



# wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 22, 2024 – 09:15 PM EDT

PDB ID : 6BRT  
Title : F-box protein CTH with hydrolase  
Authors : Shabek, N.; Zheng, N.; Mao, H.; Hinds, T.R.; Ticchiarelli, F.; Leyser, O.  
Deposited on : 2017-12-01  
Resolution : 2.39 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 1.20.1  
EDS : 2.37.1  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.37.1

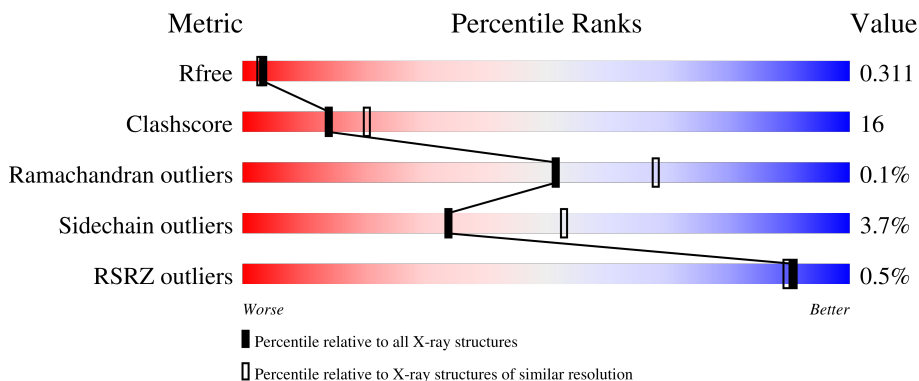
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.39 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.






Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	285	83% 16%
1	B	285	3% 76% 22% .
1	C	285	62% 28% . 7%
1	D	285	59% 32% . 7%
1	E	285	73% 19% . 7%

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Mol	Chain	Length	Quality of chain
1	F	285	 67% 26% 7%
1	G	285	 65% 26% 7%
1	H	285	 60% 29% 7%

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 17162 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called D3-CTH-D14-D-ring.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	285	2190	1392	389	399	10	0	0	0
1	B	285	2190	1392	389	399	10	0	0	0
1	C	265	2037	1299	362	368	8	0	0	0
1	D	265	2037	1299	362	368	8	0	0	0
1	E	266	2041	1301	363	369	8	0	0	0
1	F	265	2037	1299	362	368	8	0	0	0
1	G	265	2037	1299	362	368	8	0	0	0
1	H	265	2037	1299	362	368	8	0	0	0

There are 176 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-16	ASP	-	expression tag	UNP A0A0D9Z3L0
A	-15	LEU	-	expression tag	UNP A0A0D9Z3L0
A	-14	MET	-	expression tag	UNP A0A0D9Z3L0
A	-13	PHE	-	expression tag	UNP A0A0D9Z3L0
A	-12	THR	-	expression tag	UNP A0A0D9Z3L0
A	-11	GLU	-	expression tag	UNP A0A0D9Z3L0
A	-10	MET	-	expression tag	UNP A0A0D9Z3L0
A	-9	ARG	-	expression tag	UNP A0A0D9Z3L0
A	-8	ALA	-	expression tag	UNP A0A0D9Z3L0
A	-7	GLU	-	expression tag	UNP A0A0D9Z3L0
A	-6	SER	-	expression tag	UNP A0A0D9Z3L0
A	-5	TRP	-	expression tag	UNP A0A0D9Z3L0
A	-4	LEU	-	expression tag	UNP A0A0D9Z3L0

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	ARG	-	expression tag	UNP A0A0D9Z3L0
A	-2	GLY	-	expression tag	UNP A0A0D9Z3L0
A	-1	SER	-	expression tag	UNP A0A0D9Z3L0
A	0	GLY	-	linker	UNP A0A0D9Z3L0
A	1	SER	-	linker	UNP A0A0D9Z3L0
A	2	SER	-	linker	UNP A0A0D9Z3L0
A	3	GLY	-	linker	UNP A0A0D9Z3L0
A	4	ALA	-	linker	UNP A0A0D9Z3L0
A	5	SER	-	linker	UNP A0A0D9Z3L0
B	-16	ASP	-	expression tag	UNP A0A0D9Z3L0
B	-15	LEU	-	expression tag	UNP A0A0D9Z3L0
B	-14	MET	-	expression tag	UNP A0A0D9Z3L0
B	-13	PHE	-	expression tag	UNP A0A0D9Z3L0
B	-12	THR	-	expression tag	UNP A0A0D9Z3L0
B	-11	GLU	-	expression tag	UNP A0A0D9Z3L0
B	-10	MET	-	expression tag	UNP A0A0D9Z3L0
B	-9	ARG	-	expression tag	UNP A0A0D9Z3L0
B	-8	ALA	-	expression tag	UNP A0A0D9Z3L0
B	-7	GLU	-	expression tag	UNP A0A0D9Z3L0
B	-6	SER	-	expression tag	UNP A0A0D9Z3L0
B	-5	TRP	-	expression tag	UNP A0A0D9Z3L0
B	-4	LEU	-	expression tag	UNP A0A0D9Z3L0
B	-3	ARG	-	expression tag	UNP A0A0D9Z3L0
B	-2	GLY	-	expression tag	UNP A0A0D9Z3L0
B	-1	SER	-	expression tag	UNP A0A0D9Z3L0
B	0	GLY	-	linker	UNP A0A0D9Z3L0
B	1	SER	-	linker	UNP A0A0D9Z3L0
B	2	SER	-	linker	UNP A0A0D9Z3L0
B	3	GLY	-	linker	UNP A0A0D9Z3L0
B	4	ALA	-	linker	UNP A0A0D9Z3L0
B	5	SER	-	linker	UNP A0A0D9Z3L0
C	-16	ASP	-	expression tag	UNP A0A0D9Z3L0
C	-15	LEU	-	expression tag	UNP A0A0D9Z3L0
C	-14	MET	-	expression tag	UNP A0A0D9Z3L0
C	-13	PHE	-	expression tag	UNP A0A0D9Z3L0
C	-12	THR	-	expression tag	UNP A0A0D9Z3L0
C	-11	GLU	-	expression tag	UNP A0A0D9Z3L0
C	-10	MET	-	expression tag	UNP A0A0D9Z3L0
C	-9	ARG	-	expression tag	UNP A0A0D9Z3L0
C	-8	ALA	-	expression tag	UNP A0A0D9Z3L0
C	-7	GLU	-	expression tag	UNP A0A0D9Z3L0
C	-6	SER	-	expression tag	UNP A0A0D9Z3L0

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-5	TRP	-	expression tag	UNP A0A0D9Z3L0
C	-4	LEU	-	expression tag	UNP A0A0D9Z3L0
C	-3	ARG	-	expression tag	UNP A0A0D9Z3L0
C	-2	GLY	-	expression tag	UNP A0A0D9Z3L0
C	-1	SER	-	expression tag	UNP A0A0D9Z3L0
C	0	GLY	-	linker	UNP A0A0D9Z3L0
C	1	SER	-	linker	UNP A0A0D9Z3L0
C	2	SER	-	linker	UNP A0A0D9Z3L0
C	3	GLY	-	linker	UNP A0A0D9Z3L0
C	4	ALA	-	linker	UNP A0A0D9Z3L0
C	5	SER	-	linker	UNP A0A0D9Z3L0
D	-16	ASP	-	expression tag	UNP A0A0D9Z3L0
D	-15	LEU	-	expression tag	UNP A0A0D9Z3L0
D	-14	MET	-	expression tag	UNP A0A0D9Z3L0
D	-13	PHE	-	expression tag	UNP A0A0D9Z3L0
D	-12	THR	-	expression tag	UNP A0A0D9Z3L0
D	-11	GLU	-	expression tag	UNP A0A0D9Z3L0
D	-10	MET	-	expression tag	UNP A0A0D9Z3L0
D	-9	ARG	-	expression tag	UNP A0A0D9Z3L0
D	-8	ALA	-	expression tag	UNP A0A0D9Z3L0
D	-7	GLU	-	expression tag	UNP A0A0D9Z3L0
D	-6	SER	-	expression tag	UNP A0A0D9Z3L0
D	-5	TRP	-	expression tag	UNP A0A0D9Z3L0
D	-4	LEU	-	expression tag	UNP A0A0D9Z3L0
D	-3	ARG	-	expression tag	UNP A0A0D9Z3L0
D	-2	GLY	-	expression tag	UNP A0A0D9Z3L0
D	-1	SER	-	expression tag	UNP A0A0D9Z3L0
D	0	GLY	-	linker	UNP A0A0D9Z3L0
D	1	SER	-	linker	UNP A0A0D9Z3L0
D	2	SER	-	linker	UNP A0A0D9Z3L0
D	3	GLY	-	linker	UNP A0A0D9Z3L0
D	4	ALA	-	linker	UNP A0A0D9Z3L0
D	5	SER	-	linker	UNP A0A0D9Z3L0
E	-16	ASP	-	expression tag	UNP A0A0D9Z3L0
E	-15	LEU	-	expression tag	UNP A0A0D9Z3L0
E	-14	MET	-	expression tag	UNP A0A0D9Z3L0
E	-13	PHE	-	expression tag	UNP A0A0D9Z3L0
E	-12	THR	-	expression tag	UNP A0A0D9Z3L0
E	-11	GLU	-	expression tag	UNP A0A0D9Z3L0
E	-10	MET	-	expression tag	UNP A0A0D9Z3L0
E	-9	ARG	-	expression tag	UNP A0A0D9Z3L0
E	-8	ALA	-	expression tag	UNP A0A0D9Z3L0

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-7	GLU	-	expression tag	UNP A0A0D9Z3L0
E	-6	SER	-	expression tag	UNP A0A0D9Z3L0
E	-5	TRP	-	expression tag	UNP A0A0D9Z3L0
E	-4	LEU	-	expression tag	UNP A0A0D9Z3L0
E	-3	ARG	-	expression tag	UNP A0A0D9Z3L0
E	-2	GLY	-	expression tag	UNP A0A0D9Z3L0
E	-1	SER	-	expression tag	UNP A0A0D9Z3L0
E	0	GLY	-	linker	UNP A0A0D9Z3L0
E	1	SER	-	linker	UNP A0A0D9Z3L0
E	2	SER	-	linker	UNP A0A0D9Z3L0
E	3	GLY	-	linker	UNP A0A0D9Z3L0
E	4	ALA	-	linker	UNP A0A0D9Z3L0
E	5	SER	-	linker	UNP A0A0D9Z3L0
F	-16	ASP	-	expression tag	UNP A0A0D9Z3L0
F	-15	LEU	-	expression tag	UNP A0A0D9Z3L0
F	-14	MET	-	expression tag	UNP A0A0D9Z3L0
F	-13	PHE	-	expression tag	UNP A0A0D9Z3L0
F	-12	THR	-	expression tag	UNP A0A0D9Z3L0
F	-11	GLU	-	expression tag	UNP A0A0D9Z3L0
F	-10	MET	-	expression tag	UNP A0A0D9Z3L0
F	-9	ARG	-	expression tag	UNP A0A0D9Z3L0
F	-8	ALA	-	expression tag	UNP A0A0D9Z3L0
F	-7	GLU	-	expression tag	UNP A0A0D9Z3L0
F	-6	SER	-	expression tag	UNP A0A0D9Z3L0
F	-5	TRP	-	expression tag	UNP A0A0D9Z3L0
F	-4	LEU	-	expression tag	UNP A0A0D9Z3L0
F	-3	ARG	-	expression tag	UNP A0A0D9Z3L0
F	-2	GLY	-	expression tag	UNP A0A0D9Z3L0
F	-1	SER	-	expression tag	UNP A0A0D9Z3L0
F	0	GLY	-	linker	UNP A0A0D9Z3L0
F	1	SER	-	linker	UNP A0A0D9Z3L0
F	2	SER	-	linker	UNP A0A0D9Z3L0
F	3	GLY	-	linker	UNP A0A0D9Z3L0
F	4	ALA	-	linker	UNP A0A0D9Z3L0
F	5	SER	-	linker	UNP A0A0D9Z3L0
G	-16	ASP	-	expression tag	UNP A0A0D9Z3L0
G	-15	LEU	-	expression tag	UNP A0A0D9Z3L0
G	-14	MET	-	expression tag	UNP A0A0D9Z3L0
G	-13	PHE	-	expression tag	UNP A0A0D9Z3L0
G	-12	THR	-	expression tag	UNP A0A0D9Z3L0
G	-11	GLU	-	expression tag	UNP A0A0D9Z3L0
G	-10	MET	-	expression tag	UNP A0A0D9Z3L0

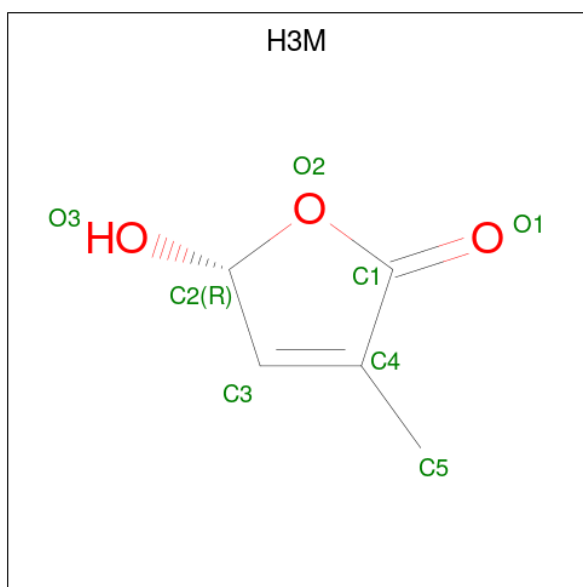
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Chain	Residue	Modelled	Actual	Comment	Reference
G	-9	ARG	-	expression tag	UNP A0A0D9Z3L0
G	-8	ALA	-	expression tag	UNP A0A0D9Z3L0
G	-7	GLU	-	expression tag	UNP A0A0D9Z3L0
G	-6	SER	-	expression tag	UNP A0A0D9Z3L0
G	-5	TRP	-	expression tag	UNP A0A0D9Z3L0
G	-4	LEU	-	expression tag	UNP A0A0D9Z3L0
G	-3	ARG	-	expression tag	UNP A0A0D9Z3L0
G	-2	GLY	-	expression tag	UNP A0A0D9Z3L0
G	-1	SER	-	expression tag	UNP A0A0D9Z3L0
G	0	GLY	-	linker	UNP A0A0D9Z3L0
G	1	SER	-	linker	UNP A0A0D9Z3L0
G	2	SER	-	linker	UNP A0A0D9Z3L0
G	3	GLY	-	linker	UNP A0A0D9Z3L0
G	4	ALA	-	linker	UNP A0A0D9Z3L0
G	5	SER	-	linker	UNP A0A0D9Z3L0
H	-16	ASP	-	expression tag	UNP A0A0D9Z3L0
H	-15	LEU	-	expression tag	UNP A0A0D9Z3L0
H	-14	MET	-	expression tag	UNP A0A0D9Z3L0
H	-13	PHE	-	expression tag	UNP A0A0D9Z3L0
H	-12	THR	-	expression tag	UNP A0A0D9Z3L0
H	-11	GLU	-	expression tag	UNP A0A0D9Z3L0
H	-10	MET	-	expression tag	UNP A0A0D9Z3L0
H	-9	ARG	-	expression tag	UNP A0A0D9Z3L0
H	-8	ALA	-	expression tag	UNP A0A0D9Z3L0
H	-7	GLU	-	expression tag	UNP A0A0D9Z3L0
H	-6	SER	-	expression tag	UNP A0A0D9Z3L0
H	-5	TRP	-	expression tag	UNP A0A0D9Z3L0
H	-4	LEU	-	expression tag	UNP A0A0D9Z3L0
H	-3	ARG	-	expression tag	UNP A0A0D9Z3L0
H	-2	GLY	-	expression tag	UNP A0A0D9Z3L0
H	-1	SER	-	expression tag	UNP A0A0D9Z3L0
H	0	GLY	-	linker	UNP A0A0D9Z3L0
H	1	SER	-	linker	UNP A0A0D9Z3L0
H	2	SER	-	linker	UNP A0A0D9Z3L0
H	3	GLY	-	linker	UNP A0A0D9Z3L0
H	4	ALA	-	linker	UNP A0A0D9Z3L0
H	5	SER	-	linker	UNP A0A0D9Z3L0

- Molecule 2 is (5R)-5-hydroxy-3-methylfuran-2(5H)-one (three-letter code: H3M) (formula: C<sub>5</sub>H<sub>6</sub>O<sub>3</sub>).





Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	C O	0	0
			8	5 3		

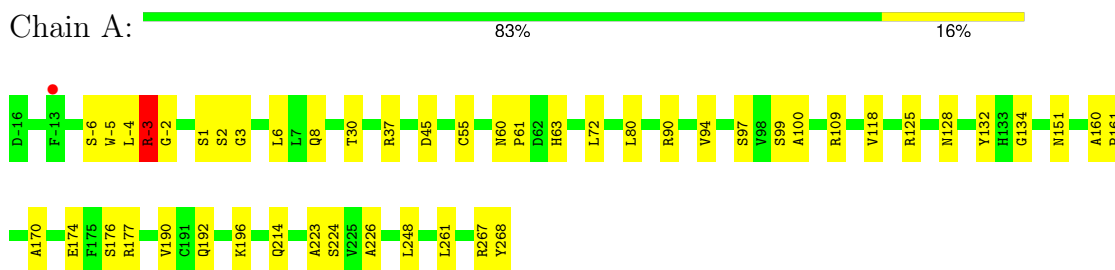
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	93	Total	O	0	0
			93	93		
3	B	55	Total	O	0	0
			55	55		
3	C	40	Total	O	0	0
			40	40		
3	D	75	Total	O	0	0
			75	75		
3	E	108	Total	O	0	0
			108	108		
3	F	44	Total	O	0	0
			44	44		
3	G	68	Total	O	0	0
			68	68		
3	H	65	Total	O	0	0
			65	65		

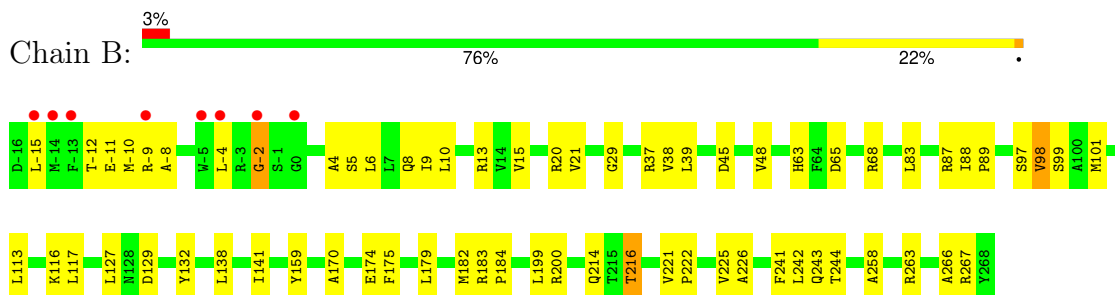
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

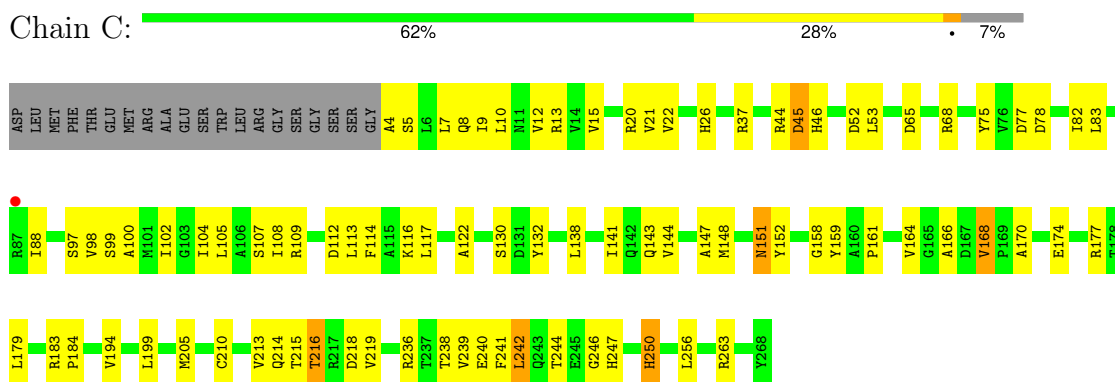
- Molecule 1: D3-CTH-D14-D-ring



- Molecule 1: D3-CTH-D14-D-ring

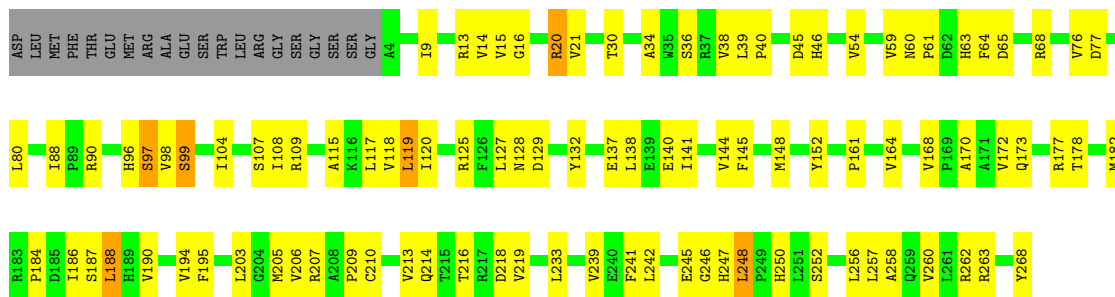


- Molecule 1: D3-CTH-D14-D-ring



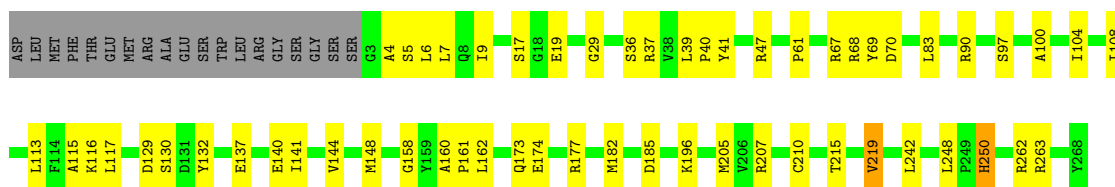
- Molecule 1: D3-CTH-D14-D-ring





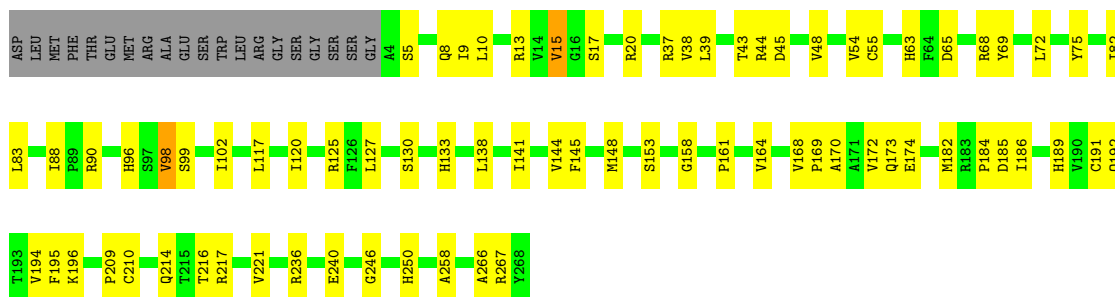
- Molecule 1: D3-CTH-D14-D-ring

Chain E: 73% 19% 7%



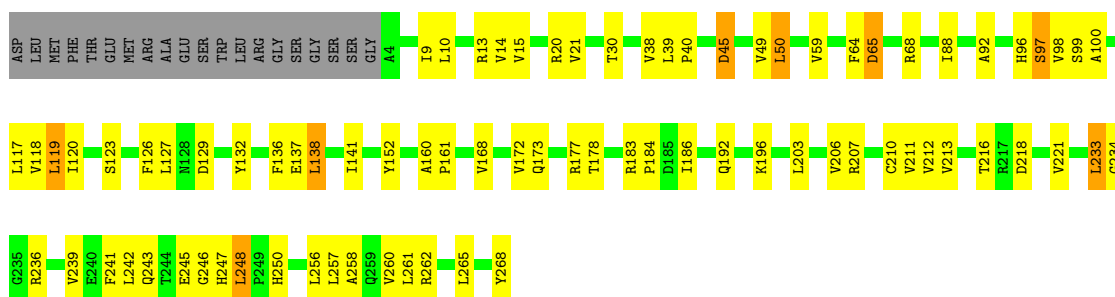
- Molecule 1: D3-CTH-D14-D-ring

Chain F: 67% 26% 7%



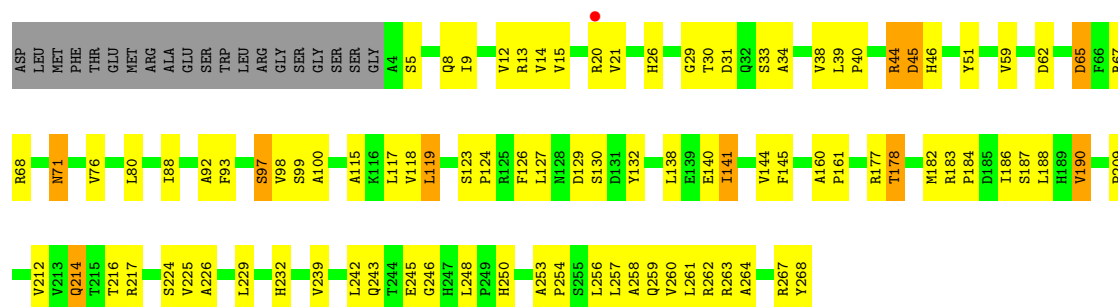
- Molecule 1: D3-CTH-D14-D-ring

Chain G: 65% 26% 7%



- Molecule 1: D3-CTH-D14-D-ring

Chain H: 60% 29% 7%



## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 65	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	183.84Å 183.84Å 153.66Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	44.16 – 2.39 44.16 – 2.39	Depositor EDS
% Data completeness (in resolution range)	99.7 (44.16-2.39) 99.7 (44.16-2.39)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.17	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.98 (at 2.39Å)	Xtrriage
Refinement program	PHENIX 1.8.4_1496	Depositor
R, $R_{free}$	0.247 , 0.306 0.258 , 0.311	Depositor DCC
$R_{free}$ test set	1990 reflections (1.72%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	26.4	Xtrriage
Anisotropy	0.283	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 17.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.480 for h,-h-k,-l	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	17162	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	32.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 44.89 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.4291e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: H3M

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.63	1/2238 (0.0%)	0.71	5/3047 (0.2%)
1	B	0.48	0/2238	0.60	3/3047 (0.1%)
1	C	0.58	1/2082 (0.0%)	0.66	4/2839 (0.1%)
1	D	0.57	0/2082	0.63	0/2839
1	E	0.63	0/2086	0.61	0/2844
1	F	0.50	0/2082	0.57	0/2839
1	G	0.51	0/2082	0.58	0/2839
1	H	0.53	0/2082	0.64	0/2839
All	All	0.56	2/16972 (0.0%)	0.63	12/23133 (0.1%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	176	SER	CB-OG	-5.76	1.34	1.42
1	C	152	TYR	CE1-CZ	-5.18	1.31	1.38

The worst 5 of 12 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	151	ASN	N-CA-C	-10.73	82.02	111.00
1	A	-3	ARG	N-CA-C	-8.63	87.70	111.00
1	C	151	ASN	CB-CA-C	7.54	125.49	110.40
1	A	151	ASN	N-CA-C	-7.39	91.05	111.00
1	B	-15	LEU	N-CA-C	7.01	129.92	111.00

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2190	0	2175	36	0
1	B	2190	0	2175	70	0
1	C	2037	0	2030	82	0
1	D	2037	0	2030	91	0
1	E	2041	0	2033	46	1
1	F	2037	0	2030	71	0
1	G	2037	0	2030	68	0
1	H	2037	0	2030	86	0
2	A	8	0	6	0	0
3	A	93	0	0	2	0
3	B	55	0	0	4	0
3	C	40	0	0	6	0
3	D	75	0	0	5	0
3	E	108	0	0	7	0
3	F	44	0	0	6	0
3	G	68	0	0	5	0
3	H	65	0	0	8	0
All	All	17162	0	16539	517	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 16.

The worst 5 of 517 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:129:ASP:HB3	1:B:132:TYR:HB3	1.25	1.18
1:D:38:VAL:HG12	1:D:258:ALA:HB2	1.39	1.00
1:D:164:VAL:HG21	1:D:172:VAL:HG22	1.44	0.99
1:H:242:LEU:HD22	1:H:256:LEU:HD21	1.44	0.97
1:H:124:PRO:HD3	1:H:229:LEU:HD11	1.48	0.96

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:185:ASP:OD2	1:E:263:ARG:NH1[5_565]	2.10	0.10

### 5.3 Torsion angles [i](#)

#### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	283/285 (99%)	272 (96%)	11 (4%)	0	100	100
1	B	283/285 (99%)	272 (96%)	10 (4%)	1 (0%)	34	48
1	C	263/285 (92%)	254 (97%)	9 (3%)	0	100	100
1	D	263/285 (92%)	248 (94%)	14 (5%)	1 (0%)	34	48
1	E	264/285 (93%)	259 (98%)	5 (2%)	0	100	100
1	F	263/285 (92%)	254 (97%)	9 (3%)	0	100	100
1	G	263/285 (92%)	246 (94%)	17 (6%)	0	100	100
1	H	263/285 (92%)	252 (96%)	11 (4%)	0	100	100
All	All	2145/2280 (94%)	2057 (96%)	86 (4%)	2 (0%)	51	68

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	54	VAL
1	B	89	PRO

#### 5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.



Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	232/234 (99%)	228 (98%)	4 (2%)	60 78
1	B	232/234 (99%)	228 (98%)	4 (2%)	60 78
1	C	216/234 (92%)	209 (97%)	7 (3%)	39 59
1	D	216/234 (92%)	206 (95%)	10 (5%)	27 43
1	E	216/234 (92%)	209 (97%)	7 (3%)	39 59
1	F	216/234 (92%)	209 (97%)	7 (3%)	39 59
1	G	216/234 (92%)	205 (95%)	11 (5%)	24 39
1	H	216/234 (92%)	201 (93%)	15 (7%)	15 25
All	All	1760/1872 (94%)	1695 (96%)	65 (4%)	34 53

5 of 65 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	H	141	ILE
1	H	188	LEU
1	D	252	SER
1	D	248	LEU
1	H	190	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	8	GLN
1	B	214	GLN
1	B	243	GLN
1	F	214	GLN
1	G	96	HIS

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

1 ligand is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	H3M	A	401	-	6,8,8	2.72	4 (66%)	10,11,11	3.43	6 (60%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	H3M	A	401	-	-	-	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	401	H3M	O2-C1	4.24	1.42	1.36
2	A	401	H3M	C1-C4	-3.81	1.42	1.47
2	A	401	H3M	O2-C2	-2.66	1.40	1.46
2	A	401	H3M	O1-C1	-2.19	1.17	1.21

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	401	H3M	C2-O2-C1	-5.88	103.77	110.19
2	A	401	H3M	C2-C3-C4	-5.01	107.33	110.30
2	A	401	H3M	O2-C1-C4	4.00	111.92	109.11
2	A	401	H3M	C5-C4-C1	3.92	125.75	121.49
2	A	401	H3M	O1-C1-C4	-3.64	124.45	129.47

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers

There are no such residues in this entry.

## 5.8 Polymer linkage issues

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	285/285 (100%)	-0.46	1 (0%) 92 91	9, 19, 62, 79	0
1	B	285/285 (100%)	-0.10	8 (2%) 53 51	23, 31, 66, 104	0
1	C	265/285 (92%)	-0.13	1 (0%) 92 91	25, 37, 50, 72	0
1	D	265/285 (92%)	-0.24	0 100 100	24, 34, 47, 66	0
1	E	266/285 (93%)	-0.52	0 100 100	8, 16, 39, 58	0
1	F	265/285 (92%)	-0.14	0 100 100	24, 36, 52, 70	0
1	G	265/285 (92%)	-0.22	0 100 100	25, 34, 49, 72	0
1	H	265/285 (92%)	-0.23	1 (0%) 92 91	24, 31, 45, 69	0
All	All	2161/2280 (94%)	-0.25	11 (0%) 91 89	8, 31, 50, 104	0

The worst 5 of 11 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	-2	GLY	7.0
1	B	-13	PHE	5.0
1	B	-14	MET	4.4
1	B	-15	LEU	3.8
1	B	-5	TRP	3.7

### 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	H3M	A	401	8/8	0.91	0.16	37,38,39,41	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.