



wwPDB X-ray Structure Validation Summary Report

Mar 5, 2024 – 06:47 AM EST

PDB ID : 2DSB
Title : Crystal structure of human ADP-ribose pyrophosphatase NUDT5
Authors : Zha, M.; Zhong, C.; Ding, J.
Deposited on : 2006-06-28
Resolution : 2.50 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

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 : 4.02b-467
Xtriage (Phenix) : 1.13
EDS : 2.36
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) : 2.36

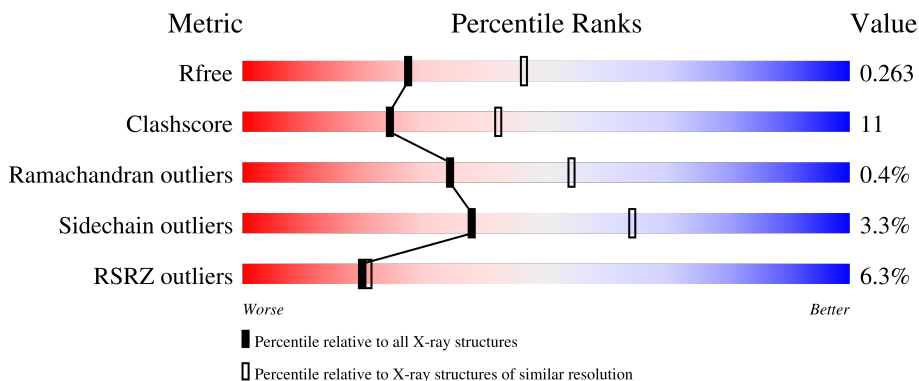
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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	227	
1	B	227	
1	C	227	
1	D	227	

2 Entry composition i

There are 2 unique types of molecules in this entry. The entry contains 6658 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 ADP-sugar pyrophosphatase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	206	1610	1023	268	311	8	0	0	0
1	B	206	1610	1023	268	311	8	0	0	0
1	C	206	1610	1023	268	311	8	0	0	0
1	D	206	1610	1023	268	311	8	0	0	0

There are 32 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	220	LEU	-	expression tag	UNP Q9UKK9
A	221	GLU	-	expression tag	UNP Q9UKK9
A	222	HIS	-	expression tag	UNP Q9UKK9
A	223	HIS	-	expression tag	UNP Q9UKK9
A	224	HIS	-	expression tag	UNP Q9UKK9
A	225	HIS	-	expression tag	UNP Q9UKK9
A	226	HIS	-	expression tag	UNP Q9UKK9
A	227	HIS	-	expression tag	UNP Q9UKK9
B	220	LEU	-	expression tag	UNP Q9UKK9
B	221	GLU	-	expression tag	UNP Q9UKK9
B	222	HIS	-	expression tag	UNP Q9UKK9
B	223	HIS	-	expression tag	UNP Q9UKK9
B	224	HIS	-	expression tag	UNP Q9UKK9
B	225	HIS	-	expression tag	UNP Q9UKK9
B	226	HIS	-	expression tag	UNP Q9UKK9
B	227	HIS	-	expression tag	UNP Q9UKK9
C	220	LEU	-	expression tag	UNP Q9UKK9
C	221	GLU	-	expression tag	UNP Q9UKK9
C	222	HIS	-	expression tag	UNP Q9UKK9
C	223	HIS	-	expression tag	UNP Q9UKK9
C	224	HIS	-	expression tag	UNP Q9UKK9

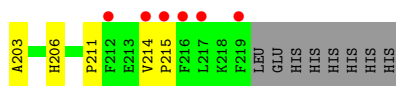
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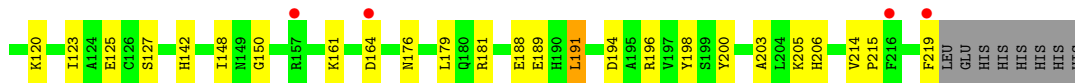
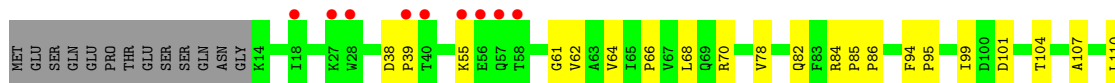
Chain	Residue	Modelled	Actual	Comment	Reference
C	225	HIS	-	expression tag	UNP Q9UKK9
C	226	HIS	-	expression tag	UNP Q9UKK9
C	227	HIS	-	expression tag	UNP Q9UKK9
D	220	LEU	-	expression tag	UNP Q9UKK9
D	221	GLU	-	expression tag	UNP Q9UKK9
D	222	HIS	-	expression tag	UNP Q9UKK9
D	223	HIS	-	expression tag	UNP Q9UKK9
D	224	HIS	-	expression tag	UNP Q9UKK9
D	225	HIS	-	expression tag	UNP Q9UKK9
D	226	HIS	-	expression tag	UNP Q9UKK9
D	227	HIS	-	expression tag	UNP Q9UKK9

- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	70	Total O 70 70	0	0
2	B	74	Total O 74 74	0	0
2	C	36	Total O 36 36	0	0
2	D	38	Total O 38 38	0	0



● Molecule 1: ADP-sugar pyrophosphatase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	81.72Å 70.32Å 87.63Å 90.00° 100.41° 90.00°	Depositor
Resolution (Å)	35.55 – 2.50 35.55 – 2.50	Depositor EDS
% Data completeness (in resolution range)	96.3 (35.55-2.50) 96.4 (35.55-2.50)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.25 (at 2.51Å)	Xtrriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.214 , 0.262 0.214 , 0.263	Depositor DCC
R_{free} test set	1641 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	51.1	Xtrriage
Anisotropy	0.578	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 62.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	6658	wwPDB-VP
Average B, all atoms (Å ²)	69.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.98% 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 [i](#)

5.1 Standard geometry [i](#)

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	0.41	0/1644	0.66	0/2233
1	B	0.42	0/1644	0.67	0/2233
1	C	0.36	0/1644	0.60	0/2233
1	D	0.36	0/1644	0.61	0/2233
All	All	0.39	0/6576	0.63	0/8932

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 [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	1610	0	1608	34	0
1	B	1610	0	1608	51	0
1	C	1610	0	1608	41	0
1	D	1610	0	1608	36	0
2	A	70	0	0	0	0
2	B	74	0	0	2	0
2	C	36	0	0	0	0
2	D	38	0	0	1	0
All	All	6658	0	6432	141	0

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 11.

The worst 5 of 141 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:C:203:ALA:HB3	1:D:203:ALA:HB3	1.49	0.92
1:A:203:ALA:HB3	1:B:203:ALA:HB3	1.57	0.86
1:C:71:THR:O	1:C:72:LEU:HB2	1.80	0.81
1:A:64:VAL:O	1:A:66:PRO:HD3	1.84	0.78
1:C:48:SER:HB3	1:D:86:PRO:HG3	1.64	0.77

There are no symmetry-related clashes.

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	204/227 (90%)	193 (95%)	11 (5%)	0	100	100
1	B	204/227 (90%)	200 (98%)	4 (2%)	0	100	100
1	C	204/227 (90%)	193 (95%)	10 (5%)	1 (0%)	29	48
1	D	204/227 (90%)	191 (94%)	11 (5%)	2 (1%)	15	28
All	All	816/908 (90%)	777 (95%)	36 (4%)	3 (0%)	34	54

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	164	ASP
1	D	176	ASN
1	C	211	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	176/196 (90%)	174 (99%)	2 (1%)	73	89
1	B	176/196 (90%)	169 (96%)	7 (4%)	31	56
1	C	176/196 (90%)	169 (96%)	7 (4%)	31	56
1	D	176/196 (90%)	169 (96%)	7 (4%)	31	56
All	All	704/784 (90%)	681 (97%)	23 (3%)	38	64

5 of 23 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	189	GLU
1	D	101	ASP
1	D	55	LYS
1	D	161	LYS
1	B	159	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	149	ASN
1	C	180	GLN
1	D	206	HIS
1	C	206	HIS
1	C	73	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](#)

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 [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, 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	206/227 (90%)	0.13	8 (3%) 39 42	28, 51, 104, 156	0
1	B	206/227 (90%)	0.16	8 (3%) 39 42	27, 51, 107, 159	0
1	C	206/227 (90%)	0.52	23 (11%) 5 4	38, 71, 134, 170	0
1	D	206/227 (90%)	0.38	13 (6%) 20 21	38, 72, 130, 176	0
All	All	824/908 (90%)	0.30	52 (6%) 20 21	27, 61, 123, 176	0

The worst 5 of 52 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	216	PHE	6.6
1	B	212	PHE	6.5
1	C	164	ASP	6.5
1	A	219	PHE	6.4
1	C	212	PHE	5.9

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](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.