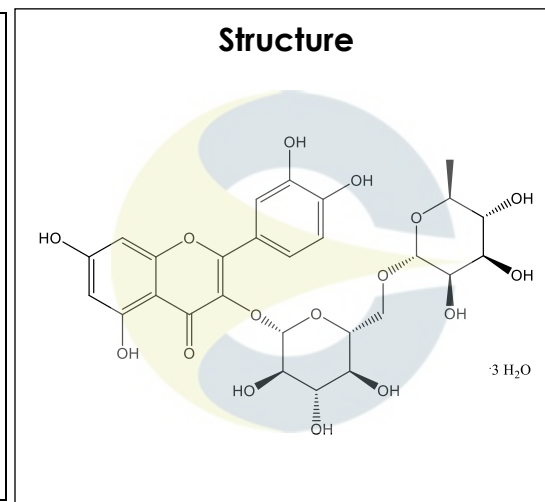


Certificate of Analysis
For Laboratory Use Only

| | |
|-----------------------------|------------------------------------|
| PRODUCT NAME | Rutin Trihydrate |
| PART NUMBER | 00018430 |
| STANDARD TYPE | Primary (P) – Compendial Traceable |
| LOT NUMBER | 00018430-002694 |
| REPORT NUMBER | CDXA-RSS-7158-02 |
| SAMPLE NUMBER | CDXA-16-003954 |
| DATE OF SAMPLE | 03/29/2016 |
| DATE OF REEVALUATION | 09/21/2020 |
| DATE OF REPORT | 10/16/2020 |



| | |
|------------------------------|---|
| CHEMICAL NAMES | 3-[[6-O-(6-Deoxy- α -L-mannopyranosyl)- β -D-glucopyranosyl]oxy]-2-(3,4-dihydroxyphenyl)-5,7-dihydroxy-4H-1-benzopyran-4-one hydrate (1:3) |
| CHEMICAL FORMULA | C ₂₇ H ₃₀ O ₁₆ • 3H ₂ O |
| MOLECULAR WEIGHT (MW) | 664.56 |
| CHEMICAL FAMILY | Flavonoids |
| CAS NUMBER | [250249-75-3] |
| EC#(EINECS) | 684-230-2 |
| RTECS | N/A |

ANALYTICAL RESULTS

| TEST | METHOD | SPECIFICATION | RESULT |
|------------------|----------------------|-----------------------|-----------------------|
| Adjusted Purity | NA | ≥ 85% | 89.3% |
| HPLC | 0.700.10.2.METH22 | ≥ 90% | 97.2% |
| NMR | 4.5.3-CD-4.0-000338 | Conforms to structure | Conforms to structure |
| Mass Spectrum | 99.1-CDXA-2.0-000126 | Conforms | Conforms |
| Residual Solvent | 99.1-CD-9.0-000115 | NA | ND |
| Water | 0.700.12.37 | NA | 8.1%* |
| Appearance | NA | NA | Yellow needles |

ADJUSTED PURITY: 89.3% IS BASED ON (100 - 8.1 WATER - 0.0 SOLVENTS) X 97.2% HPLC

*Water result includes the bonded water of the hydrate form.

| TRACEABLE SOURCE | LOT NUMBER | ASSAY RESULT |
|------------------|------------|---------------------------------|
| USP | R054J0 | 89.1% (as-is weight % of Rutin) |

This document is the property of ChromaDex, Inc. and/or its relevant affiliates and contains confidential and proprietary material for the sole use of the intended recipient(s). Any review, use, distribution or disclosure by or to others is strictly prohibited.

Certificate of Analysis

For Laboratory Use Only

STORAGE CONDITIONS

STORAGE Room Temperature in a dry place.

EXPIRATION DATE 09/2025 under the above conditions.

ANALYTICAL CONDITIONS

INSTRUMENT AGILENT 1260 HPLC UV-VIS (DAD); AGILENT 6510 QTOF

COLUMN Phenomenex Luna C18(2) 150 x 2.00 mm, 5 µm particle size

MOBILE PHASE A - 0.1% Trifluoroacetic acid in Milli-Q water, B - Acetonitrile;
 Isocratic 5% B for 5 minutes, then increasing to 95% B over 20 minutes. Hold at 95% B for 15 minutes, then decreasing to 5% B over 1 minutes.

COLUMN TEMP. 60 °C

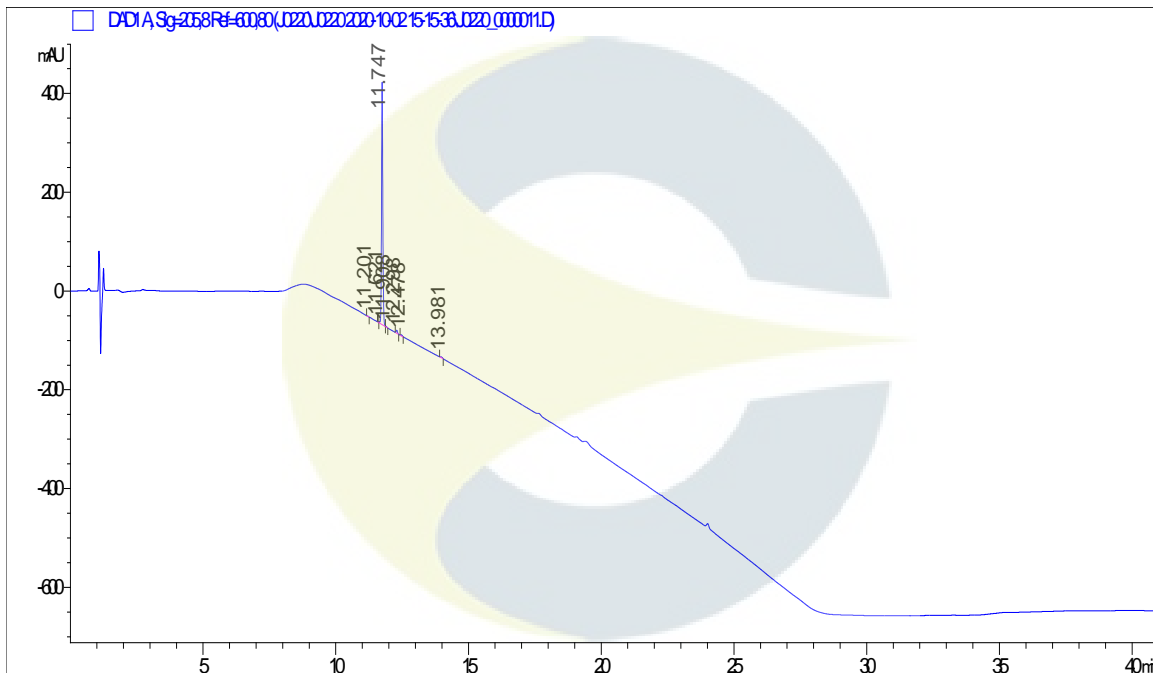
FLOW RATE 0.4 mL/minute

INJECTION VOL. 0.2 µL

INJECTION CONC. 1.1 mg/mL in Methanol

DETECTION 205 ± 4 nm

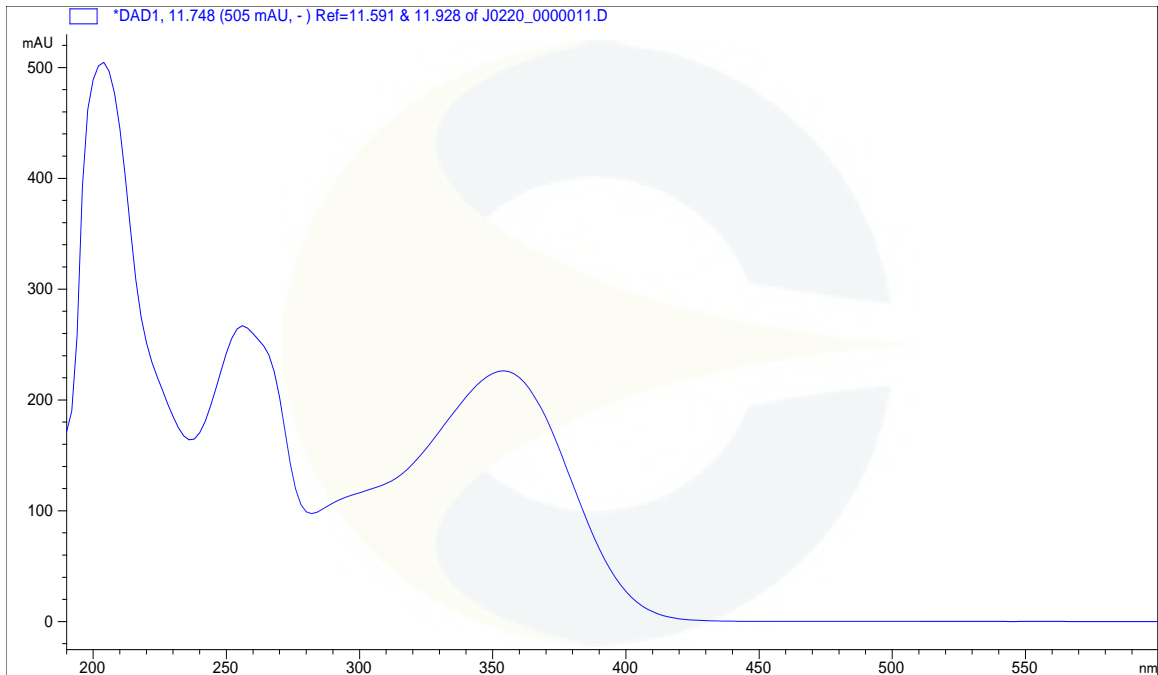
HPLC CHROMATOGRAM OF RUTIN TRIHYDRATE (CDXA-16-003954)



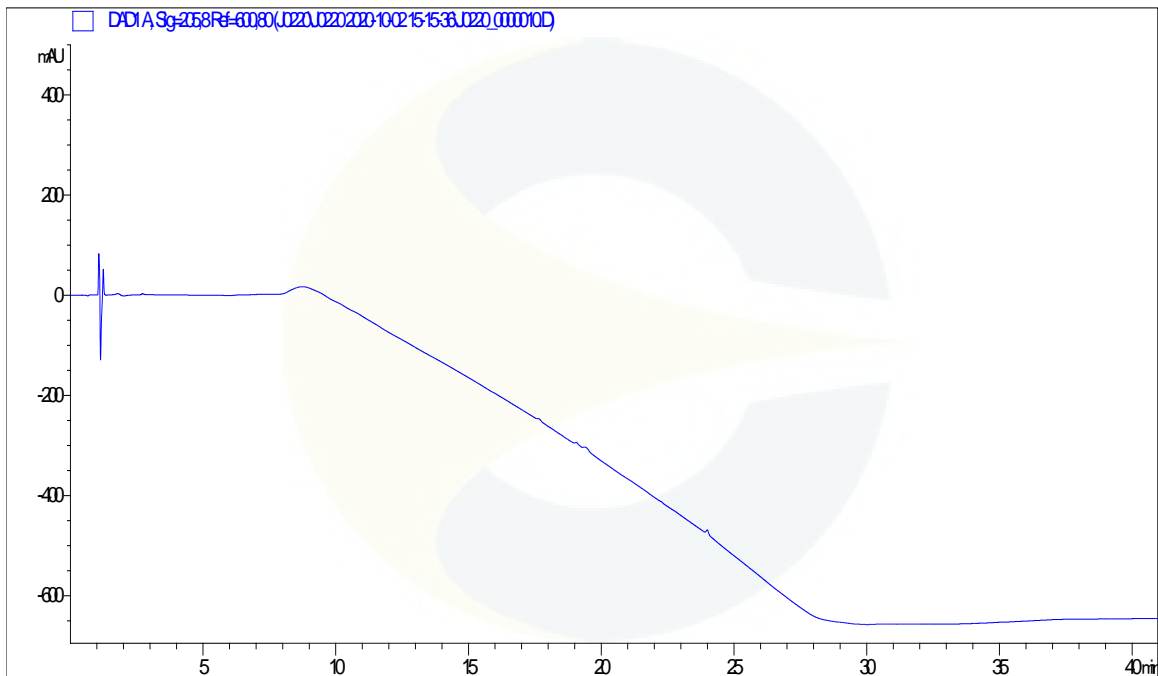
This document is the property of ChromaDex, Inc. and/or its relevant affiliates and contains confidential and proprietary material for the sole use of the intended recipient(s). Any review, use, distribution or disclosure by or to others is strictly prohibited.

Certificate of Analysis For Laboratory Use Only

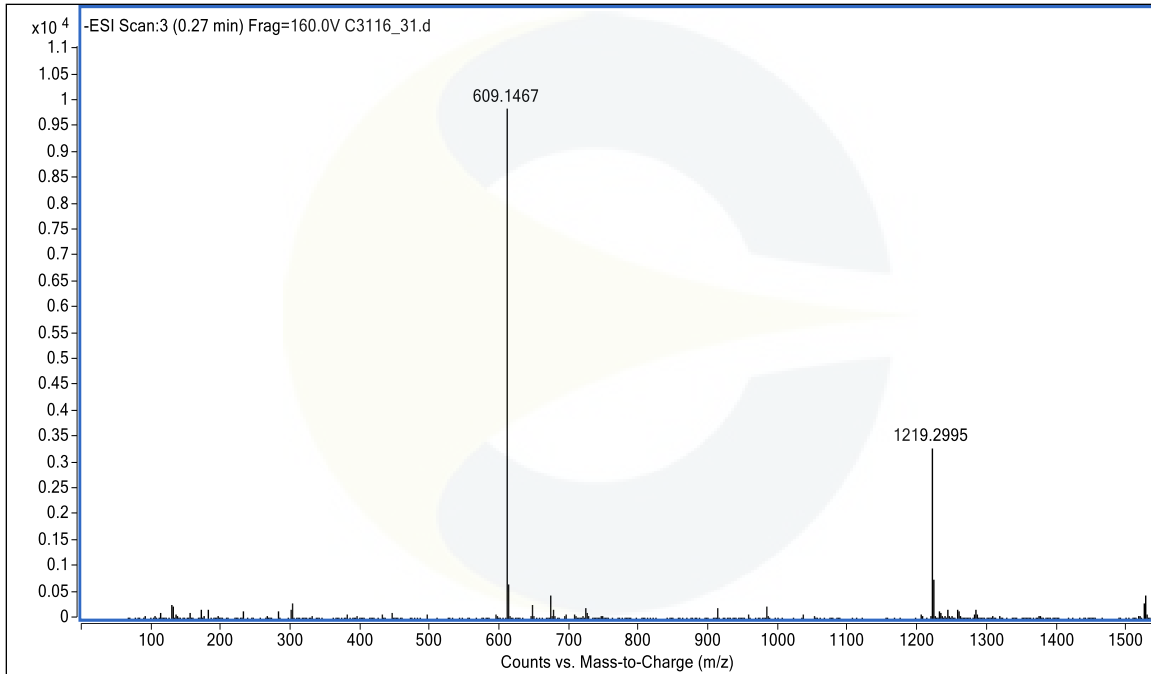
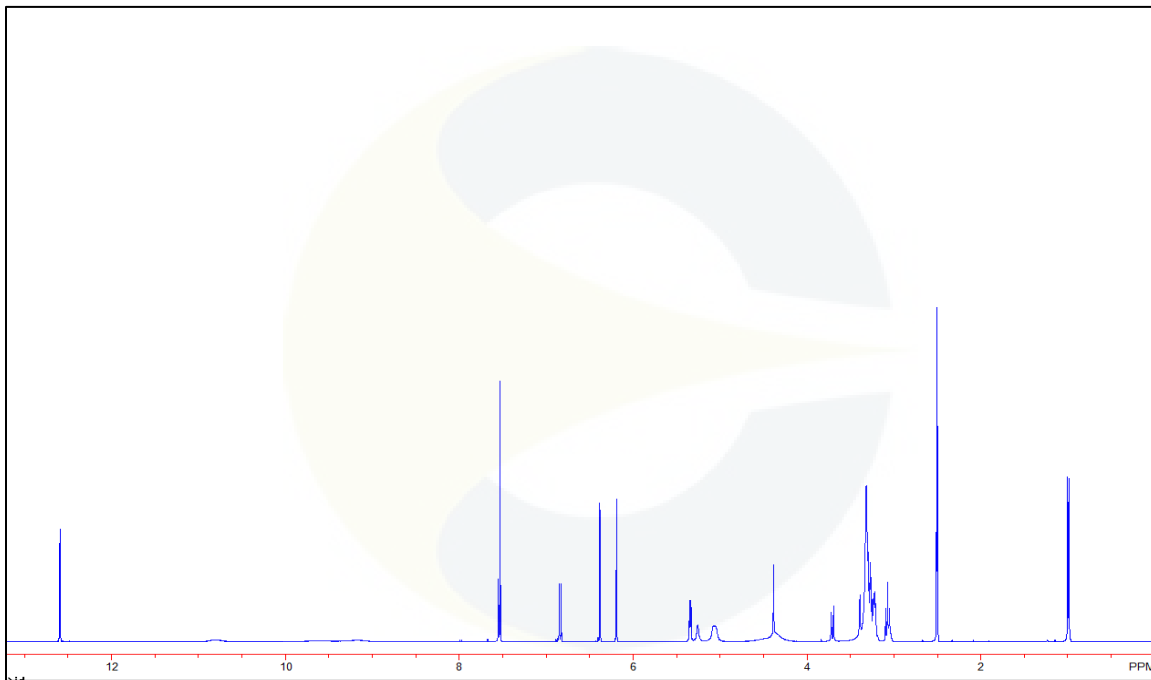
UV SPECTRUM AT 11.7 MINUTES



HPLC CHROMATOGRAM OF BLANK

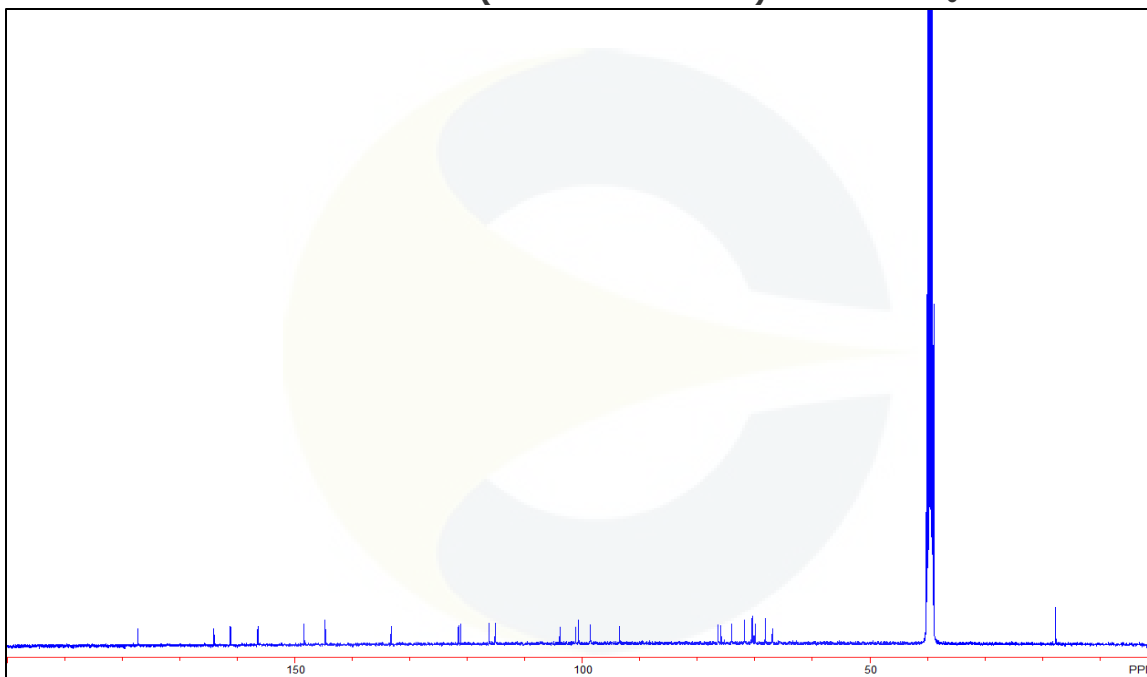


This document is the property of ChromaDex, Inc. and/or its relevant affiliates and contains confidential and proprietary material for the sole use of the intended recipient(s). Any review, use, distribution or disclosure by or to others is strictly prohibited.

MASS SPECTRUM OF RUTIN TRIHYDRATE (CDXA-16-003954)**¹H-NMR SPECTRUM OF RUTIN TRIHYDRATE (CDXA-16-003954) IN DMSO-d₆**

This document is the property of ChromaDex, Inc. and/or its relevant affiliates and contains confidential and proprietary material for the sole use of the intended recipient(s). Any review, use, distribution or disclosure by or to others is strictly prohibited.

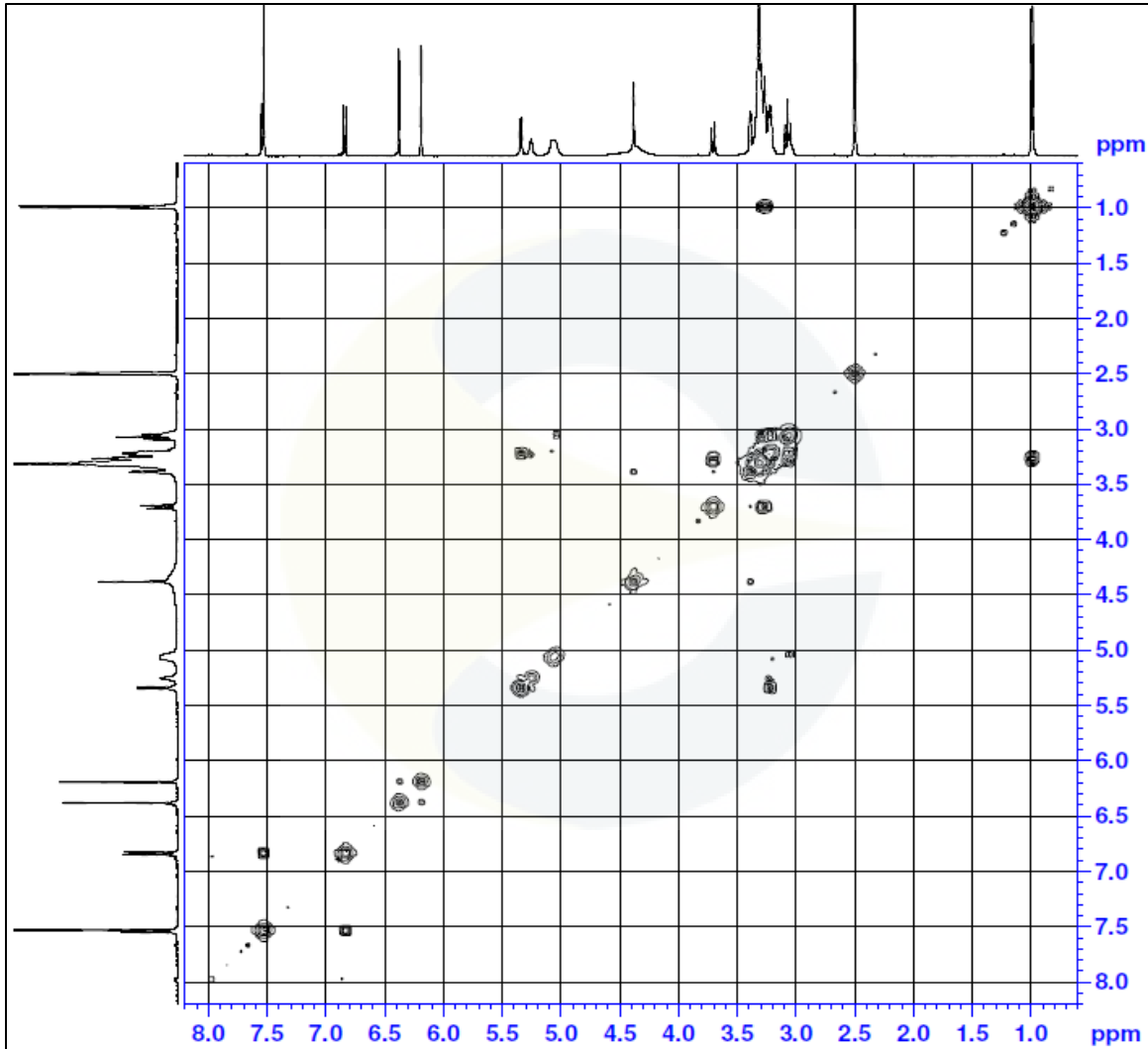
¹³C-NMR SPECTRUM OF RUTIN TRIHYDRATE (CDXA-16-003954) IN DMSO-d₆



This document is the property of ChromaDex, Inc. and/or its relevant affiliates and contains confidential and proprietary material for the sole use of the intended recipient(s). Any review, use, distribution or disclosure by or to others is strictly prohibited.

10900 Wilshire Blvd., Suite 600, Los Angeles, CA 90024 | T: +1 949-419-0288 | F: +1 949-419-0294 | www.chromadex.com
Laboratory address: 1751 S. Fordham St., Suite 350, Longmont, CO 80503

India Contact: Life Technologies (India) Pvt. Ltd.
306, Aggarwal City Mall, Opposite M2K Pitampura, Delhi - 110034 (INDIA).
Ph: +91-11-42208000, 42208111, 42208222, Mobile: +91-9810521400, Fax: +91-11-42208444
Email: customerservice@lifetechindia.com Website: www.lifetechindia.com

COSY-NMR SPECTRUM OF RUTIN TRIHYDRATE (CDXA-16-003954) IN DMSO- d_6

REVISION HISTORY

| <u>Revision History</u> | <u>Date of Revision</u> | <u>Document/Changes</u> |
|-------------------------|-------------------------|--|
| 00 | 06/21/2016 | New report |
| 01 | 08/16/2017 | Revision. Updated product and chemical names, chemical formula, molecular weight, structure, CAS number, EC#, and RTECS to reflect the trihydrate form. Removed melting point section. |
| 02 | 10/16/2020 | Material passed reevaluation by HPLC and KF. Updated EC#, analytical results, expiration date, analytical conditions, and chromatograms. |

This document is the property of ChromaDex, Inc. and/or its relevant affiliates and contains confidential and proprietary material for the sole use of the intended recipient(s). Any review, use, distribution or disclosure by or to others is strictly prohibited.