



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 24, 2025 – 05:55 am BST

PDB ID : 6ZD9 / pdb_00006zd9
Title : Crystal structure of YTHDC1 apo purified using GST tag
Authors : Bedi, R.K.; Caflisch, A.
Deposited on : 2020-06-14
Resolution : 1.51 Å(reported)

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

We welcome your comments at 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>.

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.46

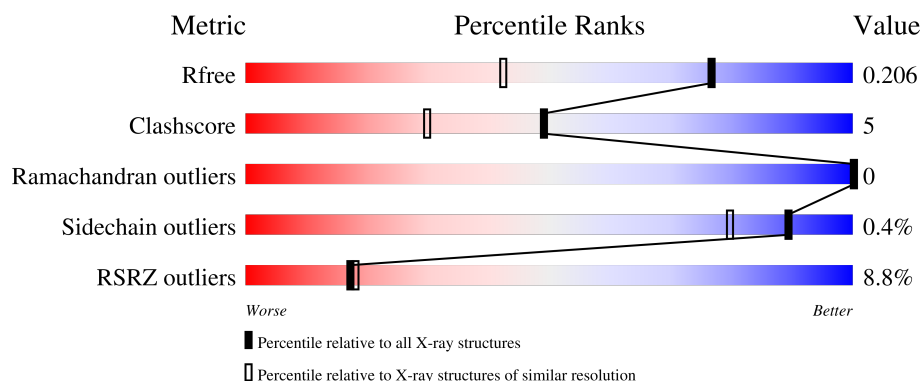
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.51 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}	164625	5293 (1.54-1.50)
Clashscore	180529	5759 (1.54-1.50)
Ramachandran outliers	177936	5653 (1.54-1.50)
Sidechain outliers	177891	5650 (1.54-1.50)
RSRZ outliers	164620	5293 (1.54-1.50)

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 ≥ 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	403	
1	B	403	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	PEG	B	601	-	-	X	-
3	SO4	B	605	-	-	X	-

2 Entry composition [i](#)

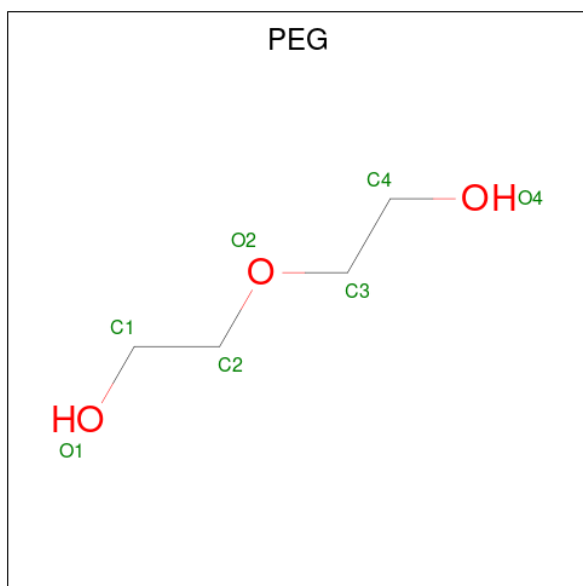
There are 4 unique types of molecules in this entry. The entry contains 3151 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 YTHDC1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	164	Total	C	N	O	S	0	10	0
			1326	863	229	230	4			
1	B	164	Total	C	N	O	S	0	10	0
			1338	871	227	234	6			

- Molecule 2 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: C₄H₁₀O₃).



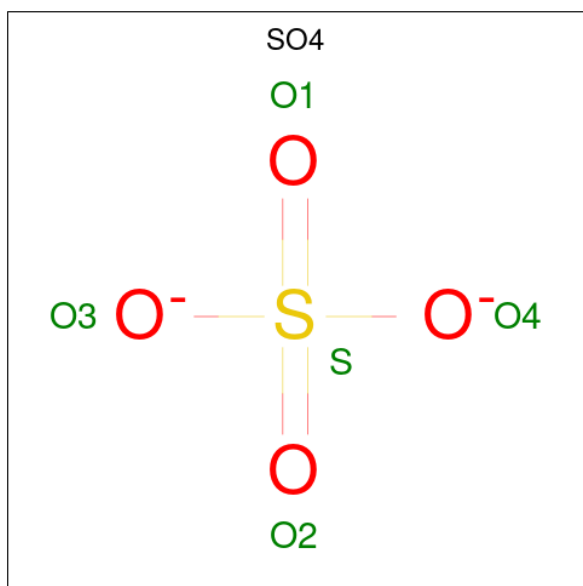
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			7	4	3		
2	B	1	Total	C	O	0	0
			7	4	3		
2	B	1	Total	C	O	0	0
			7	4	3		
2	B	1	Total	C	O	0	0
			7	4	3		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	B	1	Total	C	O	0	0
			7	4	3		

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).

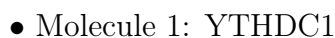


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	203	Total	O	0	0
			203	203		
4	B	224	Total	O	0	0
			224	224		

- Molecule 1: YTHDC1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	39.88Å 103.98Å 41.98Å 90.00° 104.32° 90.00°	Depositor
Resolution (Å)	40.68 – 1.51 40.68 – 1.51	Depositor EDS
% Data completeness (in resolution range)	98.3 (40.68-1.51) 98.5 (40.68-1.51)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	7.18 (at 1.51Å)	Xtriage
Refinement program	PHENIX 1.17.1_3660	Depositor
R, R_{free}	0.182 , 0.205 0.184 , 0.206	Depositor DCC
R_{free} test set	2563 reflections (4.92%)	wwPDB-VP
Wilson B-factor (Å ²)	19.6	Xtriage
Anisotropy	0.321	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 38.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	3151	wwPDB-VP
Average B, all atoms (Å ²)	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.23% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PEG, SO4

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	0.24	0/1383	0.44	0/1872
1	B	0.25	0/1403	0.48	0/1894
All	All	0.25	0/2786	0.46	0/3766

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	1326	0	1337	9	0
1	B	1338	0	1371	19	2
2	A	7	0	10	1	1
2	B	28	0	40	8	1
3	A	10	0	0	0	0
3	B	15	0	0	2	0
4	A	203	0	0	7	3
4	B	224	0	0	6	3
All	All	3151	0	2758	29	5

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 5.

All (29) 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:A:452:GLU:OE1	4:A:701:HOH:O	1.89	0.90
1:B:369[B]:SER:OG	4:B:701:HOH:O	2.04	0.73
1:A:452:GLU:OE2	4:A:702:HOH:O	2.09	0.70
1:B:472:LYS:O	4:B:702:HOH:O	2.12	0.68
1:B:392:ARG:HH12	2:B:601:PEG:H21	1.59	0.67
1:A:370[B]:LEU:HD12	1:A:374:LYS:HD2	1.78	0.65
1:B:388:ASN:HD22	2:B:601:PEG:H32	1.62	0.65
1:A:344:GLY:N	4:A:704:HOH:O	2.29	0.65
1:B:350:TYR:HD1	2:B:603:PEG:H22	1.61	0.64
1:B:388:ASN:HD22	2:B:601:PEG:C3	2.12	0.62
1:A:404:ARG:NH1	4:A:705:HOH:O	2.30	0.61
1:B:353:GLN:HG3	4:B:707:HOH:O	2.04	0.58
1:A:425:PRO:HD3	2:A:601:PEG:H41	1.86	0.58
1:B:353:GLN:NE2	1:B:354:ASP:OD1	2.39	0.55
1:B:382:VAL:HG12	4:B:868:HOH:O	2.07	0.55
1:B:385:LYS:HE3	1:B:389:LEU:HD11	1.91	0.52
1:B:448[B]:ILE:HG23	1:B:500:LEU:HD21	1.92	0.51
1:B:421:HIS:H	2:B:602:PEG:C4	2.25	0.50
3:B:605:SO4:O3	4:B:703:HOH:O	2.19	0.50
1:B:350:TYR:CD1	2:B:603:PEG:H22	2.46	0.49
1:B:380:LEU:HB2	4:B:771:HOH:O	2.14	0.48
1:B:385:LYS:HA	2:B:601:PEG:H31	1.97	0.47
1:A:498[B]:ILE:HG23	4:A:828:HOH:O	2.16	0.46
1:B:415:LEU:HD23	1:B:445:ILE:HG22	1.98	0.45
1:A:370[B]:LEU:HD22	4:A:816:HOH:O	2.18	0.44
1:A:448[B]:ILE:HG23	1:A:500:LEU:HD21	2.00	0.44
1:B:347:LYS:HE3	3:B:605:SO4:O2	2.20	0.42
4:A:704:HOH:O	1:B:386:LYS:HD2	2.19	0.41
1:B:407:GLY:HA2	2:B:607:PEG:H32	2.04	0.40

All (5) 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:B:361:LYS:NZ	2:A:601:PEG:O4[1_656]	1.30	0.90
1:B:428:TRP:O	2:B:603:PEG:C3[1_556]	1.38	0.82
4:A:748:HOH:O	4:B:727:HOH:O[1_455]	2.11	0.09
4:A:784:HOH:O	4:B:704:HOH:O[2_554]	2.14	0.06
4:A:856:HOH:O	4:B:892:HOH:O[2_555]	2.14	0.06

5.3 Torsion angles

5.3.1 Protein backbone

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	172/403 (43%)	169 (98%)	3 (2%)	0	100	100
1	B	172/403 (43%)	172 (100%)	0	0	100	100
All	All	344/806 (43%)	341 (99%)	3 (1%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains

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	142/356 (40%)	140 (99%)	2 (1%)	62	37
1	B	148/356 (42%)	148 (100%)	0	100	100
All	All	290/712 (41%)	288 (99%)	2 (1%)	89	66

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	498[A]	ILE
1	A	498[B]	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	505	HIS

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Mol	Chain	Res	Type
1	B	388	ASN
1	B	421	HIS
1	B	505	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

10 ligands are 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	PEG	B	602	-	6,6,6	0.47	0	5,5,5	0.30	0
3	SO4	A	602	-	4,4,4	0.13	0	6,6,6	0.40	0
3	SO4	B	606	-	4,4,4	0.12	0	6,6,6	0.13	0
3	SO4	A	603	-	4,4,4	0.14	0	6,6,6	0.06	0
3	SO4	B	605	-	4,4,4	0.16	0	6,6,6	0.16	0
2	PEG	B	607	-	6,6,6	0.49	0	5,5,5	0.46	0
2	PEG	B	603	-	6,6,6	0.49	0	5,5,5	0.34	0
2	PEG	A	601	-	6,6,6	0.48	0	5,5,5	0.62	0
2	PEG	B	601	-	6,6,6	0.48	0	5,5,5	0.56	0
3	SO4	B	604	-	4,4,4	0.17	0	6,6,6	0.25	0

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	PEG	B	602	-	-	1/4/4/4	-
2	PEG	B	607	-	-	3/4/4/4	-
2	PEG	B	603	-	-	3/4/4/4	-
2	PEG	A	601	-	-	0/4/4/4	-
2	PEG	B	601	-	-	4/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (11) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	601	PEG	O2-C3-C4-O4
2	B	607	PEG	O2-C3-C4-O4
2	B	601	PEG	C1-C2-O2-C3
2	B	601	PEG	O1-C1-C2-O2
2	B	603	PEG	C4-C3-O2-C2
2	B	602	PEG	O2-C3-C4-O4
2	B	603	PEG	O2-C3-C4-O4
2	B	607	PEG	C1-C2-O2-C3
2	B	607	PEG	O1-C1-C2-O2
2	B	601	PEG	C4-C3-O2-C2
2	B	603	PEG	C1-C2-O2-C3

There are no ring outliers.

6 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	602	PEG	1	0
3	B	605	SO4	2	0
2	B	607	PEG	1	0
2	B	603	PEG	2	1
2	A	601	PEG	1	1
2	B	601	PEG	4	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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, 95th 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 ²)	Q<0.9
1	A	164/403 (40%)	0.37	14 (8%) 18 19	11, 22, 56, 86	10 (6%)
1	B	164/403 (40%)	0.36	15 (9%) 16 17	10, 20, 50, 59	10 (6%)
All	All	328/806 (40%)	0.36	29 (8%) 17 18	10, 21, 52, 86	20 (6%)

All (29) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	436	ALA	7.3
1	A	432	ALA	4.7
1	B	435	SER	4.0
1	B	439	LEU	3.8
1	A	439	LEU	3.5
1	A	431	PRO	3.4
1	A	422	GLY	3.3
1	B	437	LYS	3.3
1	B	438	MET	3.2
1	B	428	TRP	3.1
1	B	430	LEU	3.0
1	A	433	GLY	2.9
1	B	434	MET	2.9
1	A	435	SER	2.9
1	A	505	HIS	2.8
1	A	434	MET	2.7
1	B	505	HIS	2.7
1	A	436	ALA	2.7
1	B	432	ALA	2.7
1	A	438	MET	2.5
1	A	503	VAL	2.5
1	A	430	LEU	2.4
1	B	426	ILE	2.4
1	A	440	GLY	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	344	GLY	2.3
1	B	431	PRO	2.2
1	B	423	GLY	2.1
1	B	424	SER	2.1
1	B	429	VAL	2.0

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 oligosaccharides 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, 95th 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 ²)	Q<0.9
2	PEG	B	602	7/7	0.68	0.23	43,46,60,61	0
2	PEG	B	603	7/7	0.71	0.16	36,45,55,56	0
3	SO4	A	603	5/5	0.73	0.10	54,67,72,83	0
3	SO4	B	606	5/5	0.74	0.16	36,42,60,62	0
2	PEG	A	601	7/7	0.79	0.15	33,38,40,44	0
2	PEG	B	601	7/7	0.86	0.13	24,37,44,47	0
2	PEG	B	607	7/7	0.87	0.10	28,38,46,46	0
3	SO4	A	602	5/5	0.90	0.13	28,31,37,40	0
3	SO4	B	605	5/5	0.92	0.09	28,34,37,45	0
3	SO4	B	604	5/5	0.98	0.06	24,25,28,29	0

6.5 Other polymers [i](#)

There are no such residues in this entry.