



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 01:32 PM GMT

PDB ID : 3TYX
Title : Crystal structure of the F177S mutant of mycroicine immunity protein (MccF) with AMP
Authors : Nocek, B.; Gu, M.; Zhou, M.; Anderson, W.F.; Joachimiak, A.; Center for Structural Genomics of Infectious Diseases (CSGID)
Deposited on : 2011-09-26
Resolution : 2.04 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
<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
Mogul	:	1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix)	:	1.9-1692
EDS	:	rb-20026688
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
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)	:	trunk26865

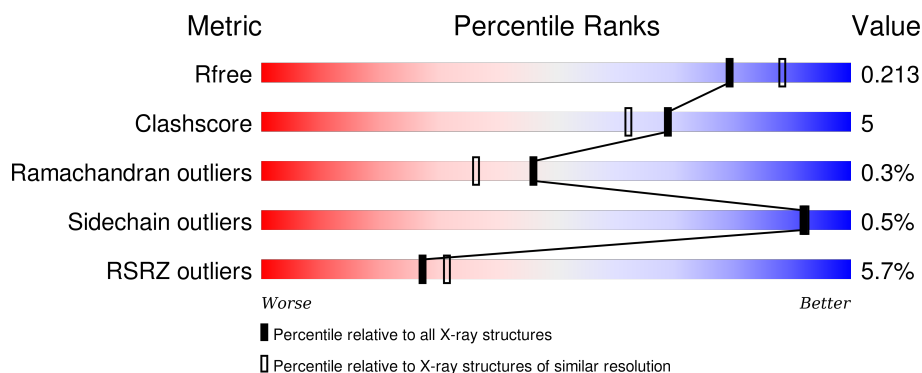
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.04 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}	91344	1192 (2.04-2.04)
Clashscore	102246	1269 (2.04-2.04)
Ramachandran outliers	100387	1258 (2.04-2.04)
Sidechain outliers	100360	1258 (2.04-2.04)
RSRZ outliers	91569	1194 (2.04-2.04)

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	336	<div> <div>4%</div> <div>91%</div> <div>7% .</div> </div>
1	B	336	<div> <div>7%</div> <div>87%</div> <div>11% ..</div> </div>

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5615 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.

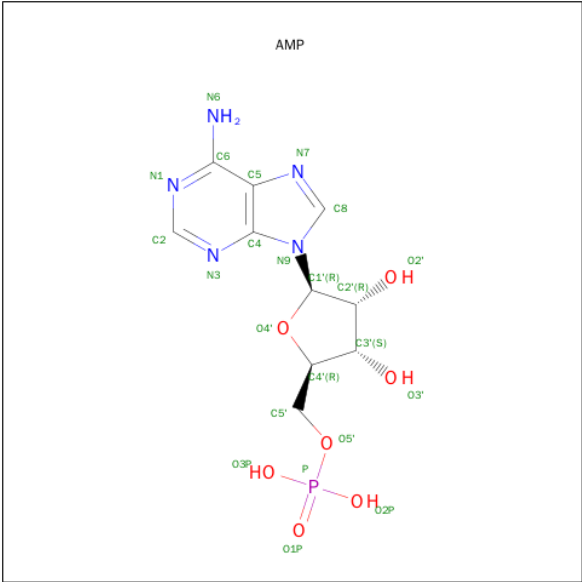
- Molecule 1 is a protein called Microcin immunity protein MccF.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	335	Total	C	N	O	S	0	3	0
			2667	1716	438	499	14			
1	B	332	Total	C	N	O	S	0	3	0
			2642	1698	431	500	13			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	SER	-	EXPRESSION TAG	UNP Q81RT8
A	-1	ASN	-	EXPRESSION TAG	UNP Q81RT8
A	0	ALA	-	EXPRESSION TAG	UNP Q81RT8
A	177	SER	PHE	ENGINEERED MUTATION	UNP Q81RT8
B	-2	SER	-	EXPRESSION TAG	UNP Q81RT8
B	-1	ASN	-	EXPRESSION TAG	UNP Q81RT8
B	0	ALA	-	EXPRESSION TAG	UNP Q81RT8
B	177	SER	PHE	ENGINEERED MUTATION	UNP Q81RT8

- Molecule 2 is ADENOSINE MONOPHOSPHATE (three-letter code: AMP) (formula: C₁₀H₁₄N₅O₇P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			23	10	5	7	1		
2	B	1	Total	C	N	O	P	0	0
			23	10	5	7	1		

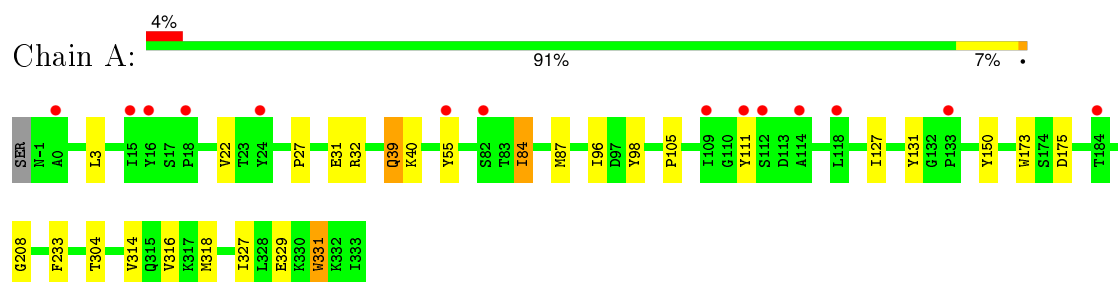
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	126	Total	O	0	0
			126	126		
3	B	134	Total	O	0	0
			134	134		

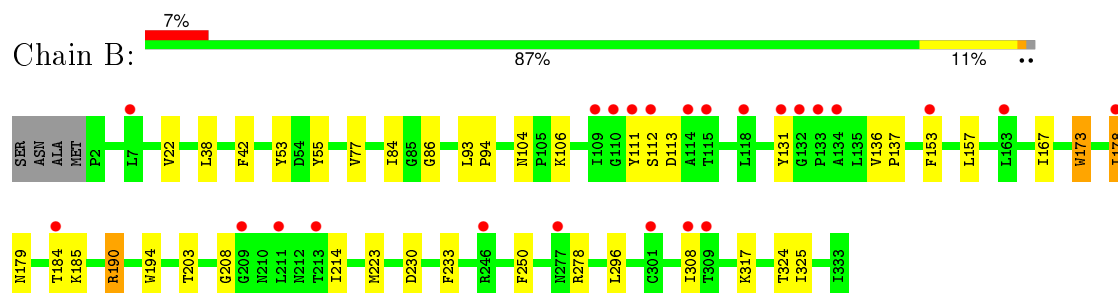
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of 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 ($\text{RSRZ} > 2$). 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: Microcin immunity protein MccF



- Molecule 1: Microcin immunity protein MccF



4 Data and refinement statistics

Property	Value	Source
Space group	P 43	Depositor
Cell constants a, b, c, α , β , γ	118.23Å 118.23Å 54.84Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.00 – 2.04 33.24 – 2.04	Depositor EDS
% Data completeness (in resolution range)	97.6 (40.00-2.04) 97.8 (33.24-2.04)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.92 (at 2.05Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.167 , 0.210 0.175 , 0.213	Depositor DCC
R_{free} test set	2444 reflections (5.45%)	DCC
Wilson B-factor (Å ²)	38.5	Xtriage
Anisotropy	0.018	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 43.4	EDS
Estimated twinning fraction	0.028 for h,-k,-l	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 47211 reflections	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	5615	wwPDB-VP
Average B, all atoms (Å ²)	45.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.70% 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, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: AMP

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	2/2744 (0.1%)	0.85	1/3724 (0.0%)
1	B	0.90	1/2716 (0.0%)	0.85	3/3688 (0.1%)
All	All	0.92	3/5460 (0.1%)	0.85	4/7412 (0.1%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	331	TRP	CD2-CE2	5.89	1.48	1.41
1	B	173	TRP	CD2-CE2	5.04	1.47	1.41
1	A	173	TRP	CD2-CE2	5.02	1.47	1.41

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	230	ASP	CB-CG-OD1	5.88	123.59	118.30
1	B	190	ARG	NE-CZ-NH1	5.57	123.08	120.30
1	B	278	ARG	NE-CZ-NH1	5.20	122.90	120.30
1	A	32	ARG	NE-CZ-NH2	5.15	122.87	120.30

There are no chirality outliers.

There are no planarity outliers.

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	2667	0	2639	15	0
1	B	2642	0	2589	34	0
2	A	23	0	12	0	0
2	B	23	0	12	2	0
3	A	126	0	0	0	0
3	B	134	0	0	1	0
All	All	5615	0	5252	49	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 5.

All (49) 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:214:ILE:HG23	1:B:223:MET:CE	1.71	1.19
1:B:214:ILE:HG23	1:B:223:MET:HE3	1.51	0.90
1:B:214:ILE:HG23	1:B:223:MET:HE1	1.60	0.83
1:B:178:ILE:HD12	1:B:179:ASN:H	1.49	0.78
1:B:203:THR:HG22	1:B:317:LYS:CB	2.20	0.70
1:B:173:TRP:CZ3	1:B:190:ARG:NH2	2.62	0.67
1:B:214:ILE:CG2	1:B:223:MET:HE3	2.24	0.67
1:B:203:THR:HG22	1:B:317:LYS:HA	1.77	0.65
1:A:39:GLN:NE2	1:A:39:GLN:O	2.29	0.64
1:B:38:LEU:HD23	1:B:42:PHE:O	1.99	0.62
1:A:40:LYS:HD2	1:A:150:TYR:CE2	2.36	0.60
1:B:77:VAL:O	1:B:106:LYS:HE3	2.03	0.58
1:B:203:THR:HG22	1:B:317:LYS:CA	2.35	0.56
1:B:208:GLY:HA3	1:B:233:PHE:O	2.08	0.54
1:B:112:SER:OG	2:B:401:AMP:O2P	2.26	0.54
1:B:173:TRP:CH2	1:B:190:ARG:NH2	2.71	0.52
1:B:214:ILE:CG2	1:B:223:MET:CE	2.64	0.52
1:B:178:ILE:CD1	1:B:179:ASN:H	2.20	0.50
1:B:153:PHE:CE1	1:B:157:LEU:HD12	2.46	0.50
1:B:112:SER:OG	3:B:371:HOH:O	2.20	0.50
1:B:104:ASN:HD22	1:B:106:LYS:NZ	2.10	0.49
1:B:296:LEU:HD23	1:B:325:ILE:HD11	1.94	0.49
1:B:84:ILE:HD11	2:B:401:AMP:H5'2	1.96	0.47
1:B:194:TRP:HB3	1:B:296:LEU:HD11	1.95	0.47
1:A:208:GLY:HA3	1:A:233:PHE:O	2.14	0.47
1:A:105:PRO:HB3	1:A:127:ILE:HD13	1.97	0.47
1:B:167:ILE:CG2	1:B:308:ILE:HD13	2.45	0.47
1:B:22:VAL:HB	1:B:84:ILE:HG21	1.95	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:324:THR:O	1:B:325:ILE:HD13	2.16	0.46
1:B:178:ILE:HD12	1:B:179:ASN:N	2.25	0.46
1:B:184:THR:O	1:B:185:LYS:CB	2.61	0.46
1:B:93:LEU:N	1:B:94:PRO:CD	2.79	0.46
1:B:178:ILE:HA	1:B:178:ILE:HD13	1.77	0.45
1:B:190:ARG:HH11	1:B:190:ARG:HG3	1.80	0.45
1:A:27:PRO:O	1:A:31:GLU:HG2	2.16	0.45
1:A:87:MET:HA	1:A:87:MET:HE2	1.98	0.45
1:B:111:TYR:HB2	1:B:131:TYR:CZ	2.52	0.45
1:A:39:GLN:NE2	1:A:39:GLN:C	2.70	0.44
1:A:318:MET:O	1:A:318:MET:HG3	2.18	0.44
1:B:86:GLY:O	1:B:113:ASP:HB2	2.18	0.43
1:A:22:VAL:HB	1:A:84:ILE:HG21	2.00	0.43
1:A:3:LEU:HD22	1:A:331:TRP:C	2.39	0.43
1:B:136:VAL:N	1:B:137:PRO:HD2	2.35	0.42
1:B:53:TYR:CZ	1:B:55:TYR:HA	2.54	0.42
1:A:111:TYR:HB2	1:A:131:TYR:CZ	2.55	0.41
1:A:175:ASP:HB3	1:A:304:THR:HG22	2.01	0.41
1:A:314:VAL:HB	1:A:329:GLU:HG2	2.03	0.41
1:A:316:VAL:HG22	1:A:327:ILE:HD13	2.03	0.40
1:A:96:ILE:HB	1:A:98:TYR:CZ	2.56	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	336/336 (100%)	323 (96%)	11 (3%)	2 (1%)	30	18
1	B	333/336 (99%)	322 (97%)	11 (3%)	0	100	100
All	All	669/672 (100%)	645 (96%)	22 (3%)	2 (0%)	46	36

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	55	TYR
1	A	84	ILE

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	294/296 (99%)	293 (100%)	1 (0%)	94	95
1	B	291/296 (98%)	289 (99%)	2 (1%)	88	88
All	All	585/592 (99%)	582 (100%)	3 (0%)	92	92

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	39	GLN
1	B	178	ILE
1	B	250	PHE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	104	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

There are no carbohydrates in this entry.

5.6 Ligand geometry

2 ligands are modelled in this entry.

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	$\# Z > 2$
2	AMP	A	401	-	20,25,25	1.30	4 (20%)	22,38,38	2.22	6 (27%)
2	AMP	B	401	-	20,25,25	1.40	3 (15%)	22,38,38	2.87	8 (36%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	AMP	A	401	-	-	0/6/26/26	0/3/3/3
2	AMP	B	401	-	-	0/6/26/26	0/3/3/3

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	401	AMP	P-O1P	2.05	1.57	1.51
2	A	401	AMP	C2-N3	2.05	1.35	1.32
2	A	401	AMP	C5-C4	2.16	1.45	1.40
2	A	401	AMP	O4'-C1'	2.26	1.44	1.41
2	A	401	AMP	O2'-C2'	2.26	1.48	1.43
2	B	401	AMP	C2-N3	2.78	1.37	1.32
2	B	401	AMP	C5-C4	3.09	1.47	1.40

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	401	AMP	N3-C2-N1	-7.96	122.80	128.89
2	A	401	AMP	N3-C2-N1	-7.36	123.25	128.89
2	B	401	AMP	O5'-P-O1P	-6.06	91.71	107.14
2	B	401	AMP	C1'-N9-C4	-4.47	120.19	126.94
2	A	401	AMP	O2P-P-O5'	-3.21	97.31	106.56
2	B	401	AMP	C2'-C1'-N9	-3.01	109.69	114.29
2	A	401	AMP	C1'-N9-C4	-2.59	123.03	126.94
2	A	401	AMP	O3'-C3'-C2'	-2.33	104.26	111.83
2	A	401	AMP	C2'-C3'-C4'	-2.19	98.11	102.61
2	B	401	AMP	O5'-C5'-C4'	-2.18	101.09	109.12
2	B	401	AMP	O4'-C1'-N9	2.10	112.49	108.10
2	A	401	AMP	O3P-P-O2P	2.18	115.68	107.38
2	B	401	AMP	O2P-P-O1P	2.27	117.88	110.58
2	B	401	AMP	O3P-P-O1P	2.79	119.57	110.58

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	401	AMP	2	0

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	335/336 (99%)	-0.02	14 (4%) 40 46	28, 42, 62, 87	0
1	B	332/336 (98%)	0.17	24 (7%) 18 22	29, 44, 71, 88	0
All	All	667/672 (99%)	0.07	38 (5%) 27 31	28, 43, 69, 88	0

All (38) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	309	THR	3.2
1	B	184	THR	3.2
1	B	109	ILE	3.1
1	B	131	TYR	2.9
1	A	16	TYR	2.9
1	A	184	THR	2.8
1	B	277	ASN	2.8
1	B	153	PHE	2.8
1	B	7	LEU	2.7
1	A	24	TYR	2.7
1	B	178	ILE	2.6
1	A	118	LEU	2.6
1	B	134	ALA	2.5
1	B	132	GLY	2.5
1	A	109	ILE	2.5
1	A	55	TYR	2.4
1	B	118	LEU	2.4
1	B	110	GLY	2.4
1	B	111	TYR	2.4
1	B	114	ALA	2.4
1	B	112	SER	2.3
1	B	163	LEU	2.3
1	A	112[A]	SER	2.3
1	A	18	PRO	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	308	ILE	2.3
1	A	133	PRO	2.2
1	A	114	ALA	2.2
1	A	15	ILE	2.2
1	B	211	LEU	2.2
1	B	115	THR	2.2
1	B	133	PRO	2.2
1	B	209	GLY	2.1
1	B	301	CYS	2.1
1	B	213	THR	2.1
1	A	0	ALA	2.1
1	A	82	SER	2.1
1	A	111	TYR	2.1
1	B	246[A]	ARG	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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
2	AMP	B	401	23/23	0.87	0.23	1.66	43,62,67,74	0
2	AMP	A	401	23/23	0.83	0.24	1.54	41,50,56,58	23

6.5 Other polymers [i](#)

There are no such residues in this entry.