Full wwPDB X-ray Structure Validation Report ⓘ

Oct 16, 2021 – 10:56 PM EDT

PDB ID	:	1TFF
Title	:	Structure of Otubain-2
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Deposited on	:	2004-05-27
Resolution	:	2.10 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 following versions of software and data (see references ⓘ) were used in the production of this report:

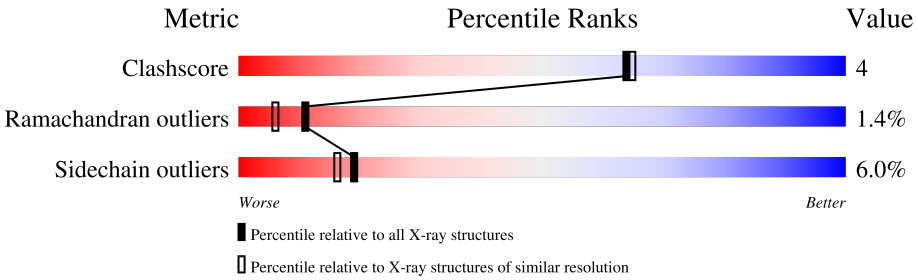
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.23.2

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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))
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)

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 <=5%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	234	76% 16% • • 6%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 1926 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 Ubiquitin thiolesterase protein OTUB2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	221	1826	1169	315	336	4	2	7	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	49	ARG	GLY	engineered mutation	UNP Q96DC9
A	158	MSE	MET	modified residue	UNP Q96DC9
A	171	MSE	MET	modified residue	UNP Q96DC9

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
2	A	100	100	100	0	0

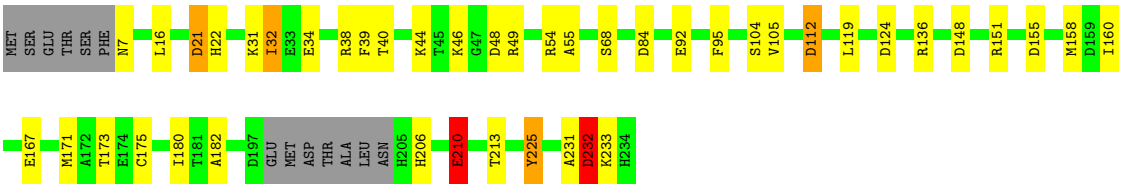
3 Residue-property plots (i)

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. 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. 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.

Note EDS was not executed.

• Molecule 1: Ubiquitin thiolesterase protein OTUB2

Chain A:



4 Data and refinement statistics (i)

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	46.43Å 65.40Å 76.26Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.39 – 2.10	Depositor
% Data completeness (in resolution range)	99.5 (49.39-2.10)	Depositor
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	REFMAC 5.1.24	Depositor
R, R_{free}	0.188 , 0.257	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	1926	wwPDB-VP
Average B, all atoms (Å^2)	29.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

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	1.31	6/1864 (0.3%)	1.43	20/2508 (0.8%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	55	ALA	CA-CB	5.75	1.64	1.52
1	A	225	TYR	CG-CD1	-5.65	1.31	1.39
1	A	182	ALA	CA-CB	-5.45	1.41	1.52
1	A	167	GLU	CD-OE1	5.40	1.31	1.25
1	A	210	GLU	CD-OE1	5.34	1.31	1.25
1	A	39	PHE	CE2-CZ	5.14	1.47	1.37

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	54	ARG	NE-CZ-NH2	-25.50	107.55	120.30
1	A	54	ARG	NE-CZ-NH1	21.22	130.91	120.30
1	A	54	ARG	CD-NE-CZ	8.45	135.43	123.60
1	A	54	ARG	CG-CD-NE	-7.85	95.32	111.80
1	A	112	ASP	CB-CG-OD1	-7.66	111.41	118.30
1	A	38	ARG	NE-CZ-NH1	7.12	123.86	120.30
1	A	136	ARG	NE-CZ-NH1	7.00	123.80	120.30
1	A	38	ARG	NE-CZ-NH2	-6.23	117.18	120.30
1	A	112	ASP	CB-CG-OD2	6.22	123.90	118.30
1	A	119	LEU	CB-CG-CD2	-6.00	100.80	111.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	84	ASP	CB-CG-OD2	5.67	123.41	118.30
1	A	225	TYR	CB-CG-CD2	5.62	124.38	121.00
1	A	175	CYS	CA-CB-SG	-5.59	103.94	114.00
1	A	148	ASP	CB-CG-OD2	5.44	123.19	118.30
1	A	151	ARG	NE-CZ-NH2	-5.42	117.59	120.30
1	A	124	ASP	CB-CG-OD2	5.27	123.04	118.30
1	A	232	ASP	CB-CG-OD2	5.23	123.00	118.30
1	A	155	ASP	CB-CG-OD2	5.12	122.91	118.30
1	A	21	ASP	CB-CG-OD2	5.11	122.90	118.30
1	A	173	THR	OG1-CB-CG2	-5.02	98.46	110.00

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	232	ASP	Peptide
1	A	233	LYS	Peptide

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	1826	0	1796	14	1
2	A	100	0	0	0	1
All	All	1926	0	1796	14	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 4.

All (14) 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:158:MSE:CE	1:A:158:MSE:SE	2.18	1.41
1:A:171:MSE:CE	1:A:171:MSE:SE	2.21	1.37
1:A:40:THR:HG23	1:A:231:ALA:HB2	1.67	0.77

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:40:THR:CG2	1:A:231:ALA:HB2	2.26	0.65
1:A:92:GLU:HA	1:A:95:PHE:CZ	2.31	0.65
1:A:92:GLU:HA	1:A:95:PHE:CE2	2.38	0.59
1:A:112:ASP:OD1	1:A:112:ASP:C	2.44	0.56
1:A:213:THR:O	1:A:213:THR:OG1	2.24	0.54
1:A:46:LYS:HZ3	1:A:48:ASP:HB3	1.74	0.53
1:A:46:LYS:NZ	1:A:48:ASP:HB3	2.25	0.52
1:A:32:ILE:N	1:A:32:ILE:HD13	2.26	0.51
1:A:40:THR:HG23	1:A:231:ALA:CB	2.39	0.50
1:A:210:GLU:H	1:A:210:GLU:CD	2.16	0.49
1:A:180:ILE:HD11	1:A:225:TYR:OH	2.18	0.42

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:A:49:ARG:NH2	2:A:328:HOH:O[3_655]	1.32	0.88

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	217/234 (93%)	210 (97%)	4 (2%)	3 (1%)	11 6

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	21	ASP
1	A	22	HIS
1	A	206	HIS

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	200/210 (95%)	188 (94%)	12 (6%)	19 16

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	7	ASN
1	A	16	LEU
1	A	31	LYS
1	A	32	ILE
1	A	34	GLU
1	A	44	LYS
1	A	68	SER
1	A	104	SER
1	A	105	VAL
1	A	160	ILE
1	A	210	GLU
1	A	232	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	7	ASN

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

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)

There are no ligands in this entry.

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

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.