Full wwPDB X-ray Structure Validation Report ⓘ

Apr 21, 2021 – 10:04 am BST

PDB ID	:	6ZL1
Title	:	Crystal structure of human serum albumin in complex with the MCL-1 neutralizing Alphabody CMPX-383B
Authors	:	Pannecoucke, E.; Savvides, S.N.; Desmet, J.; Lasters, I.
Deposited on	:	2020-06-30
Resolution	:	3.27 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 following versions of software and data (see references ⓘ) were used in the production of this report:

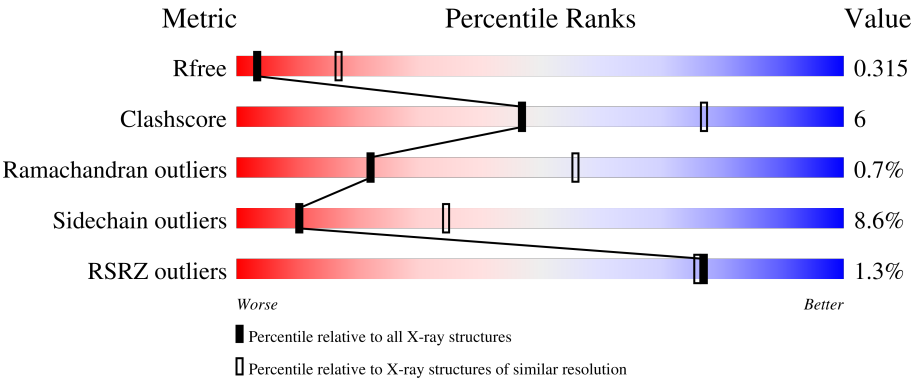
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.18
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.18

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 3.27 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	1177 (3.32-3.24)
Clashscore	141614	1044 (3.30-3.26)
Ramachandran outliers	138981	1026 (3.30-3.26)
Sidechain outliers	138945	1025 (3.30-3.26)
RSRZ outliers	127900	1141 (3.32-3.24)

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 <=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	609	79% 11% • 9%
1	B	609	76% 12% • 11%
2	C	143	66% 20% 15%
2	D	143	69% 13% • 16%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 8860 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 Albumin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	555	Total	C	N	O	S	0	0	0
			3627	2258	638	699	32			
1	B	542	Total	C	N	O	S	0	0	0
			3537	2202	622	681	32			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	131	LYS	ASP	conflict	UNP P02768
A	155	THR	GLU	conflict	UNP P02768
A	529	GLY	GLU	conflict	UNP P02768
B	131	LYS	ASP	conflict	UNP P02768
B	155	THR	GLU	conflict	UNP P02768
B	529	GLY	GLU	conflict	UNP P02768

- Molecule 2 is a protein called CMPX-383B.

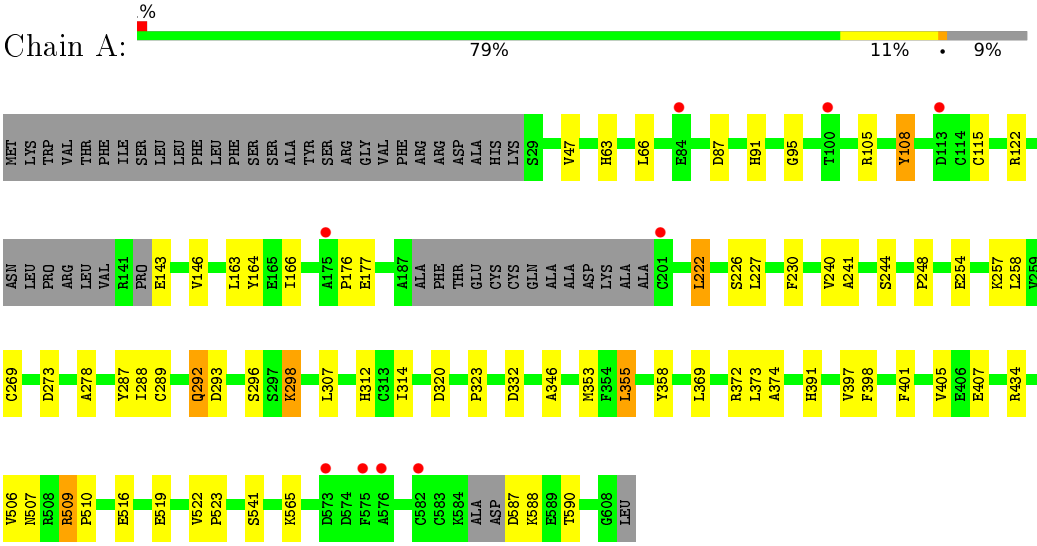
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	122	Total	C	N	O	S	0	1	0
			842	529	145	163	5			
2	D	120	Total	C	N	O	S	0	0	0
			854	538	147	165	4			

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.

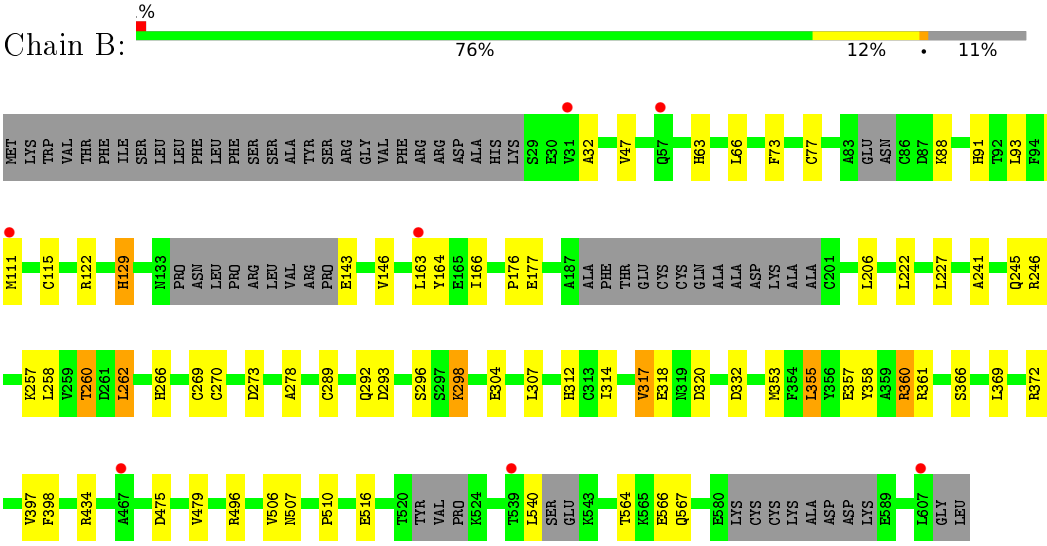
- Molecule 1: Albumin

Chain A:



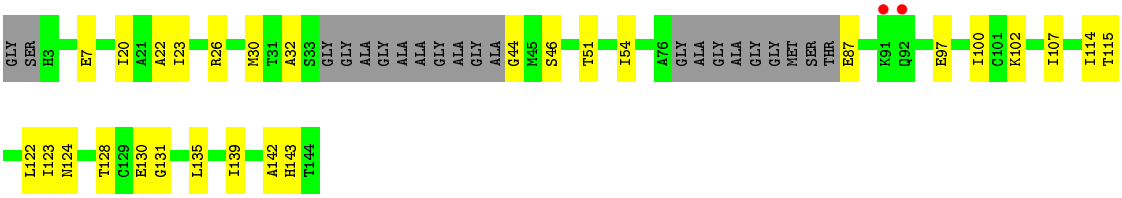
- Molecule 1: Albumin

Chain B:

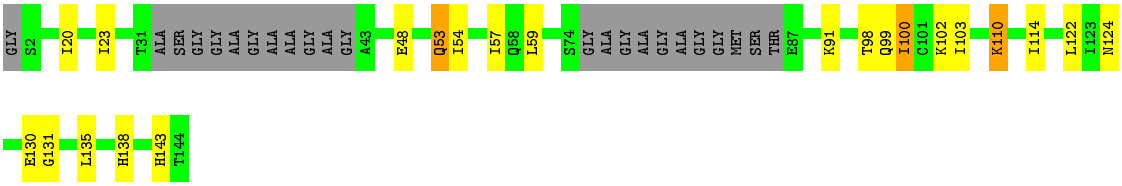


- Molecule 2: CMPX-383B

Chain C:



- Molecule 2: CMPX-383B



4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	60.69Å 231.35Å 240.19Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	115.67 – 3.27 115.67 – 3.27	Depositor EDS
% Data completeness (in resolution range)	91.8 (115.67-3.27) 91.8 (115.67-3.27)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.02 (at 3.26Å)	Xtriage
Refinement program	BUSTER 2.10.3	Depositor
R, R_{free}	0.239 , 0.281 0.270 , 0.315	Depositor DCC
R_{free} test set	1271 reflections (5.18%)	wwPDB-VP
Wilson B-factor (Å^2)	84.5	Xtriage
Anisotropy	0.046	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.28 , 105.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.46$, $< L^2 > = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.89	EDS
Total number of atoms	8860	wwPDB-VP
Average B, all atoms (Å^2)	96.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.66% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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	0.42	0/3687	0.56	0/5066
1	B	0.42	0/3592	0.56	0/4936
2	C	0.50	0/845	0.63	0/1147
2	D	0.55	0/857	0.67	0/1157
All	All	0.44	0/8981	0.58	0/12306

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	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	522	VAL	Mainchain

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	3627	0	2834	32	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	3537	0	2782	43	0
2	C	842	0	779	18	0
2	D	854	0	828	17	0
All	All	8860	0	7223	99	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 6.

All (99) 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:111:MET:HA	1:B:129:HIS:HD2	1.26	1.00
1:B:111:MET:HA	1:B:129:HIS:CD2	2.10	0.86
2:C:128:THR:HG23	2:C:131:GLY:H	1.52	0.74
1:B:357:GLU:O	1:B:361:ARG:HD2	1.87	0.74
1:B:353:MET:HG3	2:D:122:LEU:HD21	1.68	0.74
2:C:20:ILE:HG23	2:C:54:ILE:HD12	1.75	0.68
1:A:257:LYS:HE3	2:C:130:GLU:HB3	1.77	0.66
1:B:111:MET:CA	1:B:129:HIS:HD2	2.07	0.65
1:A:287:TYR:OH	2:C:128:THR:HG21	1.99	0.63
2:C:114:ILE:HD13	2:C:143:HIS:CD2	2.33	0.63
1:A:289:CYS:SG	1:A:314:ILE:HD11	2.40	0.61
1:B:257:LYS:HE3	2:D:130:GLU:HB3	1.84	0.59
1:B:289:CYS:SG	1:B:314:ILE:HD11	2.43	0.58
2:C:44:GLY:N	2:C:115:THR:HA	2.20	0.57
2:C:122:LEU:HB3	2:C:135:LEU:HD21	1.88	0.56
1:B:260:THR:OG1	2:D:138:HIS:NE2	2.28	0.54
1:B:357:GLU:OE1	1:B:360:ARG:NH1	2.40	0.54
2:D:91:LYS:HA	2:D:91:LYS:NZ	2.23	0.54
1:B:298:LYS:HG2	1:B:318:GLU:HB2	1.90	0.53
1:A:248:PRO:HD2	1:A:320:ASP:HB3	1.89	0.53
1:A:353:MET:HG3	2:C:122:LEU:HD21	1.91	0.53
1:B:397:VAL:HG13	1:B:398:PHE:HD1	1.74	0.53
1:B:177:GLU:OE2	1:B:312:HIS:ND1	2.42	0.52
1:A:397:VAL:HG13	1:A:398:PHE:HD1	1.73	0.52
1:A:369:LEU:HD11	1:A:405:VAL:HG12	1.91	0.52
1:B:253:ALA:HB1	2:D:131:GLY:O	2.09	0.52
1:A:407:GLU:OE2	1:A:509:ARG:NH2	2.44	0.51
1:A:177:GLU:OE2	1:A:312:HIS:ND1	2.44	0.51
1:B:248:PRO:HD2	1:B:320:ASP:HB3	1.93	0.50
1:B:241:ALA:O	1:B:245:GLN:HG3	2.11	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:246:ARG:HD3	1:B:317:VAL:HG12	1.94	0.49
1:A:372:ARG:HG2	1:A:506:VAL:HG12	1.95	0.49
2:C:22:ALA:O	2:C:26:ARG:HG3	2.13	0.49
1:B:369:LEU:O	1:B:373:LEU:HG	2.11	0.49
2:D:122:LEU:HB3	2:D:135:LEU:HD21	1.95	0.48
2:C:102:LYS:HD3	2:C:124:ASN:HA	1.95	0.48
2:C:23:ILE:HG21	2:C:54:ILE:HD11	1.94	0.48
1:A:292:GLN:O	1:A:296:SER:O	2.32	0.47
1:A:496:ARG:HH22	1:A:516:GLU:H	1.62	0.47
1:A:346:ALA:HB1	2:C:142:ALA:HB3	1.96	0.47
1:B:372:ARG:HG2	1:B:506:VAL:HG12	1.97	0.46
1:A:507:ASN:HA	1:A:510:PRO:HD2	1.98	0.46
1:B:91:HIS:CE1	1:B:273:ASP:OD1	2.68	0.46
1:A:63:HIS:HA	1:A:66:LEU:HD12	1.97	0.46
1:A:372:ARG:HG2	1:A:506:VAL:CG1	2.45	0.46
2:C:23:ILE:HG23	2:C:107:ILE:HD11	1.97	0.46
2:C:87:GLU:HG3	2:C:87:GLU:O	2.15	0.46
1:B:63:HIS:HA	1:B:66:LEU:HD12	1.99	0.45
1:B:496:ARG:HH22	1:B:516:GLU:H	1.64	0.45
1:A:254:GLU:OE1	2:C:128:THR:HG22	2.17	0.45
1:B:176:PRO:HG3	1:B:278:ALA:HA	1.99	0.45
1:B:357:GLU:HA	1:B:360:ARG:HD3	1.97	0.45
2:D:20:ILE:HA	2:D:23:ILE:HD12	1.99	0.45
1:A:91:HIS:CE1	1:A:273:ASP:OD1	2.70	0.45
2:C:135:LEU:O	2:C:139:ILE:HG13	2.17	0.44
1:A:105:ARG:O	1:A:108:TYR:O	2.35	0.44
1:B:176:PRO:HG3	1:B:278:ALA:CA	2.48	0.44
1:B:372:ARG:HG2	1:B:506:VAL:CG1	2.47	0.44
1:B:366:SER:HB2	1:B:369:LEU:H	1.83	0.44
1:B:507:ASN:HA	1:B:510:PRO:HD2	2.00	0.44
1:B:564:THR:HB	1:B:567:GLN:CB	2.48	0.44
1:B:258:LEU:O	1:B:262:LEU:HB2	2.18	0.44
1:B:475:ASP:O	1:B:479:VAL:HG23	2.17	0.44
1:B:353:MET:CG	2:D:122:LEU:HD21	2.43	0.44
1:B:247:PHE:CD1	1:B:296:SER:HB2	2.52	0.44
2:C:97:GLU:HA	2:C:100:ILE:HD12	2.00	0.43
2:C:123:ILE:HD13	2:C:135:LEU:HD23	2.00	0.43
1:A:222:LEU:HD12	1:A:482:ASN:HD22	1.83	0.43
1:B:88:LYS:CB	1:B:93:LEU:HG	2.49	0.43
2:D:53:GLN:OE1	2:D:99:GLN:OE1	2.36	0.43
1:B:355:LEU:HG	1:B:374:ALA:HB2	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:53:GLN:HB3	2:D:103:ILE:HD11	2.01	0.42
1:A:298:LYS:HD3	1:A:320:ASP:HA	2.01	0.42
1:A:143:GLU:CB	1:A:146:VAL:CB	2.97	0.42
1:A:176:PRO:HG3	1:A:278:ALA:HA	2.02	0.42
1:B:143:GLU:CB	1:B:146:VAL:CB	2.98	0.42
1:A:298:LYS:H	1:A:298:LYS:HD2	1.84	0.41
1:B:91:HIS:O	1:B:95:GLY:HA3	2.19	0.41
1:B:298:LYS:HB3	1:B:317:VAL:HG22	2.02	0.41
1:A:373:LEU:HD22	1:A:401:PHE:HB3	2.02	0.41
1:A:587:ASP:CB	1:A:590:THR:CB	2.98	0.41
1:A:91:HIS:O	1:A:95:GLY:HA3	2.19	0.41
1:B:73:PHE:HE2	1:B:93:LEU:HD13	1.85	0.41
1:B:257:LYS:HB2	2:D:131:GLY:HA2	2.01	0.41
2:D:102:LYS:HD3	2:D:124:ASN:HA	2.03	0.41
1:B:564:THR:HG22	1:B:566:GLU:H	1.85	0.41
2:D:110:LYS:HE2	2:D:110:LYS:HB3	1.83	0.41
1:A:258:LEU:O	1:A:262:LEU:HB2	2.21	0.41
1:A:355:LEU:HG	1:A:374:ALA:HB2	2.02	0.41
1:A:241:ALA:HB2	1:A:355:LEU:HD22	2.03	0.41
1:B:298:LYS:HD3	1:B:320:ASP:HA	2.03	0.41
2:D:114:ILE:HG22	2:D:143:HIS:CD2	2.55	0.41
1:A:240:VAL:O	1:A:244:SER:HB2	2.21	0.40
1:B:266:HIS:O	1:B:270:CYS:SG	2.80	0.40
1:A:226:SER:HA	1:A:230:PHE:HD2	1.86	0.40
2:D:57:ILE:HD13	2:D:100:ILE:CD1	2.52	0.40
1:B:32:ALA:HB2	1:B:77:CYS:HB3	2.03	0.40
2:D:23:ILE:HG21	2:D:54:ILE:HD11	2.04	0.40
2:D:57:ILE:HD13	2:D:100:ILE:HD12	2.03	0.40

There are no symmetry-related clashes.

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	546/609 (90%)	510 (93%)	30 (6%)	6 (1%)	14 46
1	B	528/609 (87%)	494 (94%)	32 (6%)	2 (0%)	34 67
2	C	117/143 (82%)	110 (94%)	6 (5%)	1 (1%)	17 50
2	D	114/143 (80%)	108 (95%)	6 (5%)	0	100 100
All	All	1305/1504 (87%)	1222 (94%)	74 (6%)	9 (1%)	22 56

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	87	ASP
1	A	307	LEU
1	A	541	SER
1	A	588	LYS
1	B	307	LEU
2	C	32	ALA
1	A	523	PRO
1	A	108	TYR
1	B	108	TYR

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	271/532 (51%)	247 (91%)	24 (9%)	9 32
1	B	267/532 (50%)	242 (91%)	25 (9%)	8 30
2	C	70/101 (69%)	66 (94%)	4 (6%)	20 51
2	D	77/101 (76%)	71 (92%)	6 (8%)	12 38
All	All	685/1266 (54%)	626 (91%)	59 (9%)	10 34

All (59) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	47	VAL
1	A	115	CYS

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Mol	Chain	Res	Type
1	A	122	ARG
1	A	163	LEU
1	A	164	TYR
1	A	166	ILE
1	A	222	LEU
1	A	227	LEU
1	A	260	THR
1	A	262	LEU
1	A	269	CYS
1	A	288	ILE
1	A	292	GLN
1	A	293	ASP
1	A	298	LYS
1	A	323	PRO
1	A	332	ASP
1	A	355	LEU
1	A	358	TYR
1	A	391	HIS
1	A	434	ARG
1	A	509	ARG
1	A	519	GLU
1	A	565	LYS
1	B	47	VAL
1	B	115	CYS
1	B	122	ARG
1	B	129	HIS
1	B	163	LEU
1	B	164	TYR
1	B	166	ILE
1	B	206	LEU
1	B	222	LEU
1	B	227	LEU
1	B	260	THR
1	B	262	LEU
1	B	269	CYS
1	B	292	GLN
1	B	293	ASP
1	B	298	LYS
1	B	304	GLU
1	B	317	VAL
1	B	332	ASP
1	B	355	LEU

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Mol	Chain	Res	Type
1	B	358	TYR
1	B	360	ARG
1	B	391	HIS
1	B	434	ARG
1	B	540	LEU
2	C	7	GLU
2	C	30	MET
2	C	46	SER
2	C	51	THR
2	D	48	GLU
2	D	53	GLN
2	D	59	LEU
2	D	98	THR
2	D	100	ILE
2	D	110	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	123	ASN
1	A	129	HIS
1	A	245	GLN
1	A	292	GLN
1	A	482	ASN
1	B	123	ASN
1	B	129	HIS
1	B	482	ASN
1	B	488	HIS
2	C	24	GLN
2	C	65	GLN
2	C	99	GLN
2	C	143	HIS
2	D	99	GLN
2	D	143	HIS

5.3.3 RNA

There are no RNA molecules 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 monosaccharides 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, 95^{th} 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	555/609 (91%)	-0.19	9 (1%) 72 69	40, 100, 165, 188	0
1	B	542/609 (88%)	-0.16	7 (1%) 77 76	36, 107, 179, 210	0
2	C	122/143 (85%)	-0.21	2 (1%) 72 69	43, 72, 124, 132	0
2	D	120/143 (83%)	-0.21	0 100 100	37, 56, 90, 99	0
All	All	1339/1504 (89%)	-0.18	18 (1%) 77 76	36, 97, 169, 210	0

All (18) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	100	THR	5.7
1	B	111	MET	4.9
1	B	57	GLN	3.6
1	A	84	GLU	3.1
1	B	163	LEU	3.0
1	B	607	LEU	2.7
1	A	582	CYS	2.5
1	A	573	ASP	2.5
1	A	175	ALA	2.3
1	B	539	THR	2.3
1	A	201	CYS	2.3
1	A	576	ALA	2.3
2	C	92	GLN	2.2
1	B	467	ALA	2.2
1	A	113	ASP	2.1
1	B	31	VAL	2.1
2	C	91	LYS	2.0
1	A	575	PHE	2.0

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 monosaccharides 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.