



Full wwPDB X-ray Structure Validation Report ⓘ

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PDB ID : 5QZZ / pdb_00005qzz
Title : PanDDA analysis group deposition – Auto-refined data of Aar2/RNaseH for ground state model 50
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Deposited on : 2020-02-12
Resolution : 1.59 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
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
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)	:	2.49

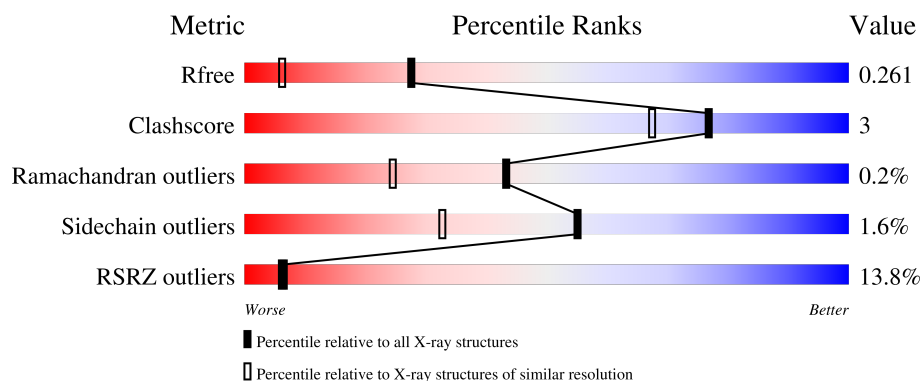
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.59 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}	180053	4673 (1.60-1.60)
Clashscore	190562	4931 (1.60-1.60)
Ramachandran outliers	187476	4831 (1.60-1.60)
Sidechain outliers	187428	4830 (1.60-1.60)
RSRZ outliers	180081	4672 (1.60-1.60)

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	258	10% 85% 6% • 8%
2	B	308	15% 88% 8% • •

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 4679 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 Pre-mRNA-splicing factor 8.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	237	2002	1283	335	372	12	0	12	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1833	GLY	-	expression tag	UNP P33334
A	1834	ALA	-	expression tag	UNP P33334
A	1835	MET	-	expression tag	UNP P33334

- Molecule 2 is a protein called A1 cistron-splicing factor AAR2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	300	2580	1654	421	485	20	5	9	0

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-3	GLY	-	expression tag	UNP P32357
B	-2	ALA	-	expression tag	UNP P32357
B	-1	MET	-	expression tag	UNP P32357
B	0	ALA	-	expression tag	UNP P32357
B	166	SER	-	linker	UNP P32357
B	167	SER	-	linker	UNP P32357
B	168	SER	-	linker	UNP P32357
B	169	SER	-	linker	UNP P32357
B	170	SER	-	linker	UNP P32357

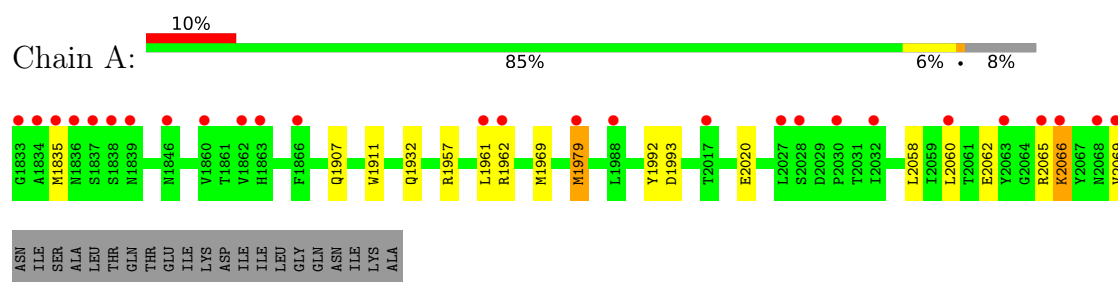
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	56	Total 56	O 56	0	0
3	B	41	Total 41	O 41	0	0

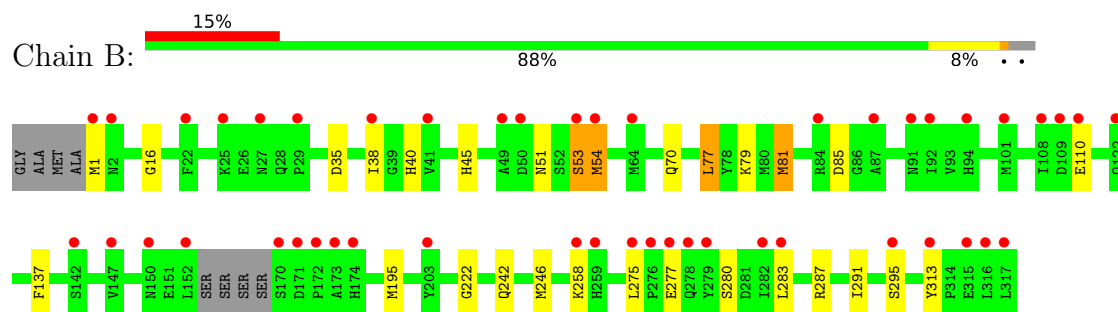
3 Residue-property plots [i](#)

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 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: Pre-mRNA-splicing factor 8



- Molecule 2: A1 cistron-splicing factor AAR2



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	88.76Å 81.98Å 93.95Å 90.00° 108.71° 90.00°	Depositor
Resolution (Å)	44.66 – 1.59 44.66 – 1.59	Depositor EDS
% Data completeness (in resolution range)	97.8 (44.66-1.59) 97.8 (44.66-1.59)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.96 (at 1.59Å)	Xtriage
Refinement program	REFMAC 5.8.0238, PHENIX 1.16.3549	Depositor
R, R_{free}	0.247 , 0.249 0.255 , 0.261	Depositor DCC
R_{free} test set	4049 reflections (4.77%)	wwPDB-VP
Wilson B-factor (Å ²)	36.6	Xtriage
Anisotropy	0.015	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 24.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	4679	wwPDB-VP
Average B, all atoms (Å ²)	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.51% 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	1.07	0/2049	1.28	1/2775 (0.0%)
2	B	1.07	3/2651 (0.1%)	1.26	2/3581 (0.1%)
All	All	1.07	3/4700 (0.1%)	1.27	3/6356 (0.0%)

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
2	B	0	2

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	38	ILE	C-O	5.83	1.31	1.24
2	B	222	GLY	C-O	5.57	1.30	1.23
2	B	137	PHE	C-O	5.11	1.30	1.23

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	85	ASP	CA-C-N	5.29	125.96	119.99
2	B	85	ASP	C-N-CA	5.29	125.96	119.99
1	A	2066	LYS	N-CA-CB	5.08	117.44	110.07

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	54[A]	MET	Peptide
2	B	54[B]	MET	Peptide

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	2002	0	2029	12	0
2	B	2580	0	2450	16	0
3	A	56	0	0	1	0
3	B	41	0	0	1	0
All	All	4679	0	4479	26	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 3.

All (26) 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:2069:VAL:C	3:A:2101:HOH:O	2.16	0.89
2:B:51:ASN:OD1	2:B:53:SER:HB2	1.78	0.81
1:A:1911:TRP:CD1	2:B:195:MET:HE3	2.23	0.73
1:A:2062:GLU:O	1:A:2066:LYS:HG2	1.93	0.69
2:B:280:SER:HB3	2:B:313:TYR:CE1	2.31	0.64
1:A:1979[B]:MET:HA	1:A:1979[B]:MET:HE2	1.83	0.59
1:A:1962:ARG:HD3	1:A:1962:ARG:H	1.70	0.56
1:A:2058:LEU:C	1:A:2058:LEU:HD23	2.32	0.55
2:B:77:LEU:HD21	2:B:79:LYS:HE3	1.87	0.55
1:A:1969:MET:HA	1:A:1969:MET:HE2	1.89	0.54
2:B:287:ARG:O	2:B:291:ILE:HD13	2.08	0.54
2:B:70:GLN:HB3	2:B:81:MET:HE2	1.90	0.53
1:A:1907:GLN:HG2	2:B:195:MET:CE	2.38	0.53
1:A:1835:MET:HE1	1:A:1961:LEU:HD12	1.90	0.53
2:B:16:GLY:HA3	2:B:45:HIS:CE1	2.46	0.50
2:B:277:GLU:CD	2:B:277:GLU:H	2.21	0.49
1:A:2062:GLU:HB3	1:A:2066:LYS:HE3	1.96	0.47
2:B:110:GLU:HG2	2:B:110:GLU:O	2.14	0.47
1:A:1932:GLN:OE1	1:A:1957:ARG:NH1	2.42	0.47
2:B:258:LYS:HD2	2:B:258:LYS:H	1.79	0.47
2:B:275:LEU:CD2	2:B:283:LEU:HD13	2.46	0.46
2:B:1:MET:HB3	2:B:35:ASP:HA	2.00	0.43
1:A:1992:TYR:O	1:A:1993:ASP:C	2.60	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:242:GLN:O	2:B:246:MET:HG3	2.19	0.43
2:B:275:LEU:HD22	2:B:283:LEU:HD13	2.02	0.42
2:B:40:HIS:HD2	3:B:421:HOH:O	2.03	0.41

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	248/258 (96%)	243 (98%)	5 (2%)	0	100	100
2	B	306/308 (99%)	295 (96%)	9 (3%)	2 (1%)	18	6
All	All	554/566 (98%)	538 (97%)	14 (2%)	2 (0%)	43	14

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	54[A]	MET
2	B	54[B]	MET

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	226/233 (97%)	220 (97%)	6 (3%)	39	16

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	B	287/284 (101%)	283 (99%)	4 (1%)	59	38
All	All	513/517 (99%)	503 (98%)	10 (2%)	55	27

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1979[A]	MET
1	A	1979[B]	MET
1	A	1979[C]	MET
1	A	2020	GLU
1	A	2060	LEU
1	A	2065	ARG
2	B	53	SER
2	B	77	LEU
2	B	81	MET
2	B	295	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	2054	GLN
2	B	40	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](#)

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

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	237/258 (91%)	0.87	27 (11%) 10 9	11, 31, 56, 99	12 (5%)
2	B	300/308 (97%)	1.09	47 (15%) 5 4	11, 35, 63, 96	9 (3%)
All	All	537/566 (94%)	0.99	74 (13%) 6 6	11, 34, 63, 99	21 (3%)

All (74) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	22	PHE	7.7
2	B	152	LEU	7.4
2	B	54[A]	MET	7.3
1	A	2069	VAL	6.0
2	B	170	SER	5.8
2	B	173	ALA	5.6
2	B	1	MET	5.5
1	A	1979[A]	MET	5.3
2	B	108	ILE	4.9
1	A	1833	GLY	4.9
2	B	279	TYR	4.7
2	B	172	PRO	4.7
2	B	316	LEU	4.6
1	A	2065	ARG	4.6
1	A	1834	ALA	4.6
2	B	203[A]	TYR	4.5
2	B	317	LEU	4.5
2	B	174	HIS	4.2
1	A	1837	SER	3.7
2	B	41[A]	VAL	3.5
2	B	38	ILE	3.5
1	A	1836	ASN	3.4
1	A	1835	MET	3.4
2	B	275	LEU	3.4

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Mol	Chain	Res	Type	RSRZ
2	B	84	ARG	3.2
1	A	1866	PHE	3.1
1	A	2027	LEU	3.0
1	A	2028	SER	3.0
2	B	313	TYR	2.9
1	A	1839	ASN	2.9
1	A	1838	SER	2.9
2	B	53	SER	2.9
2	B	258	LYS	2.9
2	B	2	ASN	2.9
1	A	1863	HIS	2.8
1	A	2017[A]	THR	2.8
2	B	49	ALA	2.7
1	A	1846	ASN	2.7
2	B	27	ASN	2.7
2	B	92	ILE	2.7
2	B	282	ILE	2.7
1	A	2063	TYR	2.6
2	B	142	SER	2.6
2	B	87	ALA	2.5
1	A	2032	ILE	2.5
2	B	109	ASP	2.5
1	A	2030	PRO	2.5
2	B	122[A]	GLN	2.4
1	A	2060	LEU	2.4
2	B	50	ASP	2.4
1	A	1962	ARG	2.4
2	B	150	ASN	2.4
2	B	29	PRO	2.4
2	B	64[A]	MET	2.4
2	B	110	GLU	2.4
2	B	147	VAL	2.3
2	B	278	GLN	2.3
2	B	91	ASN	2.2
2	B	171	ASP	2.2
2	B	315	GLU	2.2
2	B	94	HIS	2.2
1	A	2068	ASN	2.2
1	A	1862	VAL	2.2
2	B	101	MET	2.2
1	A	1961	LEU	2.1
2	B	25	LYS	2.1

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Mol	Chain	Res	Type	RSRZ
2	B	283	LEU	2.1
2	B	277	GLU	2.1
2	B	295	SER	2.1
2	B	259	HIS	2.1
1	A	2066	LYS	2.0
1	A	1860	VAL	2.0
1	A	1988	LEU	2.0
2	B	276	PRO	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](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.