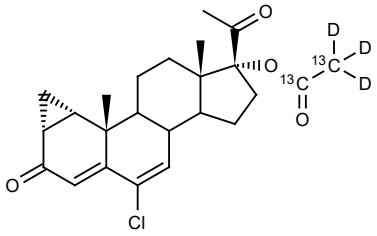
BDG SYNTHESIS

# Certificate of Analysis

BDG Synthesis certifies that this reference material meets or exceeds the specifications stated herein.

Neil Beare, PhD, Director
6 August 2018

| | |
|---|---|
| **Name:** | **Cyproterone Acetate-$^{13}C_2$,$d_3$** |
| **CAS Number:** | 427-51-0 (unlabelled) |
| **Structure:** |  |
| **Molecular Weight:** | $C_{22}{}^{13}C_2H_{26}D_3ClO_4$ = 421.94 |
| **Lot Number:** | BDG 17358.3 |
| **Appearance:** | White, crystalline solid |
| **Corrected Purity:** | 99.3 % (HPLC) - 0.1 % (methyl *t*-butyl ether) - 0.4 % (water) = 98.8 % |
| **Isotopic Purity:** | Under 0.5 % $d_0$ |
| **Re-test Date:** | 6 August 2023 |
| **Storage and Handling:** | Temperature: refrigerate for prolonged storage; may be handled and shipped at ambient temperature. |
| | Humidity: not believed to be hygroscopic; may be handled in normal laboratory atmosphere. |
| | Light: protect from strong sunlight. |
| | Caution: only experienced laboratory personnel should handle the material. |



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## Identity and Purity

### Proton NMR Spectrum

Identity: the signals are consistent with the proposed structure and in accord with literature where available.
Isotopic Labelling: signals at the site of deuteration are absent, compared with the spectrum of unlabelled material, indicating clean deuteration.
Residual Solvents: a small amount of methyl *t*-butyl ether (0.1 % *w/w*) is observed.
Impurities: no significant impurities are evident in the spectrum.

### Carbon-13 NMR Spectrum

Identity: the signals are consistent with the proposed structure and in accord with literature where available.
Isotopic Labelling: the spectrum is of little value in determining isotopic purity. Signals are split by $^{13}C$-$^{13}C$ coupling and the $^{13}CD_3$ signal has collapsed to a multiplet as expected.

### High-resolution Mass Spectrum (ESI+)

Found *m/z* 422.2098. $C_{22}{}^{13}C_2H_{27}D_3ClO_4$ $[M+H]^+$ requires *m/z* 422.2088. The deviation of 2.0 ppm is within normally accepted limits for the establishment of identity by HRMS. No signal for $d_0$ material was seen (detection limit about 0.5 %).

### HPLC

A sharp, symmetrical peak is observed (99.3 %). Note: in the absence of reference materials for preparing calibration curves, it is assumed that all peaks have the same detector response. Where possible, the conditions of analysis follow a pharmacopeial or literature method, or have been adapted from same.

### Elemental Analysis

| | | |
|---|---|---|
| | Found: | C 68.26, H 6.17, D 1.61 % |
| $C_{22}{}^{13}C_2H_{26}D_3ClO_4 \cdot 0.1H_2O$ | Requires: | C 68.49, H 6.23, D 1.43 %, $H_2O$ 0.43 % |
| $C_{22}{}^{13}C_2H_{26}D_3ClO_4$ | Requires: | C 68.78, H 6.21, D 1.43 % |

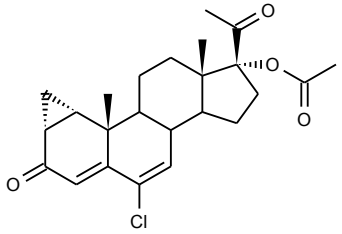
The elemental analyses fall within generally accepted limits for establishing the molecular formula given. The results may also be taken to imply the absence of significant quantities of water or inorganic salts (which have not been elsewhere tested for because of sample size limitations).

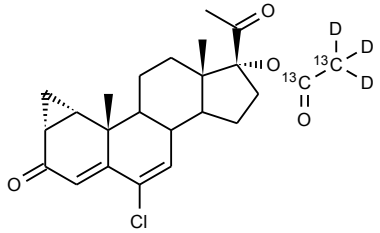
The available quantity of custom-synthesised material is always small, and this limits the extent and type of analytical data which can be obtained. This Certificate is presented in descriptive format for use by analytical chemists who are trained in the use of custom-synthesised materials. Custom materials often contain higher levels of residual solvents and/or water, and we urge you to use the corrected purity where needed rather than the raw HPLC purity. This compound is intended for use as an analytical reference material and it is not for human administration. Structures are shown with relative stereochemistry unless otherwise specified.

The re-test date is assigned from experience gained with the material in the laboratory and/or on storage. It is not possible to perform formal storage studies because of the small amount of material available.

BDG SYNTHESIS

Proton NMR Spectrum of Cyproterone Acetate (top) and Cyproterone Acetate-$^{13}C_2$,$d_3$ (bottom) in Methanol-$d_4$

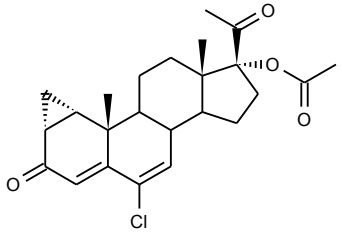


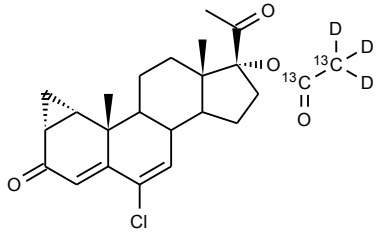


Lot Number: BDG 17358.3

BDG SYNTHESIS

Carbon-13 NMR Spectrum of Cyproterone Acetate (top) and Cyproterone Acetate-$^{13}C_2$,$d_3$ (bottom) in Methanol-$d_4$



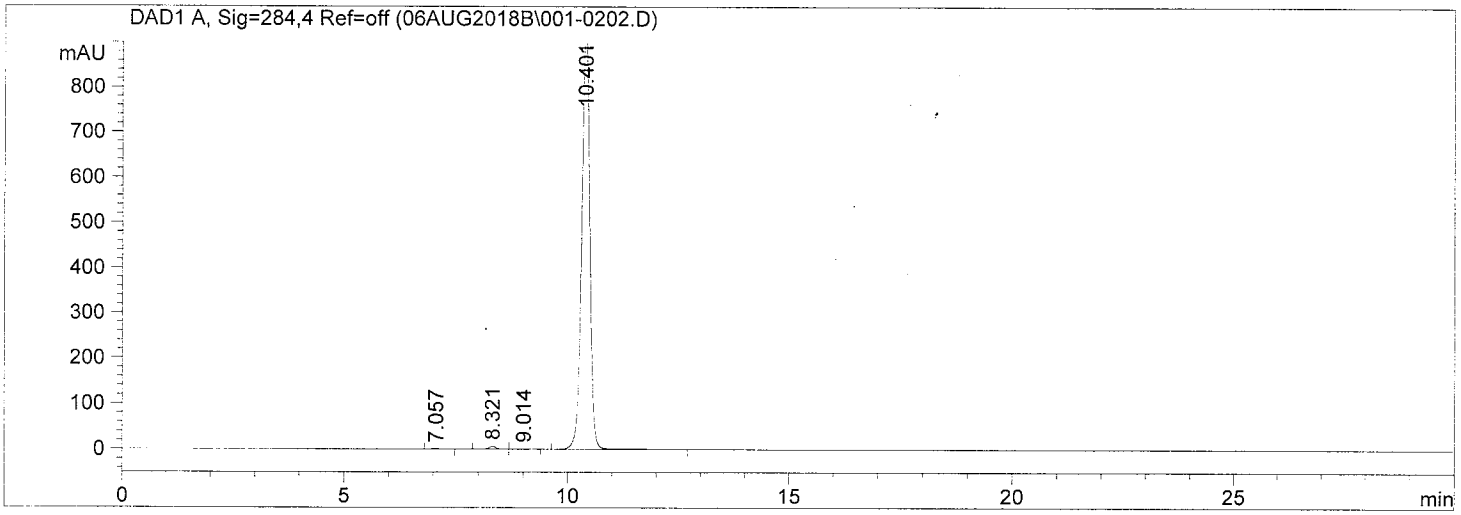




Lot Number: BDG 17358.3

Sample Name: BDG 17358.3

Injection Date : 8/6/2018 2:08:07 PM Inj : 2
Inj Volume : 10 µl
Acq. Method : C:\CHEM32\1\METHODS\2018\LC20021A.M
Last changed : 8/6/2018 2:25:09 PM by Bruce Hamilton
(modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\2018\LC20021A.M
Last changed : 8/7/2018 11:33:42 AM by Bruce Hamilton
(modified after loading)
Method Info : BDG - Analysis of Cyproterone Acetate-13C2,d3

Column : Phenomenex Luna C18(2) 5 um 250 x 4.6 mm : Guard C18RP 4 x 3 mm
Mobile Phase : 35:65 Water : Acetonitrile
Flow : 1 ml/min., Column Temperature : 20 C, Injection : 10 ul,
Detection : UV at 284 nm, Sample Solvent : Mobile Phase

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Area Percent Report

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Sorted By : Signal
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: DAD1 A, Sig=284,4 Ref=off

| Peak # | RetTime [min] | Type | Width [min] | Area [mAU*s] | Height [mAU] | Area % |
|---|---|---|---|---|---|---|
| 1 | 7.057 | BB | 0.1400 | 9.54979 | 1.01298 | 0.0800 |
| 2 | 8.321 | BB | 0.1554 | 67.59834 | 6.71736 | 0.5664 |
| 3 | 9.014 | BB | 0.1777 | 10.67543 | 9.17593e-1 | 0.0894 |
| 4 | 10.401 | BB | 0.1916 | 1.18470e4 | 949.20416 | 99.2641 |
| Totals : | | | | 1.19348e4 | 957.85210 | |

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*** End of Report ***