

Tech Tip 0001 - Reference Standards Product Grades



Choosing the correct reference standard is essential to the success of your quality management program or research project. ChromaDex offers three different product grades to suit your technical and budgetary needs. These product grades are differentiated by the level of characterization and testing performed and reported on the certificate of analysis. The below information will guide you in choosing the right product grade for your use. If you have any questions about our product grades or would like assistance in your choice, please let us know.

Primary Analytical Standards (P)

As the highest grade reference standards in the ChromaDex catalog, Primary Analytical Standards offer thorough characterization. These products come with a complete certificate of analysis for each lot that details adjusted total purity as calculated by HPLC, Karl Fischer (water content), and GC (residual solvent), and includes Mass Spec. and NMR profiles. Whenever possible, for the most accurate analytical results, the best choice for quantitative analysis is a Primary Analytical Standard.

Analytical Standards (AS)

Formerly called Secondary (SH/SG), Analytical Standard grade is a step below our Primary grade regarding the level of characterization reported on the certificate of analysis accompanying each lot. The purity of these products are determined by chromatographic purity. Water and residual solvent content are not reported for AS grade standards.

Reagent Grade Chemicals (RG)

Reagent grade chemicals are suitable as fine chemicals for many laboratory uses however they are not intended for use as reference standards. The certificate of analysis for Reagent grade chemicals contains basic physical properties but they are not characterized for purity and so not suitable for direct quantitative use.

ChromaDex product grades are differentiated by the level of characterization and testing performed and reported for each lot of material.

| Grade | Chemical Data | Adjusted Purity | HPLC/GC % | Water % | Solvent % | NMR | Mass Spec |
|---------------------------------|---------------|-----------------|-----------|---------|-----------|-----|-----------|
| Primary Analytical Standard (P) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Analytical Standard* (AS) | ✓ | | ✓ | | | | |
| Reagent Grade (RG) | ✓ | | ∅ | | | | |

Depending on your project and needs, different end uses require different product grades. Here is an overview of some typical uses and appropriate ChromaDex product grades for each.

| Grade | Quantitative HPLC/GC | Quality Control | Method Devel. | Working Std. | Cell Assays | Basic Research |
|---------------------------------|----------------------|-----------------|---------------|--------------|-------------|----------------|
| Primary Analytical Standard (P) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Analytical Standard (AS) | ✓** | ✓** | ✓ | ✓ | ✓ | ✓ |
| Reagent Grade (RG) | | | | | ✓ | ✓ |

**Since Analytical Standard (AS) grade products are not corrected for water and solvent content, quantitative results from these standards will give content on chromatographic purity only and will not account for the water and solvent that is contained in the sample being tested. Whenever possible for the most accurate analytical results, the best choice for quantitative analysis is a Primary Analytical Standard (P).

In addition to our three product grades, ChromaDex offers two additional specialized types of Primary Analytical Standards. These products are full Primary Analytical Standards with additional value added testing and results.

AHP Verified Primary Analytical Standards

In partnership with the American Herbal Pharmacopoeia (AHP), ChromaDex offers several Primary Analytical Standards as AHP Verified. These products have been produced and tested by ChromaDex and then independently verified by AHP. Each (P) AHP Verified standard is accompanied by a Primary Analytical Standard certificate of analysis which bears the AHP Verified logo.

Compendial Traceable Primary Analytical Standards

As an added value to our clients, ChromaDex is now offering Primary Analytical Standards (P) that are also traceable to a compendial reference material. These products undergo full Primary characterization and also have a purity assay value tested against a compendial material such as supplied by the United States Pharmacopeia, National Institute of Standards and Technology, or other similar international compendia. Certificates of Analysis for these products include full data for Primary Analytical Standards along with a listing of the compendial source, lot number, and assay value.

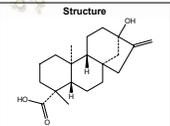
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Example: Primary Analytical Standard Certificate of Analysis

ChromaDex
Certificate of Analysis FOR LABORATORY USE ONLY

PRODUCT NAME Steviol
PART NUMBER 00019352
STANDARD TYPE Primary (P)
LOT NUMBER
REPORT NUMBER CDXA-RSS-5338-00
SAMPLE NUMBER CDXA-12-5893
DATE OF SAMPLE 09/11/2012
DATE OF REPORT 12/27/2012

Structure



CHEMICAL NAMES (4S)-13-Hydroxy-kaur-16-en-18-olic acid, 13-Hydroxykauronic acid
CHEMICAL FORMULA C₃₀H₄₈O₃
MOLECULAR WEIGHT (MW) 316.45
PUBLISHED MELTING POINT NA
CHEMICAL FAMILY Diterpenes
CAS NUMBER [471-86-7]
EINECS NA
RTECS NZ9176000

ANALYTICAL RESULTS

| TEST | METHOD | SPECIFICATION | RESULT |
|------------------|-----------------------------------|-----------------------|-----------------------|
| Adjusted Purity | NA | NA | 94.4% |
| HPLC | See below | NA | 99.9% |
| NMR | 99.1-CDCl ₃ -12000122 | Conforms to structure | Conforms to structure |
| Mass Spectrum | Direct Infusion, ESI (-) | Conforms | Conforms |
| Residual Solvent | 99.1-CDCl ₃ -0-0000119 | NA | MeOH = 3.4% |
| Water | 99.1-CDXA-S-0-0000084 | NA | 0.1% |
| Appearance | NA | NA | White powder |

ADJUSTED PURITY: 94.4% IS BASED ON (100 - 0.1 WATER - 5.4 SOLVENTS) X 99.9% HPLC

STORAGE CONDITIONS
STORAGE Room Temperature in a dry place.
EXPIRATION DATE 09/2017 under the above conditions.

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Page 2 of 7

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Certificate of Analysis FOR LABORATORY USE ONLY

ANALYTICAL CONDITIONS

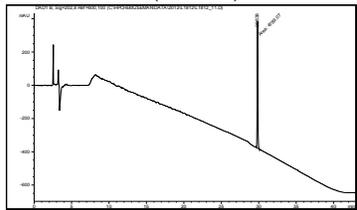
INSTRUMENT AGILENT 1100 HPLC UV-VIS (DAD) DETECTOR (ZEEMAN), AGILENT 6510 QTOF (AVOGADRO)

COLUMN Phenomenex Synergi Hydro-RP 250 x 4.6 mm, 4 µm particle size; SIN 640061-23

MOBILE PHASE A - 0.1% Trifluoroacetic acid in Milli-Q water, B - Acetonitrile; Isocratic 5% B for 3 minutes, then increasing to 95% B over 35 minutes. Hold at 95% B for 2 minutes.

COLUMN TEMP. 60 °C
FLOW RATE 1.0 mL/minute
INJECTION VOL. 5 µL
INJECTION CONC. 1.1 mg/mL in 0.1N NaOH in Ethanol
DETECTION 202 ± 4 nm

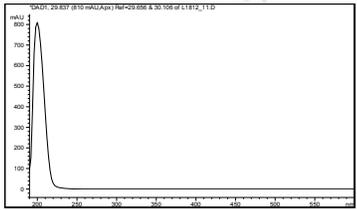
HPLC CHROMATOGRAM OF STEVIOL (CDXA-12-5893)



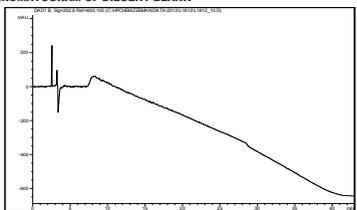
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Page 3 of 7

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UV SPECTRUM AT RT = 29.8 MINUTES



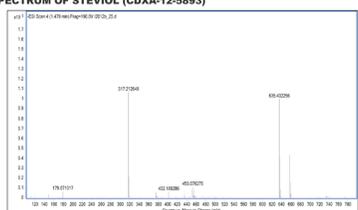
HPLC CHROMATOGRAM OF DILUENT BLANK



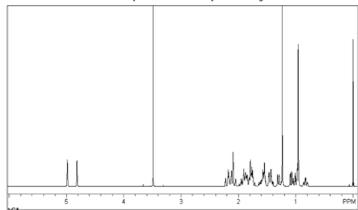
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Page 4 of 7

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MASS SPECTRUM OF STEVIOL (CDXA-12-5893)



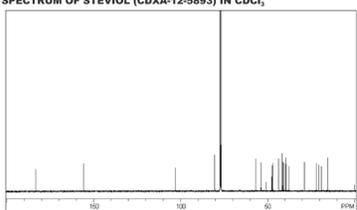
¹H-NMR SPECTRUM OF STEVIOL (CDXA-12-5893) IN CDCl₃



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Page 5 of 7

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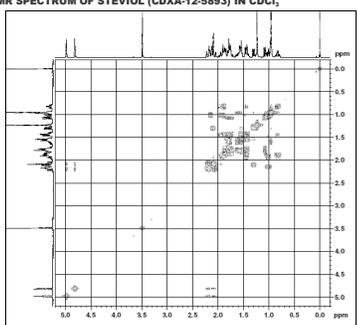
¹³C-NMR SPECTRUM OF STEVIOL (CDXA-12-5893) IN CDCl₃



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Page 6 of 7

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COSY-NMR SPECTRUM OF STEVIOL (CDXA-12-5893) IN CDCl₃



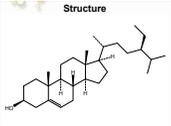
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Page 7 of 7

Tech Tip 0001 - Reference Standards Product Grades

Example: Analytical Standard Certificate of Analysis

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Certificate of Analysis FOR LABORATORY USE ONLY

PRODUCT NAME beta-Sitosterol
PART NUMBER 00019282
STANDARD TYPE Analytical Standard (AS)
LOT NUMBER 00019282-101
REPORT NUMBER CDXA-RSS-5414-00
SAMPLE NUMBER CDXA-13-0893
DATE OF SAMPLE 02/05/2013
DATE OF REPORT 02/14/2013

Structure


CHEMICAL NAMES (S)-Stigmaster-5-en-3-ol; 22,23-Dihydrostigmasterol; Cinchool; Cupirool; Cionasterol; Harzol; Nimbosterol; Prostatol; Quebrachol; Rhammol; Sobatum; Triastanol

CHEMICAL FORMULA C₂₈H₄₈O
MOLECULAR WEIGHT (MW) 414.71
PUBLISHED MELTING POINT 136-137 °C
CHEMICAL FAMILY Steroids
CAS NUMBER [83-46-9]
EINECS 201-480-6
RTECS WJ2800000

ANALYTICAL RESULTS

| TEST | METHOD | SPECIFICATION | RESULT |
|---------------|---------------------------|---------------|--------------|
| HPLC | CDXA-CPM-056-00 | NA | 75.8% |
| Mass Spectrum | Direct Infusion, APCI (+) | Conforms | Conforms |
| Appearance | NA | NA | White powder |

STORAGE CONDITIONS
STORAGE Room Temperature in a dry place.
EXPIRATION DATE 02/2018 under the above conditions.

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Page 1 of 4

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ANALYTICAL CONDITIONS

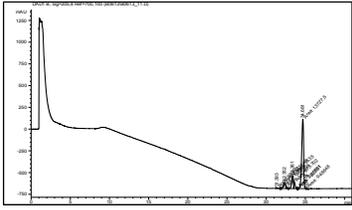
INSTRUMENT AGILENT 1100 HPLC UV-VIS (DAD) DETECTOR (YOUNG), AGILENT 1100 ION TRAP (KELVIN)

COLUMN Phenomenex Luna C18(2) 150 x 2.00 mm, 5 µm particle size; S/N 026506-6

MOBILE PHASE A - 0.1% Trifluoroacetic acid in Mill-Q water; B - Acetonitrile; Isocratic 5% B for 5 minutes, then increasing to 95% B over 20 minutes. Hold at 95% B for 5 minutes.

COLUMN TEMP. 60 °C
FLOW RATE 0.4 mL/minute
INJECTION VOL. 5.0 µL
INJECTION CONC. 2.4 mg/mL in (1:1) Methanol/DMSO
DETECTION 205 ± 4nm

HPLC CHROMATOGRAM OF BETA-SITOSTEROL (CDXA-13-0893)

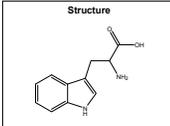


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Page 2 of 4

Example: Reagent Grade Certificate of Analysis

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Certificate of Analysis

PRODUCT NAME DL-Tryptophan
PART NUMBER 00020520
STANDARD TYPE Reagent Grade (RG)
LOT NUMBER
REPORT NUMBER CDXA-RSS-5247-00
SAMPLE NUMBER CDXA-12-7425
DATE OF SAMPLE 10/18/2012
DATE OF REPORT 10/30/2012

Structure


CHEMICAL NAMES DL-α-Amino-3-indolepropionic acid; (+)-Tryptophan
CHEMICAL FORMULA C₁₁H₉N₂O₂
MOLECULAR WEIGHT (MW) 204.23
PUBLISHED MELTING POINT NA
CHEMICAL FAMILY Amino acids
CAS NUMBER [54-12-6]
EINECS 200-194-9
RTECS YN8129200

STORAGE CONDITIONS
STORAGE Room Temperature in a dry place.
EXPIRATION DATE 10/2017 under the above conditions.

Note - Reagent Grade (RG) chemicals are not guaranteed as quantitative standards. This product line has been developed for research and qualitative purposes only.

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Page 2 of 2

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UV SPECTRUM AT RT = 34.7 MINUTES



HPLC CHROMATOGRAM OF DILUENT BLANK