Desethyl Vardenafil
CAS Number: 448184-46-1
Mol. Formula: C₂₁H₂₈N₆O₄S
Synonyms: 1-[[3-(1,4-Dihydro-5-methyl-4-oxo-7-propylimidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxyphenyl]sulfonyl]-piperazine;

[Click on image to enlarge](#)



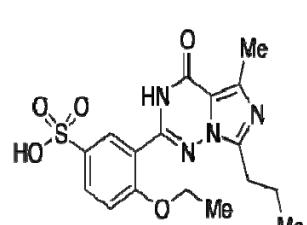
Catalogue #: D289952
Chemical Name: N-Desethyl Vardenafil-d8
CAS Number:
Mol. Formula: C₂₁H₂₀D₈N₆O₄S
Synonyms: 1-[[3-(1,4-Dihydro-5-methyl-4-oxo-7-propylimidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxyphenyl]sulfonyl]-piperazine-d8;

[Click on image to enlarge](#)



Catalogue #: D220200
Chemical Name: 1-Decarboxyl-1-(bromoacetyl) Norneo**vardenafil**
CAS Number: 358388-58-6
Mol. Formula: C₁₉H₂₁BrN₄O₃
Synonyms: 2-[5-(Bromoacetyl)-2-ethoxyphenyl]-5-methyl-7-propylimidazo[5,1-f][1,2,4]triazin-4(1H)-one;

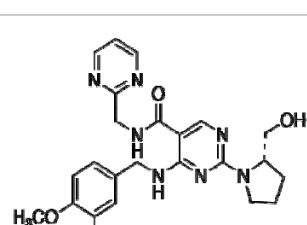
[Click on image to enlarge](#)



Catalogue #: D453410
Chemical Name: 3-(1,4-Dihydro-5-methyl-4-oxo-7-propylimidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxybenzenesulfonic Acid
CAS Number: 437717-43-6
Mol. Formula: C₁₇H₂₀N₄O₅S
Synonyms:

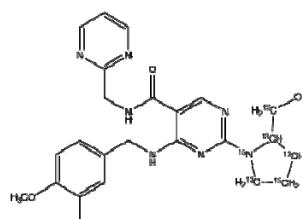
[Click on image to enlarge](#)

Avanafil Related Compounds (commercial standards available) – includes deuterated standards.



Catalogue #: A794670
Chemical Name: Avanafil
CAS Number: 330784-47-9
Mol. Formula: C₂₃H₂₆CIN₇O₃
Synonyms: (S)-2-(2-Hydroxymethyl-1-pyrrolidinyl)-4-(3-chloro-4-methoxybenzylamino)-5-[(2-pyrimidinylmethyl)carbamoyl]pyrimidine; 4-[(3-Chloro-4-methoxyphenyl)methyl] amino-2-[(2S)-2-(hydroxymethyl)-1-pyrrolidinyl]-N-(2-pyrimidinylmethyl)-5-pyrimidinecarboxamide; TA 1790;

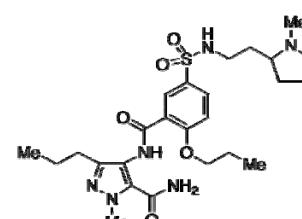
[Click on image to enlarge](#)



Catalogue #: A794672
Chemical Name: Avanafil-13C5,15N
CAS Number:
Mol. Formula: C1813C5H26CIN615NO3
Synonyms: (S)-2-(2-Hydroxymethyl-1-pyrrolidinyl)-4-(3-chloro-4-methoxybenzylamino)-5-[(2-pyrimidinylmethyl)carbamoyl]pyrimidine-13C5,15N; 4-[(3-Chloro-4-methoxyphenyl)methyl] amino-2-[(2S)-2-(hydroxymethyl)-1-pyrrolidinyl]-N-(2-pyrimidinylmethyl)-5-pyrimidinecarboxamide-13C5,15N; TA 1790-13C5,15N;

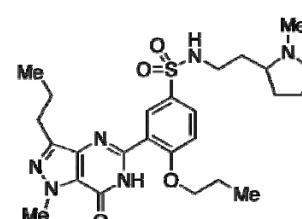
[Click on image to enlarge](#)

Udenafil Related Compounds (commercial standards available) – includes deuterated standards.



Catalogue #: M320180
Chemical Name: 1-Methyl-4-[[5-[[[2-(1-methyl-2-pyrrolidinyl)ethyl]amino]sulfonyl]-2-propoxybenzoyl]amino]-3-propyl-1H-pyrazole-5-carboxamide
CAS Number: 382592-28-1
Mol. Formula: C25H38N6O5S
Synonyms:

[Click on image to enlarge](#)



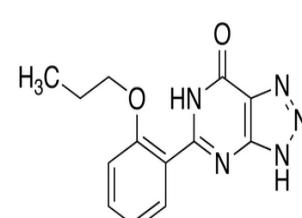
Catalogue #: U250500
Chemical Name: Udenafil
CAS Number: 268203-93-6
Mol. Formula: C25H36N6O4S
Synonyms: 3-(6,7-Dihydro-1-methyl-7-oxo-3-propyl-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-N-[2-(1-methyl-2-pyrrolidinyl)ethyl]-4-propoxybenzenesulfonamide; DA 8159; Zydena;

[Click on image to enlarge](#)

no image of structure available

Catalogue #: U250502
Chemical Name: Udenafil-d7
CAS Number: 1175992-76-3
Mol. Formula: C25H29D7N6O4S
Synonyms: 3-(6,7-Dihydro-1-methyl-7-oxo-3-propyl-1H-pyrazolo[4,3-d]pyrimidin-5-yl)-N-[2-(1-methyl-2-pyrrolidinyl)ethyl]-4-(propoxy-d7)benzenesulfonamide; DA 8159-d7; Zydena-d7;

Zaprinast



Catalogue #: Z150000
Chemical Name: Zaprinast
CAS Number: 37762-06-4
Mol. Formula: C13H13N5O2
Synonyms: 3,6-dihydro-5-(2-propoxyphenyl)-7H-1,2,3-triazolo[4,5-d]pyrimidin-7-one; 1,4-Dihydro-5-[2-propoxyphenyl]-7H-1,2,3-triazolo[4,5-d]pyrimidine-7-one; 8-Aza-2-(2-propoxyphenyl)-6-purinone; M&B 22,948;

[Click on image to enlarge](#)

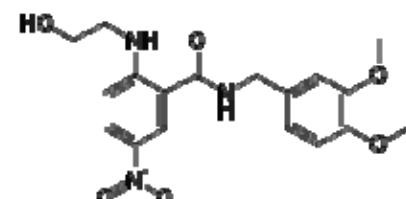
4. Additional Items for Consideration Web Based Search Data

Benzamidenafil

IUPAC name: N-[(3,4-Dimethoxyphenyl)methyl]-2-(1-hydroxypropan-2-ylamino)-5-nitrobenzamide

Other names: Xanthoanthrafil

CAS number: 1020251-53-



5. Additional Items for Consideration Novel PDE-5 inhibitors from SIAL

MBCQ

SML0439 SIGMA

≥98% (HPLC)

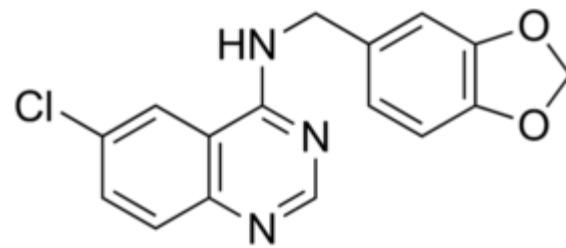
Synonym: 4-((3,4-Methylenedioxybenzyl)amino)-6-chloroquinazoline

CAS Number [150450-53-6](#)

Empirical Formula (Hill Notation) C₁₆H₁₂ClN₃O₂

Molecular Weight 313.74

MDL number [MFCD00673946](#)



Gisadenafil besylate salt

≥98% (HPLC)

PZ0172 SIGMA

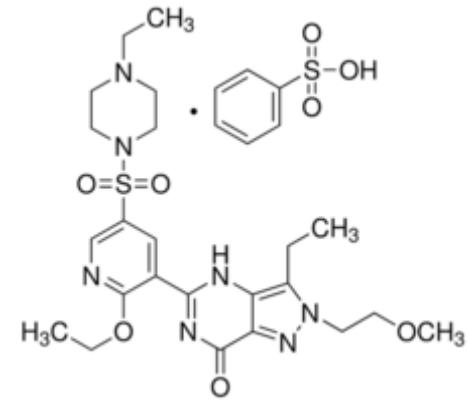
Synonym: 5-[2-Ethoxy-5-[(4-ethyl-1-piperazinyl)sulfonyl]-3-pyridinyl]-3-ethyl-2,6-dihydro-2-(2-methoxyethyl)-7H-pyrazolo[4,3-d]pyrimidin-7-one benzenesulfonate besylate salt, UK 369003-26, UK 369003

CAS Number 334827-98-4

Empirical Formula (Hill Notation) C₂₃H₃₃N₇O₅S · C₆H₆O₃S

Molecular Weight 677.79

MDL number [MFCD18384964](#)



Dipyridamole

≥98% (TLC), powder

D9766 SIGMA

CAS Number 58-32-2

Empirical Formula (Hill Notation) C₂₄H₄₀N₈O₄

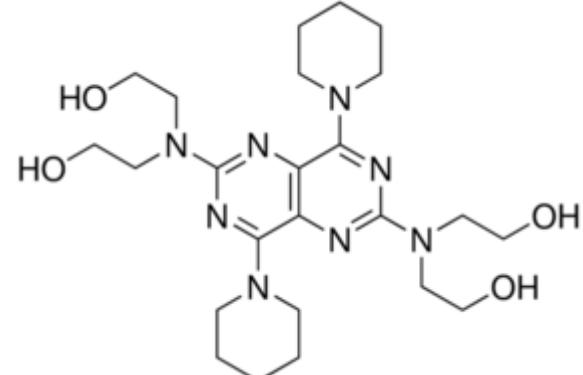
Molecular Weight 504.63

EC Number 200-374-7

MDL number [MFCD00010555](#)

PubChem Substance ID [24277705](#)

No Longer Offered by SIAL but published and possibly produced in Japan



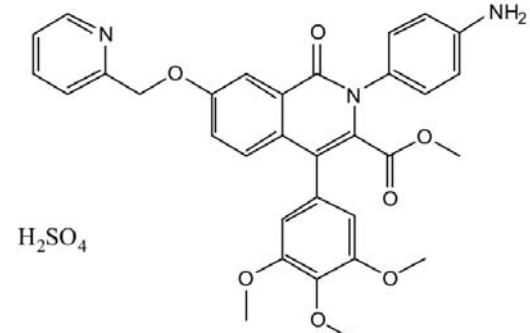
Product Number T7692

Cas #: 212500-03-3

Synonyms: Methyl-(2-(4-aminophenyl)-1,2-dihydro-1-oxo-7-(2-pyridinylmethoxy)-4-(3,4,5-trimethoxyphenyl))-3-isoquinoline carboxylic acid, sulfate salt

Molecular Formula: C₃₂H₂₉N₃O₇·H₂SO₄

The isoquinolone derivative, T-1032, is a potent, selective inhibitor of cyclic GMP-specific phosphodiesterase (PDE5). In studies of PDE isoenzymes isolated from canine tissues, T-1032 was a competitive inhibitor of cyclic GMP hydrolysis by PDE5 at nanomolar concentrations (IC₅₀ 1.0 nM, Ki = 1.2 nM).



6. Additional Information

There are a significant number of lead compounds being researched which depart from the classic sildenafil pyrazolopyrimidinone template. These compounds number into the thousands and are likely to appear in greater number over time as research publications and patent literature show more detail on particular structures and their synthesis.