



wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 15, 2017 – 01:24 am GMT

PDB ID : 3AQD
Title : Unliganded TRAP
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Deposited on : 2010-10-29
Resolution : 3.20 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

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.9-1692
EDS	:	trunk28620
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	recalc28949

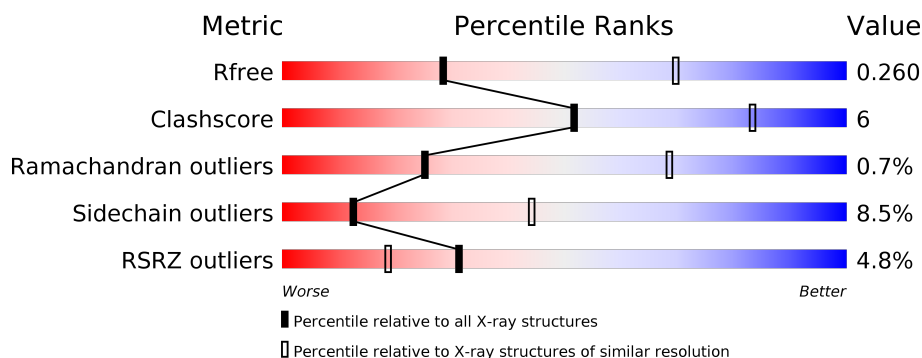
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.20 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}	100719	1015 (3.22-3.18)
Clashscore	112137	1009 (3.20-3.20)
Ramachandran outliers	110173	1118 (3.22-3.18)
Sidechain outliers	110143	1117 (3.22-3.18)
RSRZ outliers	101464	1020 (3.22-3.18)

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. 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	74	<div> <div>70%15%11%</div> <div>70%15%11%</div> </div>
1	B	74	<div> <div>69%14%15%</div> <div>69%14%15%</div> </div>
1	C	74	<div> <div>5%68%16%14%</div> <div>5%68%16%14%</div> </div>
1	D	74	<div> <div>7%70%12%15%</div> <div>7%70%12%15%</div> </div>
1	E	74	<div> <div>3%69%15%15%</div> <div>3%69%15%15%</div> </div>
1	F	74	<div> <div>4%72%12%15%</div> <div>4%72%12%15%</div> </div>

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Mol	Chain	Length	Quality of chain
1	G	74	
1	H	74	
1	I	74	
1	J	74	
1	K	74	
1	L	74	
1	M	74	
1	N	74	
1	O	74	
1	P	74	
1	Q	74	
1	R	74	
1	S	74	
1	T	74	
1	U	74	
1	V	74	

2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 10669 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 Transcription attenuation protein mtrB.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
1	A	66	Total	C	N	O	0	0	0
			514	324	93	97			
1	B	63	Total	C	N	O	0	0	0
			480	304	83	93			
1	C	64	Total	C	N	O	0	0	0
			495	312	88	95			
1	D	63	Total	C	N	O	0	0	0
			484	306	87	91			
1	E	63	Total	C	N	O	0	0	0
			483	306	84	93			
1	F	63	Total	C	N	O	0	0	0
			482	305	84	93			
1	G	63	Total	C	N	O	0	0	0
			483	302	87	94			
1	H	64	Total	C	N	O	0	0	0
			496	312	89	95			
1	I	61	Total	C	N	O	0	0	0
			454	286	77	91			
1	J	62	Total	C	N	O	0	0	0
			476	300	85	91			
1	K	64	Total	C	N	O	0	0	0
			486	305	86	95			
1	L	68	Total	C	N	O	0	0	0
			522	327	94	101			
1	M	60	Total	C	N	O	0	0	0
			456	287	80	89			
1	N	62	Total	C	N	O	0	0	0
			477	302	83	92			
1	O	68	Total	C	N	O	0	0	0
			519	325	95	99			
1	P	64	Total	C	N	O	0	0	0
			494	312	88	94			

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
1	Q	61	Total	C	N	O	0	0	0
			467	297	79	91			
1	R	62	Total	C	N	O	0	0	0
			488	309	87	92			
1	S	63	Total	C	N	O	0	0	0
			485	303	88	94			
1	T	63	Total	C	N	O	0	0	0
			469	294	82	93			
1	U	63	Total	C	N	O	0	0	0
			475	298	84	93			
1	V	63	Total	C	N	O	0	0	0
			477	301	83	93			

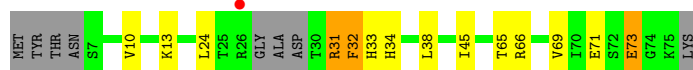
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	1	Total	O	0	0
			1	1		
2	D	1	Total	O	0	0
			1	1		
2	N	1	Total	O	0	0
			1	1		
2	O	1	Total	O	0	0
			1	1		
2	R	1	Total	O	0	0
			1	1		
2	S	1	Total	O	0	0
			1	1		
2	T	1	Total	O	0	0
			1	1		

3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

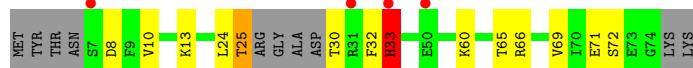
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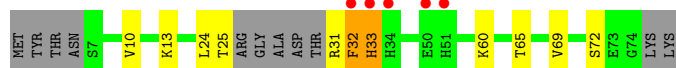
- Molecule 1: Transcription attenuation protein mtrB



- Molecule 1: Transcription attenuation protein mtrB



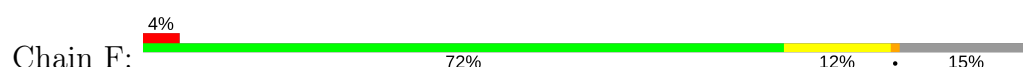
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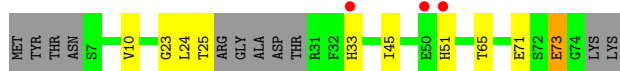


- Molecule 1: Transcription attenuation protein mtrB

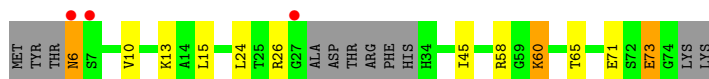


- Molecule 1: Transcription attenuation protein mtrB

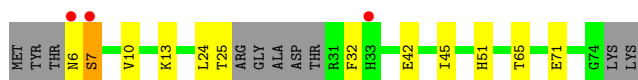




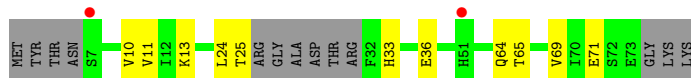
- Molecule 1: Transcription attenuation protein mtrB



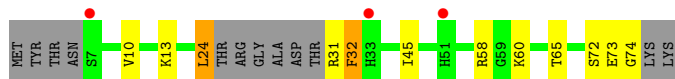
- Molecule 1: Transcription attenuation protein mtrB



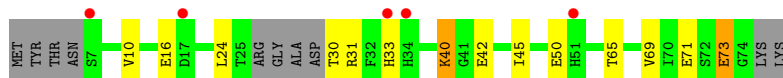
- Molecule 1: Transcription attenuation protein mtrB



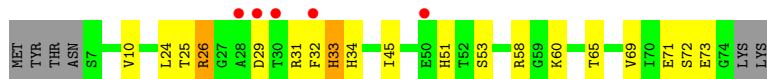
- Molecule 1: Transcription attenuation protein mtrB



- Molecule 1: Transcription attenuation protein mtrB



- Molecule 1: Transcription attenuation protein mtrB



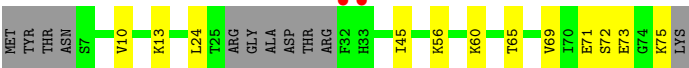
- Molecule 1: Transcription attenuation protein mtrB



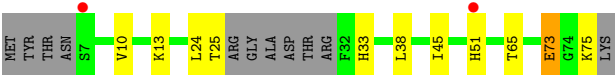




● Molecule 1: Transcription attenuation protein mtrB



● Molecule 1: Transcription attenuation protein mtrB



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	68.15Å 85.43Å 127.44Å 90.00° 95.13° 90.00°	Depositor
Resolution (Å)	20.00 – 3.20 20.00 – 3.20	Depositor EDS
% Data completeness (in resolution range)	95.9 (20.00-3.20) 95.9 (20.00-3.20)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.81 (at 3.22Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.238 , 0.267 0.234 , 0.260	Depositor DCC
R_{free} test set	1174 reflections (5.33%)	DCC
Wilson B-factor (Å ²)	59.2	Xtriage
Anisotropy	0.272	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 62.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.28$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	10669	wwPDB-VP
Average B, all atoms (Å ²)	68.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.80% 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

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	0.63	0/520	0.69	0/697
1	B	0.63	0/486	0.66	0/654
1	C	0.67	0/501	0.75	1/673 (0.1%)
1	D	0.66	0/490	0.69	0/658
1	E	0.70	0/489	0.77	1/657 (0.2%)
1	F	0.64	0/488	0.64	0/656
1	G	0.56	0/487	0.64	0/652
1	H	0.61	0/502	0.67	0/674
1	I	0.57	0/460	0.60	0/620
1	J	0.60	0/482	0.67	0/647
1	K	0.57	0/491	0.62	0/660
1	L	0.61	0/529	0.72	0/712
1	M	0.55	0/461	0.64	0/620
1	N	0.59	0/483	0.67	0/649
1	O	0.61	0/526	0.67	0/708
1	P	0.56	0/500	0.69	0/671
1	Q	0.57	0/473	0.63	0/637
1	R	0.60	0/494	0.67	0/662
1	S	0.72	2/490 (0.4%)	0.68	1/658 (0.2%)
1	T	0.65	0/475	0.68	0/639
1	U	0.64	0/480	0.71	0/645
1	V	0.61	0/482	0.70	0/647
All	All	0.62	2/10789 (0.0%)	0.68	3/14496 (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
1	G	0	1
1	H	0	1
All	All	0	2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	S	73	GLU	CG-CD	6.67	1.61	1.51
1	S	73	GLU	CB-CG	6.42	1.64	1.52

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	74	GLY	N-CA-C	7.48	131.80	113.10
1	S	73	GLU	OE1-CD-OE2	-5.39	116.83	123.30
1	C	33	HIS	N-CA-C	5.19	125.01	111.00

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	G	6	ASN	Peptide
1	H	6	ASN	Peptide

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	514	0	512	11	0
1	B	480	0	466	9	0
1	C	495	0	491	7	0
1	D	484	0	480	8	0
1	E	483	0	475	5	0
1	F	482	0	473	6	0
1	G	483	0	488	9	0
1	H	496	0	490	7	0
1	I	454	0	422	5	0
1	J	476	0	465	9	0
1	K	486	0	479	7	1
1	L	522	0	512	9	0
1	M	456	0	446	12	0
1	N	477	0	471	5	1
1	O	519	0	513	12	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	P	494	0	488	20	0
1	Q	467	0	457	9	0
1	R	488	0	492	6	0
1	S	485	0	481	7	0
1	T	469	0	438	6	0
1	U	475	0	465	6	0
1	V	477	0	472	5	0
2	B	1	0	0	0	0
2	D	1	0	0	0	0
2	N	1	0	0	0	0
2	O	1	0	0	0	0
2	R	1	0	0	0	0
2	S	1	0	0	0	0
2	T	1	0	0	0	0
All	All	10669	0	10476	136	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 6.

The worst 5 of 136 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:L:25:THR:HG22	1:L:51:HIS:O	1.63	0.98
1:G:15:LEU:HB2	1:G:60:LYS:HG2	1.47	0.97
1:T:25:THR:HG22	1:T:51:HIS:O	1.65	0.96
1:M:56:LYS:NZ	1:M:58:ARG:HH21	1.63	0.94
1:S:25:THR:HG22	1:S:51:HIS:O	1.79	0.83

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:K:50:GLU:OE1	1:N:50:GLU:OE1[1_655]	2.17	0.03

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	62/74 (84%)	57 (92%)	5 (8%)	0	100	100
1	B	59/74 (80%)	57 (97%)	2 (3%)	0	100	100
1	C	60/74 (81%)	57 (95%)	3 (5%)	0	100	100
1	D	59/74 (80%)	57 (97%)	2 (3%)	0	100	100
1	E	59/74 (80%)	55 (93%)	4 (7%)	0	100	100
1	F	59/74 (80%)	57 (97%)	2 (3%)	0	100	100
1	G	59/74 (80%)	57 (97%)	2 (3%)	0	100	100
1	H	60/74 (81%)	56 (93%)	3 (5%)	1 (2%)	11	48
1	I	57/74 (77%)	56 (98%)	1 (2%)	0	100	100
1	J	58/74 (78%)	55 (95%)	3 (5%)	0	100	100
1	K	60/74 (81%)	57 (95%)	3 (5%)	0	100	100
1	L	66/74 (89%)	58 (88%)	5 (8%)	3 (4%)	3	21
1	M	56/74 (76%)	56 (100%)	0	0	100	100
1	N	58/74 (78%)	56 (97%)	2 (3%)	0	100	100
1	O	66/74 (89%)	60 (91%)	3 (4%)	3 (4%)	3	21
1	P	60/74 (81%)	55 (92%)	5 (8%)	0	100	100
1	Q	57/74 (77%)	55 (96%)	2 (4%)	0	100	100
1	R	58/74 (78%)	55 (95%)	3 (5%)	0	100	100
1	S	59/74 (80%)	56 (95%)	3 (5%)	0	100	100
1	T	59/74 (80%)	55 (93%)	2 (3%)	2 (3%)	4	28
1	U	59/74 (80%)	56 (95%)	3 (5%)	0	100	100
1	V	59/74 (80%)	58 (98%)	1 (2%)	0	100	100
All	All	1309/1628 (80%)	1241 (95%)	59 (4%)	9 (1%)	25	68

5 of 9 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	H	7	SER
1	L	26	ARG
1	L	32	PHE
1	T	34	HIS
1	L	31	ARG

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	54/62 (87%)	47 (87%)	7 (13%)	5	22
1	B	50/62 (81%)	46 (92%)	4 (8%)	14	49
1	C	53/62 (86%)	47 (89%)	6 (11%)	7	29
1	D	51/62 (82%)	47 (92%)	4 (8%)	15	50
1	E	51/62 (82%)	47 (92%)	4 (8%)	15	50
1	F	51/62 (82%)	48 (94%)	3 (6%)	23	62
1	G	52/62 (84%)	47 (90%)	5 (10%)	10	37
1	H	53/62 (86%)	51 (96%)	2 (4%)	38	74
1	I	46/62 (74%)	42 (91%)	4 (9%)	12	42
1	J	50/62 (81%)	46 (92%)	4 (8%)	14	49
1	K	51/62 (82%)	44 (86%)	7 (14%)	4	19
1	L	54/62 (87%)	48 (89%)	6 (11%)	7	30
1	M	48/62 (77%)	46 (96%)	2 (4%)	34	72
1	N	51/62 (82%)	49 (96%)	2 (4%)	37	74
1	O	54/62 (87%)	50 (93%)	4 (7%)	16	52
1	P	52/62 (84%)	47 (90%)	5 (10%)	10	37
1	Q	50/62 (81%)	45 (90%)	5 (10%)	9	35
1	R	53/62 (86%)	49 (92%)	4 (8%)	16	52
1	S	52/62 (84%)	48 (92%)	4 (8%)	15	50
1	T	47/62 (76%)	42 (89%)	5 (11%)	8	32

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	U	50/62 (81%)	46 (92%)	4 (8%)	14	49
1	V	50/62 (81%)	45 (90%)	5 (10%)	9	35
All	All	1123/1364 (82%)	1027 (92%)	96 (8%)	12	44

5 of 96 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	K	24	LEU
1	L	45	ILE
1	U	45	ILE
1	K	31	ARG
1	K	69	VAL

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 9 such sidechains are listed below:

Mol	Chain	Res	Type
1	K	33	HIS
1	S	34	HIS
1	P	34	HIS
1	D	33	HIS
1	M	34	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 carbohydrates 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	66/74 (89%)	-0.17	1 (1%) 74 61	24, 68, 112, 118	1 (1%)
1	B	63/74 (85%)	-0.21	1 (1%) 72 59	22, 63, 101, 111	1 (1%)
1	C	64/74 (86%)	-0.11	4 (6%) 21 12	22, 63, 103, 110	0
1	D	63/74 (85%)	0.04	5 (7%) 13 7	23, 64, 104, 116	0
1	E	63/74 (85%)	-0.04	2 (3%) 48 32	24, 67, 106, 115	0
1	F	63/74 (85%)	-0.12	3 (4%) 31 19	25, 68, 108, 115	0
1	G	63/74 (85%)	-0.04	3 (4%) 31 19	25, 68, 107, 115	1 (1%)
1	H	64/74 (86%)	-0.00	3 (4%) 32 19	25, 69, 110, 124	0
1	I	61/74 (82%)	-0.09	2 (3%) 47 31	26, 69, 109, 118	0
1	J	62/74 (83%)	0.06	3 (4%) 31 19	26, 70, 112, 123	0
1	K	64/74 (86%)	-0.03	5 (7%) 14 8	25, 70, 116, 123	1 (1%)
1	L	68/74 (91%)	0.03	5 (7%) 15 9	25, 68, 112, 118	1 (1%)
1	M	60/74 (81%)	-0.20	1 (1%) 70 57	27, 68, 103, 114	1 (1%)
1	N	62/74 (83%)	0.01	5 (8%) 13 7	27, 69, 104, 113	0
1	O	68/74 (91%)	0.03	6 (8%) 11 6	27, 70, 115, 118	0
1	P	64/74 (86%)	-0.11	1 (1%) 72 59	27, 69, 105, 115	0
1	Q	61/74 (82%)	-0.13	3 (4%) 30 18	27, 69, 106, 116	0
1	R	62/74 (83%)	-0.07	4 (6%) 20 11	26, 70, 110, 120	1 (1%)
1	S	63/74 (85%)	-0.08	3 (4%) 31 19	25, 68, 104, 113	0
1	T	63/74 (85%)	-0.03	3 (4%) 31 19	23, 65, 102, 110	0
1	U	63/74 (85%)	-0.05	2 (3%) 48 32	23, 63, 102, 109	0
1	V	63/74 (85%)	-0.11	2 (3%) 48 32	24, 64, 100, 109	1 (1%)
All	All	1393/1628 (85%)	-0.06	67 (4%) 31 19	22, 68, 110, 124	8 (0%)

The worst 5 of 67 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	6	ASN	4.7
1	G	6	ASN	4.6
1	E	32	PHE	4.3
1	D	34	HIS	4.0
1	V	51	HIS	4.0

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 carbohydrates 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.