



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 03:51 PM UTC

PDB ID : 3LX6 / pdb_00003lx6
Title : Crystal structure of putative dna cytosine methylase from shigella flexneri 2a str. 2457T
Authors : Ramagopal, U.A.; Toro, R.; Burley, S.K.; Almo, S.C.; New York SGX Research Center for Structural Genomics (NYSGXRC)
Deposited on : 2010-02-24
Resolution : 2.29 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	:	2022.3.0, CSD as543be (2022)
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

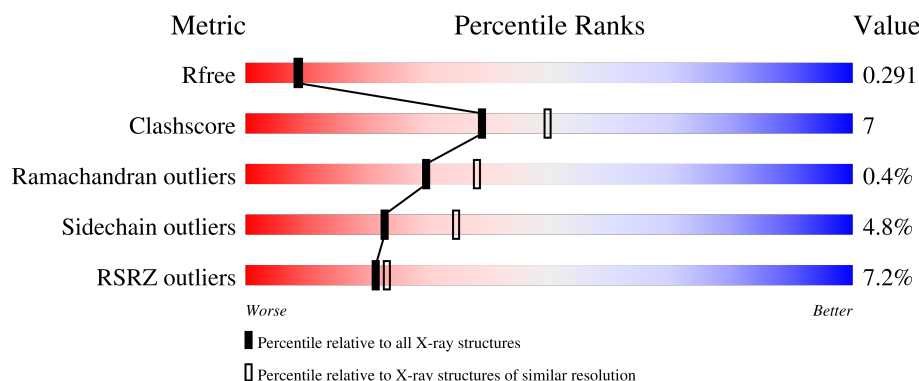
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.29 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	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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	410	3% 75% 15% 10%
1	B	410	10% 69% 18% 12%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 5835 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 Cytosine-specific methyltransferase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	368	Total	C	N	O	S	Se	0	0	0
			2964	1889	531	532	6	6			
1	B	362	Total	C	N	O	S	Se	0	0	0
			2842	1800	514	516	6	6			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	61	MSE	-	expression tag	UNP E3Y0J2
A	62	SER	-	expression tag	UNP E3Y0J2
A	463	GLU	-	expression tag	UNP E3Y0J2
A	464	GLY	-	expression tag	UNP E3Y0J2
A	465	HIS	-	expression tag	UNP E3Y0J2
A	466	HIS	-	expression tag	UNP E3Y0J2
A	467	HIS	-	expression tag	UNP E3Y0J2
A	468	HIS	-	expression tag	UNP E3Y0J2
A	469	HIS	-	expression tag	UNP E3Y0J2
A	470	HIS	-	expression tag	UNP E3Y0J2
B	61	MSE	-	expression tag	UNP E3Y0J2
B	62	SER	-	expression tag	UNP E3Y0J2
B	463	GLU	-	expression tag	UNP E3Y0J2
B	464	GLY	-	expression tag	UNP E3Y0J2
B	465	HIS	-	expression tag	UNP E3Y0J2
B	466	HIS	-	expression tag	UNP E3Y0J2
B	467	HIS	-	expression tag	UNP E3Y0J2
B	468	HIS	-	expression tag	UNP E3Y0J2
B	469	HIS	-	expression tag	UNP E3Y0J2
B	470	HIS	-	expression tag	UNP E3Y0J2

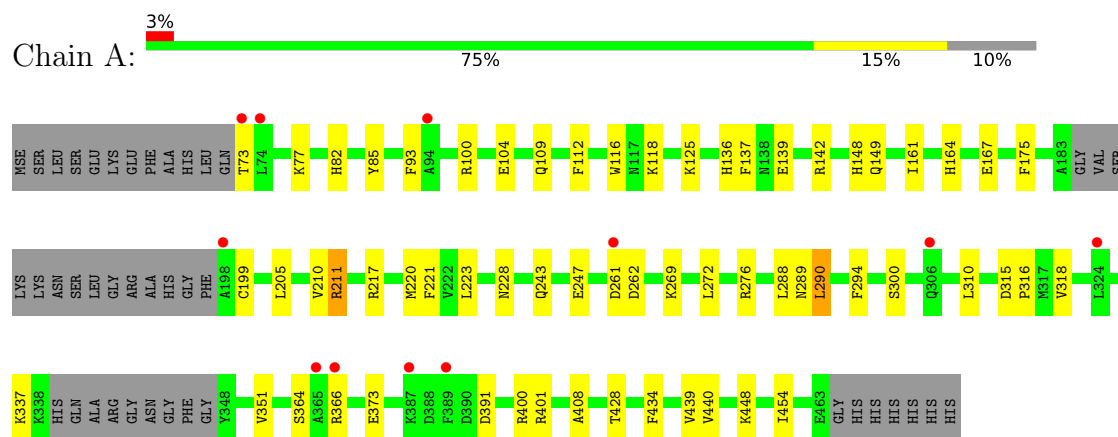
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	24	Total 24	O 24	0	0
2	B	5	Total 5	O 5	0	0

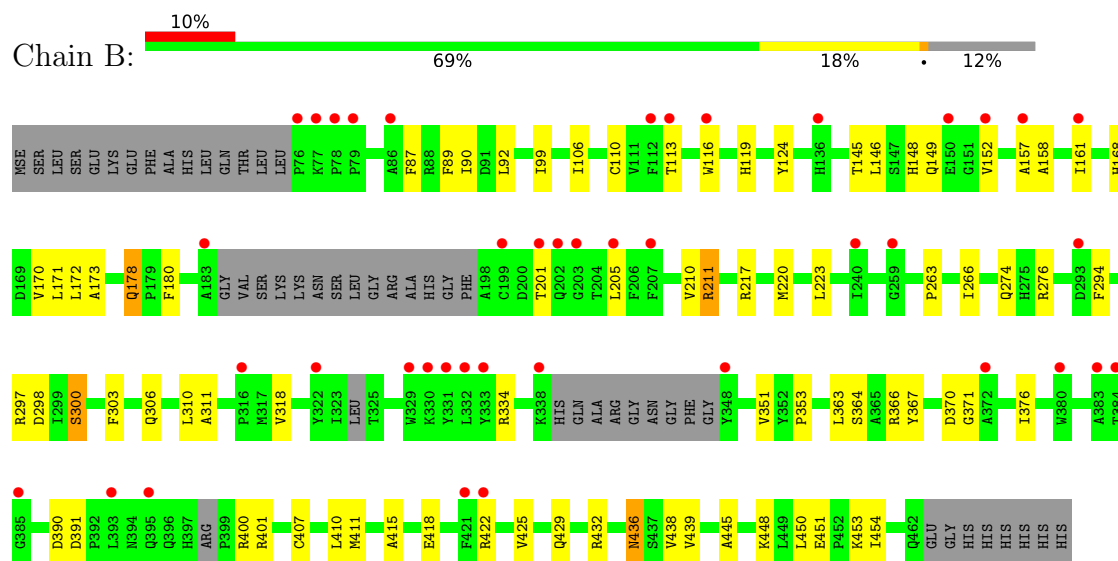
3 Residue-property plots [i](#)

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: Cytosine-specific methyltransferase



• Molecule 1: Cytosine-specific methyltransferase



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	122.96Å 83.81Å 113.24Å 90.00° 118.51° 90.00°	Depositor
Resolution (Å)	31.26 – 2.29 31.26 – 2.29	Depositor EDS
% Data completeness (in resolution range)	96.5 (31.26-2.29) 96.5 (31.26-2.29)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.24 (at 2.29Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.243 , 0.288 0.246 , 0.291	Depositor DCC
R_{free} test set	2214 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å ²)	43.5	Xtriage
Anisotropy	0.355	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 37.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	5835	wwPDB-VP
Average B, all atoms (Å ²)	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.40% 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	0.93	1/3034 (0.0%)	1.02	9/4100 (0.2%)
1	B	0.79	1/2903 (0.0%)	0.99	2/3919 (0.1%)
All	All	0.86	2/5937 (0.0%)	1.01	11/8019 (0.1%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	217	ARG	C-O	5.68	1.26	1.23
1	A	112	PHE	C-O	-5.59	1.16	1.23

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	391	ASP	CA-C-N	5.86	126.00	119.32
1	B	391	ASP	C-N-CA	5.86	126.00	119.32
1	A	199	CYS	N-CA-C	5.76	120.14	113.18
1	A	440	VAL	CA-C-N	-5.59	113.92	119.56
1	A	440	VAL	C-N-CA	-5.59	113.92	119.56
1	A	315	ASP	CA-C-N	5.58	126.81	119.84
1	A	315	ASP	C-N-CA	5.58	126.81	119.84
1	A	391	ASP	CA-C-N	5.08	124.68	119.05
1	A	391	ASP	C-N-CA	5.08	124.68	119.05
1	A	400	ARG	CA-C-N	5.08	130.21	120.97
1	A	400	ARG	C-N-CA	5.08	130.21	120.97

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	2964	0	2911	29	0
1	B	2842	0	2733	52	0
2	A	24	0	0	0	0
2	B	5	0	0	0	0
All	All	5835	0	5644	78	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 7.

All (78) 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:178:GLN:HE22	1:B:205:LEU:H	0.96	0.91
1:A:205:LEU:HD21	1:B:306:GLN:NE2	1.91	0.86
1:B:415:ALA:HB3	1:B:418:GLU:HG3	1.59	0.84
1:B:90:ILE:HD11	1:B:171:LEU:HD12	1.65	0.77
1:B:274:GLN:HB2	1:B:410:LEU:HD11	1.68	0.75
1:B:180:PHE:CD1	1:B:201:THR:HA	2.22	0.74
1:B:178:GLN:HE22	1:B:205:LEU:N	1.80	0.74
1:A:310:LEU:CD2	1:A:351:VAL:HG11	2.22	0.70
1:B:178:GLN:NE2	1:B:205:LEU:H	1.82	0.67
1:A:243:GLN:O	1:A:247:GLU:HG3	1.99	0.62
1:A:310:LEU:HD22	1:A:351:VAL:HG11	1.79	0.62
1:A:82:HIS:HD2	1:A:85:TYR:OH	1.82	0.61
1:B:300:SER:O	1:B:303:PHE:HB2	2.01	0.61
1:A:428:THR:HG21	1:B:298:ASP:OD2	2.00	0.61
1:B:371:GLY:HA3	1:B:401:ARG:HD3	1.83	0.60
1:B:276:ARG:HD3	1:B:439:VAL:CG2	2.32	0.60
1:B:310:LEU:CD2	1:B:351:VAL:HG11	2.32	0.60
1:A:220:MSE:HE1	1:A:454:ILE:HA	1.85	0.58
1:B:146:LEU:CD1	1:B:152:VAL:HG11	2.34	0.58
1:B:445:ALA:HA	1:B:448:LYS:HE2	1.86	0.57
1:B:263:PRO:HB3	1:B:297:ARG:HG3	1.87	0.57
1:B:311:ALA:HB2	1:B:353:PRO:O	2.05	0.56
1:B:220:MSE:HE1	1:B:454:ILE:HA	1.87	0.56
1:B:90:ILE:HD11	1:B:171:LEU:CD1	2.35	0.55
1:A:408:ALA:HB2	1:A:434:PHE:CZ	2.42	0.54
1:B:376:ILE:HB	1:B:400:ARG:HG2	1.90	0.54
1:B:99:ILE:HG22	1:B:172:LEU:HD13	1.90	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:276:ARG:HD3	1:A:439:VAL:HG23	1.91	0.53
1:B:363:LEU:HD11	1:B:407:CYS:SG	2.48	0.53
1:B:276:ARG:HD3	1:B:439:VAL:HG23	1.91	0.53
1:B:276:ARG:NE	1:B:411:MSE:HE1	2.25	0.52
1:A:93:PHE:CD1	1:A:116:TRP:HZ3	2.29	0.51
1:A:93:PHE:CZ	1:A:205:LEU:HD22	2.46	0.50
1:A:136:HIS:NE2	1:A:164:HIS:O	2.38	0.50
1:B:146:LEU:HD13	1:B:152:VAL:HG11	1.94	0.49
1:A:161:ILE:HD11	1:A:211:ARG:HG2	1.94	0.49
1:B:87:PHE:HE2	1:B:106:ILE:HG13	1.77	0.49
1:B:367:TYR:OH	1:B:401:ARG:HG2	2.13	0.48
1:A:93:PHE:HD1	1:A:116:TRP:HZ3	1.61	0.48
1:B:119:HIS:CD2	1:B:119:HIS:N	2.82	0.48
1:A:93:PHE:CE1	1:A:205:LEU:HD22	2.49	0.48
1:B:180:PHE:HD1	1:B:201:THR:HA	1.74	0.48
1:B:145:THR:O	1:B:211:ARG:NH2	2.39	0.47
1:B:90:ILE:HD13	1:B:168:HIS:CE1	2.50	0.47
1:A:364:SER:CB	1:A:366:ARG:HE	2.28	0.46
1:B:89:PHE:CZ	1:B:110:CYS:HB2	2.50	0.46
1:B:92:LEU:HB2	1:B:173:ALA:HB2	1.98	0.46
1:A:294:PHE:CD2	1:A:294:PHE:C	2.93	0.46
1:B:310:LEU:HD22	1:B:351:VAL:HG11	1.98	0.46
1:A:261:ASP:O	1:A:262:ASP:C	2.60	0.45
1:A:175:PHE:HE1	1:A:223:LEU:HB3	1.83	0.44
1:B:173:ALA:O	1:B:223:LEU:HA	2.17	0.44
1:B:294:PHE:CD2	1:B:294:PHE:C	2.96	0.44
1:B:425:VAL:HB	1:B:429:GLN:HB2	1.99	0.44
1:B:432:ARG:O	1:B:436:ASN:HB2	2.17	0.44
1:A:142:ARG:HD3	1:B:306:GLN:OE1	2.18	0.44
1:A:85:TYR:CG	1:A:109:GLN:HB2	2.54	0.43
1:B:146:LEU:HD12	1:B:152:VAL:HG11	1.99	0.43
1:A:221:PHE:CD1	1:A:221:PHE:C	2.97	0.43
1:B:170:VAL:HA	1:B:220:MSE:O	2.19	0.43
1:B:367:TYR:CD1	1:B:371:GLY:HA2	2.54	0.43
1:B:113:THR:HG21	1:B:124:TYR:CZ	2.54	0.42
1:B:274:GLN:HB2	1:B:410:LEU:CD1	2.44	0.42
1:B:158:ALA:HA	1:B:161:ILE:HD12	2.02	0.42
1:A:118:LYS:HE3	1:A:139:GLU:OE2	2.20	0.41
1:A:276:ARG:HD3	1:A:439:VAL:CG2	2.49	0.41
1:A:125:LYS:HE2	1:A:137:PHE:CE2	2.56	0.41
1:B:92:LEU:HB2	1:B:173:ALA:CB	2.50	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:310:LEU:HD23	1:B:351:VAL:HG11	2.02	0.41
1:A:269:LYS:HA	1:A:272:LEU:O	2.21	0.41
1:B:274:GLN:HE21	1:B:274:GLN:HB3	1.67	0.40
1:B:364:SER:HB2	1:B:366:ARG:HH21	1.86	0.40
1:B:99:ILE:HG13	1:B:438:VAL:HG21	2.03	0.40
1:B:450:LEU:O	1:B:451:GLU:C	2.64	0.40
1:A:288:LEU:HB3	1:A:290:LEU:HD12	2.03	0.40
1:B:146:LEU:HD12	1:B:157:ALA:HA	2.03	0.40
1:A:100:ARG:HE	1:A:104:GLU:CD	2.29	0.40
1:A:401:ARG:HH21	1:A:401:ARG:HD3	1.75	0.40

There are no symmetry-related clashes.

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	362/410 (88%)	353 (98%)	8 (2%)	1 (0%)	36	46
1	B	352/410 (86%)	334 (95%)	16 (4%)	2 (1%)	21	27
All	All	714/820 (87%)	687 (96%)	24 (3%)	3 (0%)	30	38

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	300	SER
1	B	370	ASP
1	A	316	PRO

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	313/340 (92%)	297 (95%)	16 (5%)	21	32
1	B	290/340 (85%)	277 (96%)	13 (4%)	24	37
All	All	603/680 (89%)	574 (95%)	29 (5%)	23	35

All (29) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	73	THR
1	A	77	LYS
1	A	148	HIS
1	A	149	GLN
1	A	167	GLU
1	A	210	VAL
1	A	211	ARG
1	A	217	ARG
1	A	228	ASN
1	A	289	ASN
1	A	290	LEU
1	A	300	SER
1	A	318	VAL
1	A	337	LYS
1	A	373	GLU
1	A	448	LYS
1	B	116	TRP
1	B	148	HIS
1	B	149	GLN
1	B	178	GLN
1	B	210	VAL
1	B	211	ARG
1	B	266	ILE
1	B	318	VAL
1	B	334	ARG
1	B	390	ASP
1	B	422	ARG

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Mol	Chain	Res	Type
1	B	436	ASN
1	B	453	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	81	HIS
1	A	82	HIS
1	A	228	ASN
1	A	258	ASN
1	A	354	ASN
1	A	436	ASN
1	B	82	HIS
1	B	164	HIS
1	B	168	HIS
1	B	178	GLN
1	B	228	ASN
1	B	258	ASN
1	B	275	HIS
1	B	357	GLN
1	B	433	GLN
1	B	456	GLN

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	362/410 (88%)	0.38	11 (3%) 52 54	19, 30, 43, 77	0
1	B	356/410 (86%)	0.99	41 (11%) 9 10	19, 33, 48, 80	0
All	All	718/820 (87%)	0.68	52 (7%) 21 23	19, 32, 46, 80	0

All (52) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	198	ALA	3.9
1	B	77	LYS	3.8
1	B	203	GLY	3.6
1	B	199	CYS	3.6
1	B	157	ALA	3.5
1	B	393	LEU	3.5
1	B	348	TYR	3.5
1	B	205	LEU	3.5
1	B	259	GLY	3.4
1	A	74	LEU	3.3
1	B	333	TYR	3.3
1	B	380	TRP	3.2
1	B	161	ILE	3.0
1	B	150	GLU	2.7
1	B	322	TYR	2.7
1	B	338	LYS	2.7
1	B	384	THR	2.7
1	B	385	GLY	2.7
1	B	329	TRP	2.7
1	B	79	PRO	2.6
1	B	207	PHE	2.6
1	A	261	ASP	2.5
1	A	365	ALA	2.5
1	B	78	PRO	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	331	TYR	2.4
1	B	76	PRO	2.4
1	B	421	PHE	2.4
1	B	332	LEU	2.4
1	B	136	HIS	2.4
1	A	94	ALA	2.3
1	A	387	LYS	2.3
1	B	183	ALA	2.3
1	B	383	ALA	2.3
1	A	366	ARG	2.3
1	B	330	LYS	2.3
1	B	116	TRP	2.3
1	B	316	PRO	2.2
1	B	240	ILE	2.2
1	B	152	VAL	2.2
1	B	422	ARG	2.1
1	B	202	GLN	2.1
1	A	324	LEU	2.1
1	B	395	GLN	2.1
1	B	112	PHE	2.1
1	A	73	THR	2.0
1	B	86	ALA	2.0
1	A	306	GLN	2.0
1	A	389	PHE	2.0
1	B	113	THR	2.0
1	B	201	THR	2.0
1	B	372	ALA	2.0
1	B	293	ASP	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.