



Full wwPDB X-ray Structure Validation Report

May 21, 2014 – 11:52 PM EDT

PDB ID : 4OSR
Title : Crystal structure of the S505K mutant of TAL effector dHax3
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Deposited on : 2014-02-13
Resolution : 1.94 Å(reported)

This is a full wwPDB validation report for a publicly released PDB entry.
We welcome your comments at validation@mail.wwpdb.org
A user guide is available at <http://wwpdb.org/ValidationPDFNotes.html>

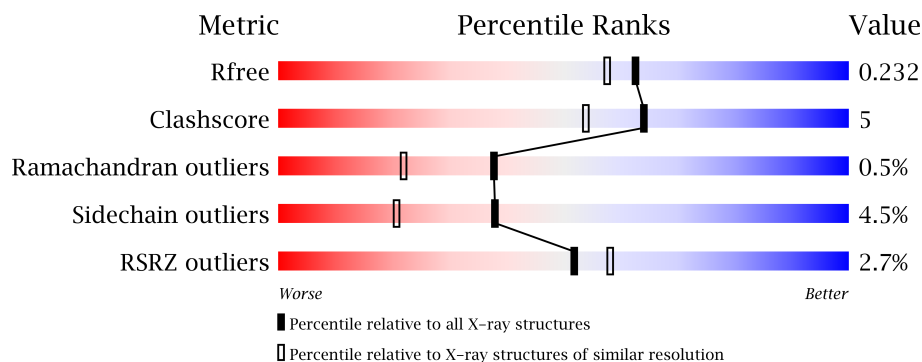
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.16 November 2013
Xtriage (Phenix) : dev-1439
EDS : stable22978
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22978

1 Overall quality at a glance

The reported resolution of this entry is 1.94 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}	66092	2024 (1.96-1.92)
Clashscore	79885	2281 (1.96-1.92)
Ramachandran outliers	78287	2255 (1.96-1.92)
Sidechain outliers	78261	2255 (1.96-1.92)
RSRZ outliers	66119	2024 (1.96-1.92)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	499	
1	B	499	
2	G	17	
2	I	17	
3	H	17	
3	J	17	

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 9231 atoms, of which 0 are hydrogen and 0 are deuterium.

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 Hax3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	493	Total	C	N	O	S	1	4	0
			3608	2258	671	667	12			
1	B	487	Total	C	N	O	S	0	8	0
			3591	2242	670	666	13			

There are 54 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	230	MET	-	EXPRESSION TAG	UNP Q3ZD72
A	300	HIS	ASN	ENGINEERED MUTATION	UNP Q3ZD72
A	301	ASP	ILE	ENGINEERED MUTATION	UNP Q3ZD72
A	368	HIS	ASN	ENGINEERED MUTATION	UNP Q3ZD72
A	369	ASP	ILE	ENGINEERED MUTATION	UNP Q3ZD72
A	402	ASN	HIS	ENGINEERED MUTATION	UNP Q3ZD72
A	403	GLY	ASP	ENGINEERED MUTATION	UNP Q3ZD72
A	436	ASN	HIS	ENGINEERED MUTATION	UNP Q3ZD72
A	437	GLY	ASP	ENGINEERED MUTATION	UNP Q3ZD72
A	470	ASN	HIS	ENGINEERED MUTATION	UNP Q3ZD72
A	471	GLY	ASP	ENGINEERED MUTATION	UNP Q3ZD72
A	505	LYS	SER	ENGINEERED MUTATION	UNP Q3ZD72
A	539	GLY	SER	ENGINEERED MUTATION	UNP Q3ZD72
A	572	HIS	ASN	ENGINEERED MUTATION	UNP Q3ZD72
A	573	ASP	SER	ENGINEERED MUTATION	UNP Q3ZD72
A	606	ASN	HIS	ENGINEERED MUTATION	UNP Q3ZD72
A	607	GLY	ASP	ENGINEERED MUTATION	UNP Q3ZD72
A	640	HIS	ASN	ENGINEERED MUTATION	UNP Q3ZD72
A	641	ASP	ILE	ENGINEERED MUTATION	UNP Q3ZD72
A	721	LEU	-	EXPRESSION TAG	UNP Q3ZD72
A	722	GLU	-	EXPRESSION TAG	UNP Q3ZD72
A	723	HIS	-	EXPRESSION TAG	UNP Q3ZD72
A	724	HIS	-	EXPRESSION TAG	UNP Q3ZD72
A	725	HIS	-	EXPRESSION TAG	UNP Q3ZD72
A	726	HIS	-	EXPRESSION TAG	UNP Q3ZD72

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Chain	Residue	Modelled	Actual	Comment	Reference
A	727	HIS	-	EXPRESSION TAG	UNP Q3ZD72
A	728	HIS	-	EXPRESSION TAG	UNP Q3ZD72
B	230	MET	-	EXPRESSION TAG	UNP Q3ZD72
B	300	HIS	ASN	ENGINEERED MUTATION	UNP Q3ZD72
B	301	ASP	ILE	ENGINEERED MUTATION	UNP Q3ZD72
B	368	HIS	ASN	ENGINEERED MUTATION	UNP Q3ZD72
B	369	ASP	ILE	ENGINEERED MUTATION	UNP Q3ZD72
B	402	ASN	HIS	ENGINEERED MUTATION	UNP Q3ZD72
B	403	GLY	ASP	ENGINEERED MUTATION	UNP Q3ZD72
B	436	ASN	HIS	ENGINEERED MUTATION	UNP Q3ZD72
B	437	GLY	ASP	ENGINEERED MUTATION	UNP Q3ZD72
B	470	ASN	HIS	ENGINEERED MUTATION	UNP Q3ZD72
B	471	GLY	ASP	ENGINEERED MUTATION	UNP Q3ZD72
B	505	LYS	SER	ENGINEERED MUTATION	UNP Q3ZD72
B	539	GLY	SER	ENGINEERED MUTATION	UNP Q3ZD72
B	572	HIS	ASN	ENGINEERED MUTATION	UNP Q3ZD72
B	573	ASP	SER	ENGINEERED MUTATION	UNP Q3ZD72
B	606	ASN	HIS	ENGINEERED MUTATION	UNP Q3ZD72
B	607	GLY	ASP	ENGINEERED MUTATION	UNP Q3ZD72
B	640	HIS	ASN	ENGINEERED MUTATION	UNP Q3ZD72
B	641	ASP	ILE	ENGINEERED MUTATION	UNP Q3ZD72
B	721	LEU	-	EXPRESSION TAG	UNP Q3ZD72
B	722	GLU	-	EXPRESSION TAG	UNP Q3ZD72
B	723	HIS	-	EXPRESSION TAG	UNP Q3ZD72
B	724	HIS	-	EXPRESSION TAG	UNP Q3ZD72
B	725	HIS	-	EXPRESSION TAG	UNP Q3ZD72
B	726	HIS	-	EXPRESSION TAG	UNP Q3ZD72
B	727	HIS	-	EXPRESSION TAG	UNP Q3ZD72
B	728	HIS	-	EXPRESSION TAG	UNP Q3ZD72

- Molecule 2 is a DNA chain called DNA (5'-D(*TP*GP*TP*CP*CP*CP*TP*TP*TP*GP*TP*CP*TP*CP*TP*CP*T)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	G	16	Total	C	N	O	P	0	0	0
			315	154	44	102	15			
2	I	17	Total	C	N	O	P	0	0	0
			335	164	46	109	16			

- Molecule 3 is a DNA chain called DNA (5'-D(*AP*GP*AP*GP*AP*GP*AP*TP*AP*AP*AP*GP*GP*GP*AP*CP*A)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	H	16	Total	C	N	O	P	0	0	0
			339	159	75	89	16			
3	J	17	Total	C	N	O	P	0	0	0
			357	169	80	92	16			

- Molecule 4 is water.

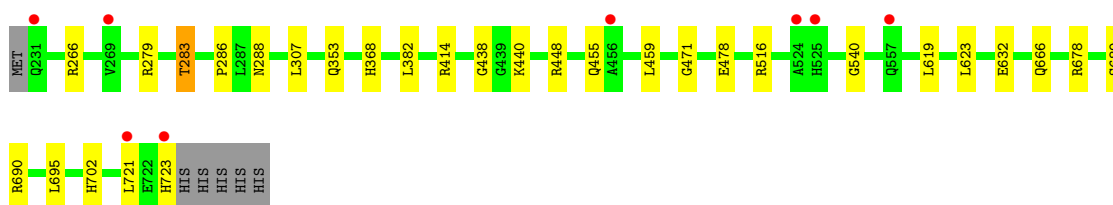
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	252	Total	O	0	0
			252	252		
4	B	266	Total	O	0	0
			266	266		
4	G	50	Total	O	0	0
			50	50		
4	H	39	Total	O	0	0
			39	39		
4	I	50	Total	O	0	0
			50	50		
4	J	29	Total	O	0	0
			29	29		

3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

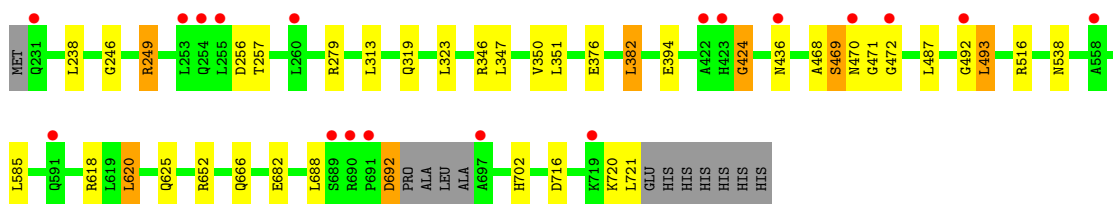
- Molecule 1: Hax3

Chain A: 



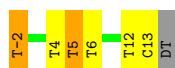
- Molecule 1: Hax3

Chain B: 



- Molecule 2: DNA (5'-D(*TP*GP*TP*CP*CP*CP*TP*TP*TP*GP*TP*CP*TP*CP*TP*CP*T)-3')

Chain G: 



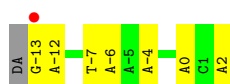
- Molecule 2: DNA (5'-D(*TP*GP*TP*CP*CP*CP*TP*TP*TP*GP*TP*CP*TP*CP*TP*CP*T)-3')

Chain I: 



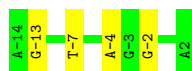
- Molecule 3: DNA (5'-D(*AP*GP*AP*GP*AP*GP*AP*TP*AP*AP*AP*GP*GP*GP*AP*CP*A)-3')

Chain H: 



- Molecule 3: DNA (5'-D(*AP*GP*AP*GP*AP*GP*AP*TP*AP*AP*AP*GP*GP*GP*AP*CP*A)-3')

Chain J:



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	81.05Å 87.37Å 88.10Å 90.00° 102.94° 90.00°	Depositor
Resolution (Å)	33.17 – 1.94 33.17 – 1.94	Depositor EDS
% Data completeness (in resolution range)	99.6 (33.17-1.94) 99.7 (33.17-1.94)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.05 (at 1.95Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.3_928)	Depositor
R, R_{free}	0.200 , 0.234 0.198 , 0.232	Depositor DCC
R_{free} test set	4399 reflections (5.01%)	DCC
Wilson B-factor (Å ²)	27.6	Xtriage
Anisotropy	0.060	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 39.2	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	1 of 87823 reflections (0.001%)	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	9231	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.59% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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	0.36	0/3662	0.53	0/5002
1	B	0.43	1/3641 (0.0%)	0.55	2/4967 (0.0%)
2	G	0.79	0/348	1.63	4/534 (0.7%)
2	I	0.77	0/370	1.47	1/568 (0.2%)
3	H	0.82	1/384 (0.3%)	1.55	4/592 (0.7%)
3	J	0.76	0/405	1.43	5/625 (0.8%)
All	All	0.49	2/8810 (0.0%)	0.82	16/12288 (0.1%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	468	ALA	C-N	14.26	1.66	1.34
3	H	-6	DA	C3'-O3'	-5.52	1.36	1.44

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	H	0	DA	O4'-C1'-N9	-8.41	102.11	108.00
3	H	-13	DG	O4'-C4'-C3'	-7.48	101.51	104.50
2	G	12	DT	O4'-C1'-N1	-7.38	102.83	108.00
3	J	-4	DA	O4'-C1'-N9	6.74	112.72	108.00
1	B	382	LEU	CA-CB-CG	5.99	129.07	115.30
3	H	-7	DT	N3-C4-O4	5.97	123.48	119.90
3	J	-7	DT	N3-C4-O4	5.71	123.33	119.90
2	G	-2	DT	N3-C4-O4	5.65	123.29	119.90
2	G	4	DT	C6-C5-C7	-5.56	119.56	122.90
3	H	-12	DA	P-O5'-C5'	-5.53	112.06	120.90
3	J	-2	DG	O4'-C1'-N9	5.42	111.80	108.00
3	J	-7	DT	C5-C4-O4	-5.33	121.17	124.90
2	I	-1	DG	O4'-C1'-N9	-5.29	104.30	108.00
3	J	-13	DG	C3'-C2'-C1'	-5.27	96.17	102.50
1	B	620	LEU	CA-CB-CG	5.25	127.37	115.30
2	G	5	DT	C6-C5-C7	-5.00	119.90	122.90

There are no chirality outliers.

There are no planarity outliers.

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3608	0	0	14	0
1	B	3591	0	4	21	0
2	G	315	0	0	4	0
2	I	335	0	0	0	0
3	H	339	0	0	2	0
3	J	357	0	0	0	0
4	A	252	0	0	11	0
4	B	266	0	0	12	0
4	G	50	0	0	2	0
4	H	39	0	0	1	0
4	I	50	0	0	0	0
4	J	29	0	0	0	0
All	All	9231	0	4	39	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 5.

All (39) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:B:538:ASN:ND2	4:B:1004:HOH:O	1.91	1.02
1:B:666:GLN:NE2	4:B:1017:HOH:O	1.94	0.99
1:A:702:HIS:ND1	4:A:993:HOH:O	2.03	0.91
1:B:487:LEU:O	1:B:492:GLY:O	1.95	0.85
1:A:438:GLY:CA	4:A:1046:HOH:O	2.29	0.80
1:A:266:ARG:O	4:A:991:HOH:O	2.01	0.78
2:G:13:DC:OP2	4:G:146:HOH:O	2.00	0.77
1:B:436:ASN:ND2	4:B:865:HOH:O	2.18	0.77
1:B:246:GLY:O	1:B:249:ARG:CG	2.32	0.76
1:B:618:ARG:NH2	4:B:956:HOH:O	2.22	0.71
1:A:368:HIS:ND1	4:A:1047:HOH:O	2.26	0.69

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
3:H:-4:DA:OP2	4:H:129:HOH:O	2.11	0.68
1:A:632:GLU:OE1	4:A:900:HOH:O	2.14	0.66
1:B:652:ARG:NH2	4:B:1056:HOH:O	2.32	0.62
1:A:279:ARG:O	1:A:283:THR:OG1	2.19	0.60
1:B:246:GLY:O	1:B:249:ARG:CD	2.50	0.59
1:A:438:GLY:C	4:A:1046:HOH:O	2.41	0.59
1:B:319:GLN:NE2	4:B:1008:HOH:O	2.36	0.58
1:A:471:GLY:N	4:A:1045:HOH:O	2.35	0.58
1:B:716:ASP:OD2	4:B:997:HOH:O	2.18	0.57
1:B:472:GLY:C	4:B:1065:HOH:O	2.44	0.56
1:B:469:SER:O	1:B:470:ASN:OD1	2.24	0.55
1:A:440:LYS:NZ	4:A:914:HOH:O	2.40	0.55
2:G:-2:DT:N3	3:H:2:DA:C2	2.76	0.54
1:B:469:SER:C	1:B:470:ASN:OD1	2.45	0.54
1:B:394:GLU:OE2	4:B:1033:HOH:O	2.18	0.53
1:A:414:ARG:NH1	4:A:882:HOH:O	2.45	0.49
1:B:692:ASP:N	1:B:692:ASP:OD2	2.46	0.48
1:B:346:ARG:NH1	1:B:376:GLU:OE2	2.46	0.48
2:G:5:DT:OP2	4:G:121:HOH:O	2.20	0.47
1:A:448:ARG:NH2	1:A:478:GLU:OE2	2.49	0.46
1:A:540:GLY:N	4:A:891:HOH:O	2.48	0.46
1:B:472:GLY:CA	4:B:1065:HOH:O	2.64	0.45
1:B:424[B]:GLY:O	4:B:1000:HOH:O	2.19	0.44
1:B:652:ARG:NH1	1:B:682:GLU:OE2	2.51	0.43
1:B:471:GLY:HA3	2:G:6:DT:C7	2.49	0.42
1:A:690:ARG:NE	4:A:960:HOH:O	2.52	0.42
1:B:516:ARG:NH2	4:B:969:HOH:O	2.53	0.41
1:A:666:GLN:OE1	1:A:666:GLN:N	2.55	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	495/499 (99%)	482 (97%)	12 (2%)	1 (0%)	56 45

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	491/499 (98%)	464 (94%)	22 (4%)	5 (1%)	22	9
All	All	986/998 (99%)	946 (96%)	34 (3%)	6 (1%)	38	18

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	469	SER
1	B	493	LEU
1	B	256	ASP
1	B	424[A]	GLY
1	B	424[B]	GLY
1	A	286	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	380/383 (99%)	365 (96%)	15 (4%)	43	26
1	B	379/383 (99%)	360 (95%)	19 (5%)	34	16
All	All	759/766 (99%)	725 (96%)	34 (4%)	38	21

All (34) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	283	THR
1	A	288	ASN
1	A	307	LEU
1	A	353	GLN
1	A	382	LEU
1	A	455	GLN
1	A	459	LEU
1	A	516	ARG
1	A	619	LEU
1	A	623	LEU
1	A	678	ARG
1	A	689	SER

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Mol	Chain	Res	Type
1	A	695	LEU
1	A	721	LEU
1	A	723	HIS
1	B	238	LEU
1	B	249	ARG
1	B	257	THR
1	B	279	ARG
1	B	313	LEU
1	B	323	LEU
1	B	347	LEU
1	B	350	VAL
1	B	351	LEU
1	B	382	LEU
1	B	493	LEU
1	B	585	LEU
1	B	620	LEU
1	B	625	GLN
1	B	688	LEU
1	B	692	ASP
1	B	702	HIS
1	B	720	LYS
1	B	721	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA ⓘ

There are no RNA chains 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 ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues

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	493/499 (98%)	-0.01	8 (1%) 68 76	17, 30, 60, 99	11 (2%)
1	B	487/499 (97%)	0.05	18 (3%) 39 44	17, 30, 59, 94	12 (2%)
2	G	16/17 (94%)	-0.37	0 100 100	19, 22, 49, 62	0
2	I	17/17 (100%)	-0.29	1 (5%) 22 26	19, 22, 64, 114	0
3	H	16/17 (94%)	-0.01	1 (6%) 19 23	29, 34, 57, 92	0
3	J	17/17 (100%)	0.18	0 100 100	26, 43, 81, 82	0
All	All	1046/1066 (98%)	0.01	28 (2%) 52 58	17, 30, 62, 114	23 (2%)

All (28) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	472	GLY	6.3
1	B	423[A]	HIS	4.4
1	B	492	GLY	4.1
1	B	690	ARG	3.6
1	A	231	GLN	3.3
1	A	524	ALA	3.1
1	A	557	GLN	3.1
1	A	456	ALA	3.0
1	A	721	LEU	2.7
1	B	254	GLN	2.5
1	A	269[A]	VAL	2.5
1	A	723	HIS	2.5
1	B	231	GLN	2.4
1	B	689	SER	2.4
1	B	470	ASN	2.4
1	B	558	ALA	2.3
1	B	260	LEU	2.3
1	B	436	ASN	2.3
1	A	525	HIS	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	691	PRO	2.3
2	I	14	DT	2.2
3	H	-13	DG	2.2
1	B	253	LEU	2.2
1	B	591	GLN	2.2
1	B	422[A]	ALA	2.1
1	B	697	ALA	2.1
1	B	719	LYS	2.1
1	B	255	LEU	2.1

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

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.