



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 22, 2023 – 06:21 PM JST

PDB ID : 8IS5
Title : Structure of an Isocytosine specific deaminase Vcz with close state
Authors : Guo, W.T.; Li, X.J.; Wu, B.X.
Deposited on : 2023-03-20
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 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
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35
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) : 2.35

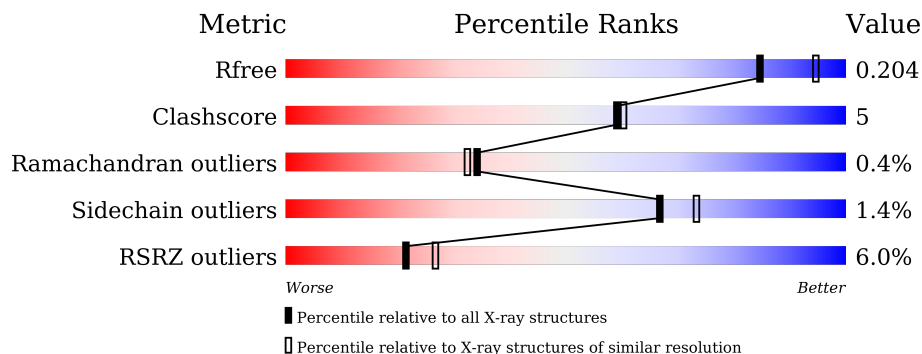
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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))
R_{free}	130704	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (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 $\leq 5\%$. 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	455	
1	B	455	

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 7355 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.

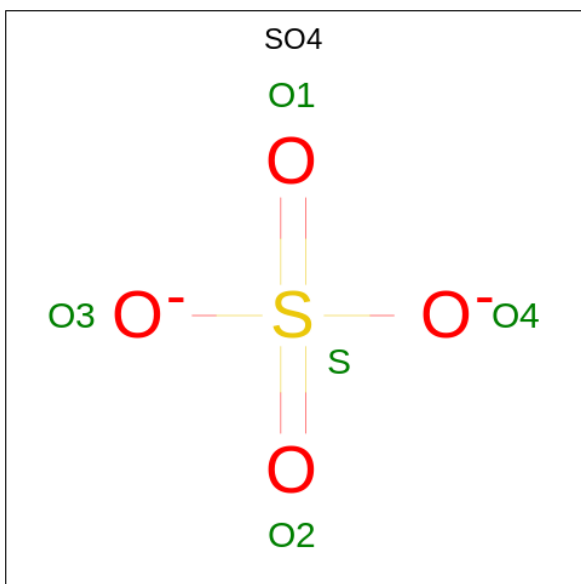
- Molecule 1 is a protein called Hydroxydechloroatrazine ethylaminohydrolase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	452	3442	2135	628	651	28	0	1	0
1	B	449	3441	2134	623	655	29	0	5	0

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Zn	0	0
			1	1		
2	B	1	Total	Zn	0	0
			1	1		

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

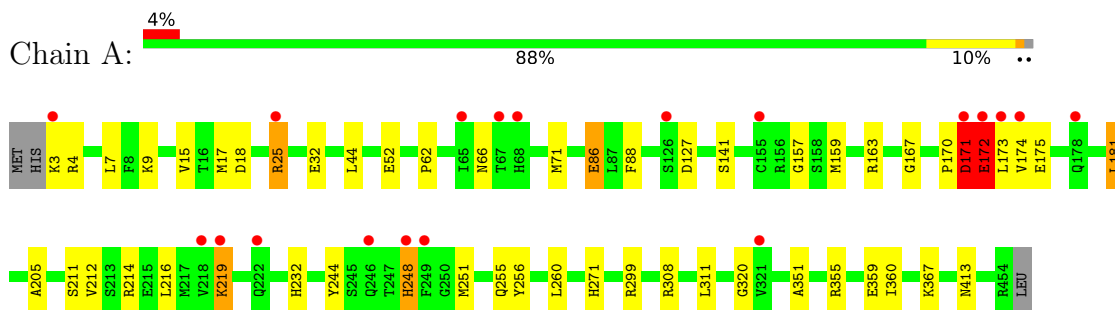
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	224	Total	O	0	0
			224	224		
4	B	241	Total	O	0	0
			241	241		

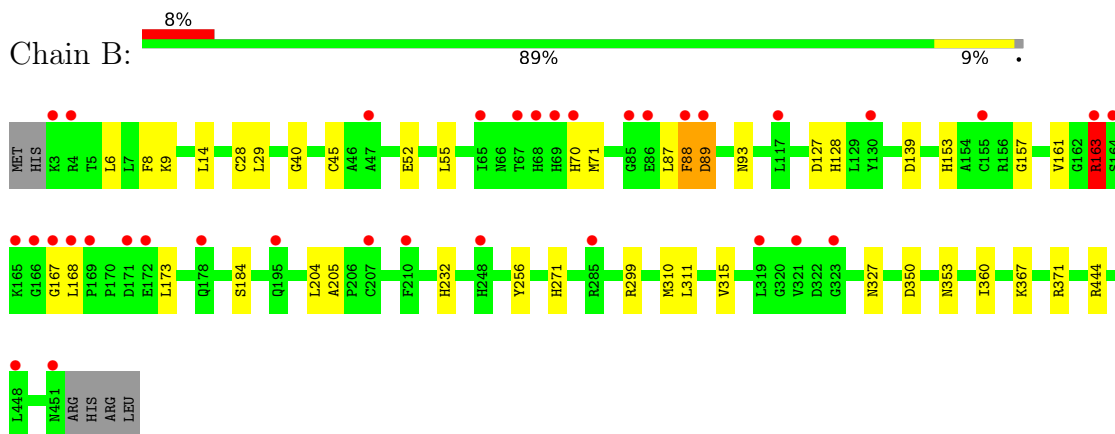
3 Residue-property plots [i](#)

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: Hydroxydechloroatrazine ethylaminohydrolase



- Molecule 1: Hydroxydechloroatrazine ethylaminohydrolase



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	68.59Å 107.63Å 120.91Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.83 – 2.10 29.83 – 2.10	Depositor EDS
% Data completeness (in resolution range)	100.0 (29.83-2.10) 100.0 (29.83-2.10)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.61 (at 2.10Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.160 , 0.196 0.167 , 0.204	Depositor DCC
R_{free} test set	2662 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	33.1	Xtrriage
Anisotropy	0.409	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 46.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	7355	wwPDB-VP
Average B, all atoms (Å ²)	36.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.86% 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, 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	0.43	0/3503	0.78	15/4749 (0.3%)
1	B	0.39	0/3501	0.66	3/4746 (0.1%)
All	All	0.41	0/7004	0.72	18/9495 (0.2%)

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	3
1	B	0	1
All	All	0	4

There are no bond length outliers.

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	219	LYS	CA-CB-CG	10.19	135.81	113.40
1	A	3	LYS	N-CA-C	-8.93	86.88	111.00
1	A	181	LEU	CA-CB-CG	-8.52	95.70	115.30
1	A	171	ASP	C-N-CA	-7.74	102.34	121.70
1	B	163	ARG	CB-CG-CD	7.62	131.41	111.60
1	A	25	ARG	CD-NE-CZ	7.50	134.09	123.60
1	A	219	LYS	CD-CE-NZ	6.73	127.18	111.70
1	A	3	LYS	CA-CB-CG	6.70	128.13	113.40
1	B	163	ARG	CD-NE-CZ	6.39	132.55	123.60
1	A	172	GLU	CB-CG-CD	-5.79	98.57	114.20
1	A	25	ARG	CG-CD-NE	-5.74	99.75	111.80
1	A	3	LYS	CB-CG-CD	-5.68	96.83	111.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	25	ARG	CB-CG-CD	5.61	126.18	111.60
1	A	3	LYS	CG-CD-CE	5.46	128.28	111.90
1	A	172	GLU	CA-CB-CG	5.34	125.14	113.40
1	A	219	LYS	N-CA-CB	5.16	119.89	110.60
1	B	327	ASN	C-N-CA	5.10	134.45	121.70
1	A	219	LYS	CB-CA-C	-5.06	100.28	110.40

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	171	ASP	Peptide
1	A	172	GLU	Peptide
1	A	25	ARG	Sidechain
1	B	163	ARG	Sidechain

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	3442	0	3388	32	1
1	B	3441	0	3383	32	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	5	0	0	0	0
4	A	224	0	0	4	0
4	B	241	0	0	2	1
All	All	7355	0	6771	64	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 5.

All (64) 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:350:ASP:OD2	4:B:601:HOH:O	1.90	0.87

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:163:ARG:NE	1:B:168:LEU:O	2.13	0.81
1:B:89:ASP:O	1:B:93:ASN:ND2	2.19	0.76
1:B:9:LYS:NZ	1:B:52:GLU:OE1	2.22	0.72
1:A:172:GLU:OE1	1:A:174:VAL:O	2.12	0.68
1:A:181:LEU:CD1	1:A:219:LYS:HD3	2.27	0.65
1:A:413:ASN:OD1	4:A:601:HOH:O	2.15	0.64
1:B:163:ARG:HG3	1:B:168:LEU:O	1.97	0.64
1:A:172:GLU:HB2	1:A:174:VAL:H	1.63	0.64
1:A:181:LEU:HD11	1:A:219:LYS:HD3	1.82	0.62
1:A:7:LEU:HD23	1:A:52:GLU:HG2	1.82	0.61
1:B:163:ARG:CZ	1:B:168:LEU:O	2.48	0.60
1:A:308:ARG:HD2	1:A:351:ALA:O	2.03	0.59
1:A:311:LEU:HD11	1:A:360:ILE:HD11	1.85	0.59
1:A:17:MET:SD	1:A:359:GLU:HG2	2.45	0.57
1:B:163:ARG:NH2	1:B:168:LEU:O	2.37	0.57
1:A:251:MET:HE2	1:A:255:GLN:HB3	1.86	0.56
1:B:161:VAL:HG12	1:B:167:GLY:HA3	1.88	0.56
1:B:157:GLY:HA2	1:B:205:ALA:O	2.07	0.55
1:A:212:VAL:HB	1:A:216:LEU:HD23	1.88	0.55
1:B:311:LEU:HD11	1:B:360:ILE:HD11	1.89	0.55
1:A:157:GLY:HA2	1:A:205:ALA:O	2.06	0.54
1:A:172:GLU:HB2	1:A:174:VAL:N	2.22	0.54
1:B:444[B]:ARG:HH11	1:B:444[B]:ARG:HG3	1.73	0.54
4:A:622:HOH:O	1:B:353:ASN:HB2	2.08	0.54
1:A:86:GLU:OE1	1:A:88:PHE:N	2.25	0.53
1:B:14:LEU:HD11	1:B:29:LEU:HD13	1.90	0.52
1:B:88:PHE:N	1:B:88:PHE:HD1	2.08	0.52
1:B:88:PHE:N	1:B:88:PHE:CD1	2.78	0.52
1:B:6:LEU:HD21	1:B:8:PHE:HE1	1.75	0.51
1:B:153:HIS:NE2	1:B:371:ARG:HD2	2.25	0.51
1:A:9:LYS:HE2	1:A:52:GLU:OE2	2.12	0.49
1:B:88:PHE:HD1	1:B:88:PHE:H	1.60	0.49
1:B:444[B]:ARG:HG3	1:B:444[B]:ARG:NH1	2.28	0.49
1:A:159:MET:O	1:A:175:GLU:N	2.36	0.49
1:B:88:PHE:O	1:B:89:ASP:HB2	2.13	0.48
1:A:66:ASN:OD1	1:A:320:GLY:HA2	2.13	0.48
1:B:184:SER:HB3	1:B:204:LEU:HD22	1.96	0.48
1:A:170:PRO:O	1:A:172:GLU:HA	2.13	0.47
1:B:70:HIS:CE1	1:B:128:HIS:HB3	2.49	0.47
1:A:18:ASP:HB2	4:A:713:HOH:O	2.15	0.47
1:A:171:ASP:O	1:A:172:GLU:HB3	2.16	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:163:ARG:HE	1:B:168:LEU:HD12	1.81	0.46
1:A:205:ALA:HA	1:A:232:HIS:O	2.16	0.46
1:A:244:TYR:O	1:A:248:HIS:HB2	2.16	0.45
1:B:205:ALA:HA	1:B:232:HIS:O	2.16	0.45
1:A:256:TYR:CE2	1:A:260:LEU:HD11	2.51	0.45
1:B:8:PHE:HD2	1:B:55:LEU:HD11	1.81	0.45
1:A:214:ARG:HD2	4:A:764:HOH:O	2.17	0.44
1:A:163:ARG:HA	1:A:167:GLY:O	2.18	0.44
1:B:173:LEU:HD23	1:B:173:LEU:HA	1.86	0.43
1:A:173:LEU:HA	1:A:173:LEU:HD23	1.79	0.43
1:B:310:MET:HB3	1:B:315:VAL:HB	2.00	0.43
1:B:367:LYS:NZ	4:B:610:HOH:O	2.47	0.43
1:A:15:VAL:O	1:A:62:PRO:HD3	2.19	0.42
1:B:71:MET:HG3	1:B:127:ASP:OD1	2.20	0.42
1:A:71:MET:HG3	1:A:127:ASP:OD1	2.20	0.42
1:B:28[B]:CYS:HB3	1:B:45:CYS:SG	2.60	0.41
1:A:44:LEU:HD23	1:A:44:LEU:HA	1.85	0.41
1:A:181:LEU:HD13	1:A:219:LYS:HD3	2.02	0.41
1:A:367:LYS:HA	1:A:367:LYS:HD3	1.94	0.41
1:A:355:ARG:O	1:A:359:GLU:HG3	2.21	0.40
1:B:55:LEU:HD23	1:B:55:LEU:HA	1.83	0.40
1:B:28[A]:CYS:N	1:B:40:GLY:O	2.46	0.40

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:32:GLU:OE1	4:B:805:HOH:O[1_655]	2.11	0.09

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	451/455 (99%)	436 (97%)	14 (3%)	1 (0%)	47	49
1	B	452/455 (99%)	435 (96%)	14 (3%)	3 (1%)	22	18
All	All	903/910 (99%)	871 (96%)	28 (3%)	4 (0%)	34	32

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	89	ASP
1	A	271	HIS
1	B	271	HIS
1	B	87	LEU

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	366/369 (99%)	360 (98%)	6 (2%)	62	69
1	B	368/369 (100%)	364 (99%)	4 (1%)	73	79
All	All	734/738 (100%)	724 (99%)	10 (1%)	67	73

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

Mol	Chain	Res	Type
1	A	4	ARG
1	A	86	GLU
1	A	141	SER
1	A	211	SER
1	A	248	HIS
1	A	299	ARG
1	B	88	PHE
1	B	139	ASP
1	B	256	TYR
1	B	299	ARG

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	111	GLN
1	A	413	ASN

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](#)

Of 3 ligands modelled in this entry, 2 are monoatomic - leaving 1 for Mogul analysis.

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	$\# Z > 2$
3	SO4	A	502	-	4,4,4	0.15	0	6,6,6	0.11	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	452/455 (99%)	0.10	19 (4%) 36 42	21, 32, 55, 75	0
1	B	449/455 (98%)	0.25	35 (7%) 13 17	22, 33, 57, 74	0
All	All	901/910 (99%)	0.17	54 (5%) 21 27	21, 33, 55, 75	0

All (54) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	167	GLY	5.9
1	B	163	ARG	5.5
1	B	88	PHE	4.8
1	A	171	ASP	4.5
1	B	166	GLY	4.1
1	A	173	LEU	3.7
1	B	451	ASN	3.6
1	A	172	GLU	3.5
1	A	3	LYS	3.5
1	B	86	GLU	3.2
1	B	321	VAL	3.2
1	A	321	VAL	3.0
1	B	164	SER	3.0
1	B	85	GLY	2.9
1	B	89	ASP	2.9
1	B	165	LYS	2.8
1	B	4	ARG	2.8
1	A	249	PHE	2.8
1	A	219	LYS	2.8
1	B	171	ASP	2.7
1	B	47	ALA	2.7
1	B	69	HIS	2.7
1	B	210	PHE	2.7
1	B	3	LYS	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	174	VAL	2.6
1	A	25	ARG	2.6
1	B	67	THR	2.6
1	A	155	CYS	2.6
1	B	117	LEU	2.5
1	B	68	HIS	2.5
1	A	178	GLN	2.5
1	A	67	THR	2.5
1	A	218	VAL	2.5
1	B	448	LEU	2.4
1	B	207	CYS	2.4
1	B	285	ARG	2.4
1	A	126	SER	2.4
1	B	65	ILE	2.4
1	B	319	LEU	2.4
1	B	169	PRO	2.3
1	B	130	TYR	2.2
1	B	168	LEU	2.2
1	B	70	HIS	2.2
1	A	246	GLN	2.2
1	B	178	GLN	2.2
1	A	68	HIS	2.2
1	B	195	GLN	2.2
1	B	248	HIS	2.2
1	B	323	GLY	2.2
1	B	172	GLU	2.2
1	A	222	GLN	2.1
1	A	65	ILE	2.1
1	B	155	CYS	2.1
1	A	248	HIS	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 monosaccharides 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
3	SO4	A	502	5/5	0.85	0.37	58,69,82,89	0
2	ZN	B	501	1/1	0.99	0.11	32,32,32,32	0
2	ZN	A	501	1/1	1.00	0.13	27,27,27,27	0

6.5 Other polymers [i](#)

There are no such residues in this entry.