Full wwPDB X-ray Structure Validation Report ⓘ

May 28, 2020 – 07:42 pm BST

PDB ID	:	1IDS
Title	:	X-RAY STRUCTURE ANALYSIS OF THE IRON-DEPENDENT SUPEROXIDE DISMUTASE FROM MYCOBACTERIUM TUBERCULOSIS AT 2.0 ANGSTROMS RESOLUTIONS REVEALS NOVEL DIMER-DIMER INTERACTIONS
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Deposited on	:	1994-09-29
Resolution	:	2.00 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 ①) were used in the production of this report:

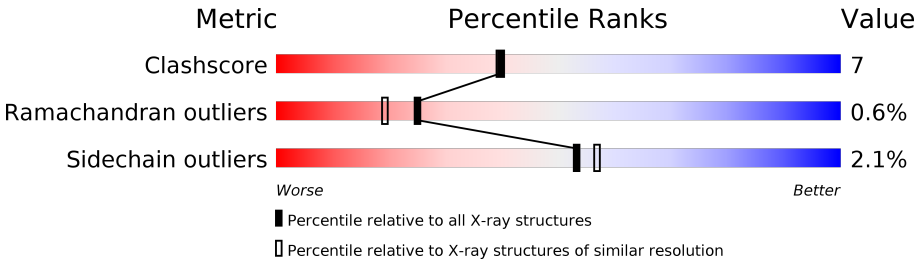
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

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 2.00 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))
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)

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 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%

Mol	Chain	Length	Quality of chain
1	A	207	81% 14%
1	B	207	81% 14%
1	C	207	76% 16%
1	D	207	80% 15%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 6932 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 IRON SUPEROXIDE DISMUTASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	198	Total	C	N	O	S	0	0	0
			1568	1012	269	286	1			
1	B	198	Total	C	N	O	S	0	0	0
			1568	1012	269	286	1			
1	C	198	Total	C	N	O	S	0	0	0
			1568	1012	269	286	1			
1	D	198	Total	C	N	O	S	0	0	0
			1568	1012	269	286	1			

- Molecule 2 is FE (III) ION (three-letter code: FE) (formula: Fe).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	1	Total	Fe	0	0
			1	1		
2	A	1	Total	Fe	0	0
			1	1		
2	D	1	Total	Fe	0	0
			1	1		
2	C	1	Total	Fe	0	0
			1	1		

- Molecule 3 is water.

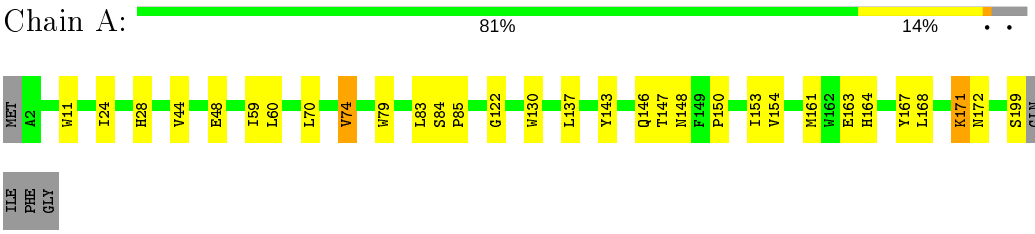
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	180	Total	O	0	0
			180	180		
3	B	168	Total	O	0	0
			168	168		
3	C	153	Total	O	0	0
			153	153		
3	D	155	Total	O	0	0
			155	155		

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. 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. 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.

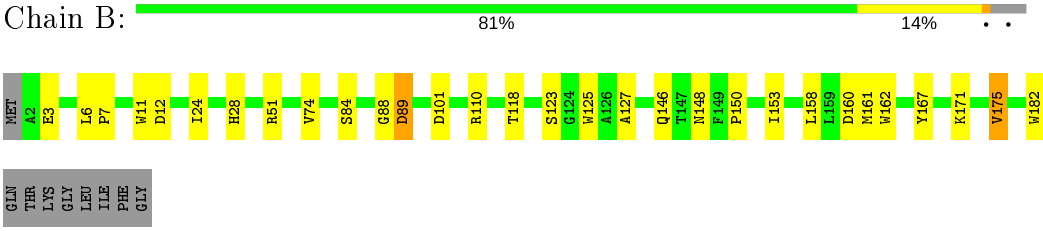
- Molecule 1: IRON SUPEROXIDE DISMUTASE

Chain A:



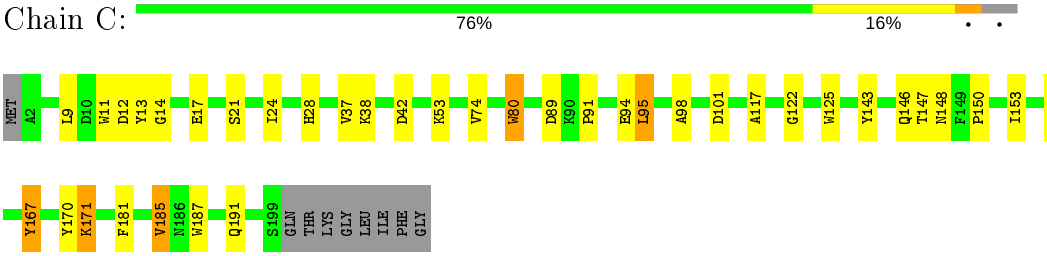
- Molecule 1: IRON SUPEROXIDE DISMUTASE

Chain B:



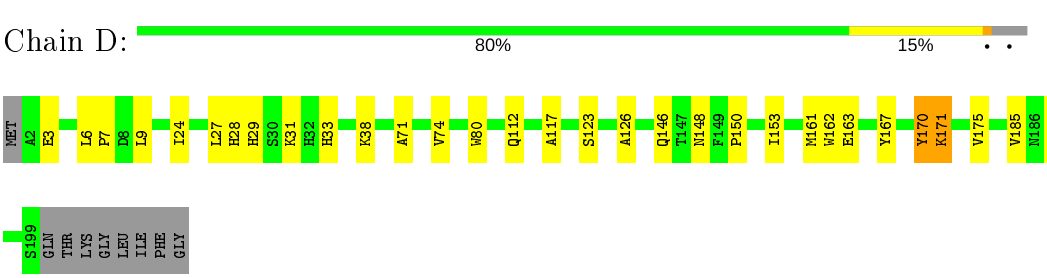
- Molecule 1: IRON SUPEROXIDE DISMUTASE

Chain C:



- Molecule 1: IRON SUPEROXIDE DISMUTASE

Chain D:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	68.65Å 85.40Å 66.35Å 90.00° 99.86° 90.00°	Depositor
Resolution (Å)	(Not available) – 2.00 11.15 – 2.01	Depositor EDS
% Data completeness (in resolution range)	80.4 ((Not available)-2.00) 80.3 (11.15-2.01)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.20 (at 2.00Å)	Xtriage
Refinement program	RESTRAIN	Depositor
R, R_{free}	0.167 , (Not available) 0.225 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å^2)	18.0	Xtriage
Anisotropy	0.235	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 14.0	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	0.022 for l,-k,h	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	6932	wwPDB-VP
Average B, all atoms (Å^2)	0.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.27% 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

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

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	0.94	0/1617	1.08	2/2206 (0.1%)
1	B	0.95	0/1617	1.12	4/2206 (0.2%)
1	C	0.95	1/1617 (0.1%)	1.11	8/2206 (0.4%)
1	D	0.96	1/1617 (0.1%)	1.11	5/2206 (0.2%)
All	All	0.95	2/6468 (0.0%)	1.11	19/8824 (0.2%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	80	TRP	NE1-CE2	-5.16	1.30	1.37
1	D	80	TRP	NE1-CE2	-5.12	1.30	1.37

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	175	VAL	CA-CB-CG2	7.12	121.59	110.90
1	C	170	TYR	CB-CG-CD2	-6.33	117.20	121.00
1	B	161	MET	CG-SD-CE	6.07	109.92	100.20
1	D	175	VAL	CA-CB-CG2	6.02	119.92	110.90
1	B	74	VAL	CA-CB-CG2	6.00	119.89	110.90
1	C	167	TYR	CB-CG-CD2	-5.71	117.57	121.00
1	D	161	MET	CG-SD-CE	5.69	109.30	100.20
1	D	170	TYR	CB-CG-CD1	-5.68	117.59	121.00
1	C	89	ASP	CA-C-N	5.67	129.69	117.20
1	C	37	VAL	CA-CB-CG2	5.61	119.31	110.90
1	C	74	VAL	CA-CB-CG2	5.48	119.12	110.90
1	A	74	VAL	CA-CB-CG2	5.46	119.10	110.90
1	C	185	VAL	CA-CB-CG2	5.30	118.86	110.90
1	B	12	ASP	CB-CG-OD1	5.23	123.01	118.30
1	D	190	VAL	CA-CB-CG2	5.17	118.66	110.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	89	ASP	O-C-N	-5.15	114.46	122.70
1	C	161	MET	CG-SD-CE	5.13	108.41	100.20
1	D	74	VAL	CA-CB-CG2	5.04	118.46	110.90
1	A	161	MET	CG-SD-CE	5.00	108.21	100.20

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	1568	0	1489	20	0
1	B	1568	0	1489	23	0
1	C	1568	0	1489	27	0
1	D	1568	0	1489	24	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	180	0	0	0	0
3	B	168	0	0	2	0
3	C	153	0	0	4	0
3	D	155	0	0	2	0
All	All	6932	0	5956	89	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 7.

All (89) 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:C:95:LEU:O	1:C:95:LEU:HD12	1.79	0.82
1:B:88:GLY:O	1:B:89:ASP:HB2	1.78	0.81
1:B:3:GLU:HB2	3:B:1611:HOH:O	1.86	0.75
1:B:101:ASP:HB3	3:B:1498:HOH:O	1.94	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:44:VAL:O	1:A:48:GLU:HG3	1.97	0.65
1:D:27:LEU:O	1:D:31:LYS:HB2	2.00	0.62
1:C:191:GLN:HG2	3:C:1585:HOH:O	2.00	0.61
1:B:24:ILE:O	1:B:28:HIS:HB2	2.01	0.60
1:B:127:ALA:HB2	1:B:158:LEU:HD23	1.84	0.59
3:C:1637:HOH:O	1:D:171:LYS:HE3	2.02	0.59
1:D:123:SER:HB3	1:D:162:TRP:CE2	2.38	0.58
1:A:24:ILE:O	1:A:28:HIS:HB2	2.04	0.57
1:B:150:PRO:HD2	1:B:153:ILE:HG13	1.86	0.57
1:C:143:TYR:HB2	1:C:147:THR:HB	1.88	0.56
1:D:185:VAL:HG11	1:D:187:TRP:CE2	2.41	0.55
1:B:88:GLY:O	1:B:89:ASP:CB	2.49	0.55
1:C:122:GLY:HA2	1:D:162:TRP:CH2	2.42	0.55
1:D:150:PRO:HG2	1:D:153:ILE:HD11	1.89	0.55
1:D:6:LEU:HD12	1:D:7:PRO:HD2	1.89	0.55
1:D:171:LYS:HD3	1:D:171:LYS:N	2.21	0.55
1:B:125:TRP:CZ3	1:B:160:ASP:HB2	2.43	0.54
1:D:146:GLN:N	1:D:146:GLN:OE1	2.34	0.54
1:D:24:ILE:O	1:D:28:HIS:HB2	2.08	0.54
1:B:51:ARG:HD3	1:D:112:GLN:OE1	2.07	0.53
1:A:150:PRO:HG2	1:A:153:ILE:CG1	2.38	0.53
1:B:150:PRO:HB3	1:D:71:ALA:HA	1.91	0.53
1:D:191:GLN:HG2	3:D:1584:HOH:O	2.09	0.53
1:A:122:GLY:HA2	1:B:162:TRP:CH2	2.44	0.52
1:B:127:ALA:CB	1:B:158:LEU:HD23	2.39	0.52
1:B:127:ALA:HB2	1:B:158:LEU:CD2	2.39	0.52
1:D:9:LEU:HD21	1:D:29:HIS:CD2	2.46	0.51
1:D:150:PRO:HG2	1:D:153:ILE:CG1	2.40	0.51
1:B:110:ARG:HG3	1:B:182:TRP:CZ2	2.45	0.51
1:D:33:HIS:O	1:D:33:HIS:HD2	1.94	0.51
1:C:163:GLU:HB2	1:D:163:GLU:HB2	1.92	0.50
1:C:9:LEU:HD12	1:C:13:TYR:CE1	2.47	0.50
1:D:146:GLN:O	1:D:146:GLN:HG2	2.10	0.50
1:C:95:LEU:CD1	1:C:98:ALA:HB3	2.42	0.49
1:B:118:THR:HG21	1:B:175:VAL:HG12	1.94	0.49
1:C:38:LYS:HE2	1:C:42:ASP:OD2	2.12	0.49
1:B:123:SER:HB3	1:B:162:TRP:CE2	2.48	0.49
1:D:123:SER:HB3	1:D:162:TRP:CD2	2.48	0.49
1:B:125:TRP:CE3	1:B:160:ASP:HA	2.48	0.49
1:A:143:TYR:HB2	1:A:147:THR:HB	1.94	0.48
1:C:150:PRO:HD2	1:C:153:ILE:HG13	1.96	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:146:GLN:O	1:C:146:GLN:HG2	2.13	0.48
1:D:117:ALA:HB2	1:D:126:ALA:HB2	1.95	0.48
1:C:9:LEU:HD12	1:C:13:TYR:CD1	2.49	0.48
1:C:24:ILE:O	1:C:28:HIS:HB2	2.13	0.48
1:C:17:GLU:OE1	1:C:21:SER:HA	2.13	0.47
1:C:14:GLY:O	1:C:17:GLU:HG3	2.14	0.47
1:C:163:GLU:O	1:C:167:TYR:HB2	2.15	0.47
1:C:95:LEU:HD12	1:C:98:ALA:HB3	1.97	0.47
1:B:146:GLN:N	1:B:146:GLN:OE1	2.46	0.47
1:A:163:GLU:O	1:A:167:TYR:HB2	2.15	0.47
1:A:146:GLN:HG2	1:A:146:GLN:O	2.15	0.47
1:A:79:TRP:CE2	1:A:83:LEU:HD11	2.50	0.46
1:C:146:GLN:N	1:C:146:GLN:OE1	2.45	0.46
1:D:33:HIS:O	1:D:33:HIS:CD2	2.68	0.46
1:B:84:SER:HB2	1:B:186:ASN:HB2	1.98	0.46
1:D:170:TYR:O	1:D:171:LYS:HB2	2.16	0.45
1:D:3:GLU:HG3	1:D:3:GLU:H	1.60	0.45
1:B:123:SER:HB3	1:B:162:TRP:CD2	2.52	0.45
1:A:150:PRO:HG2	1:A:153:ILE:HD11	1.99	0.44
1:A:130:TRP:HB3	1:A:154:VAL:HB	2.00	0.44
1:A:164:HIS:C	1:A:164:HIS:CD2	2.91	0.43
1:C:181:PHE:CZ	1:C:185:VAL:HG22	2.52	0.43
1:C:9:LEU:CD1	1:C:13:TYR:CE1	3.01	0.43
1:C:53:LYS:HD3	3:C:1475:HOH:O	2.18	0.43
1:C:117:ALA:O	1:C:161:MET:HG3	2.19	0.42
1:C:80:TRP:HA	1:C:80:TRP:CE3	2.54	0.42
1:C:95:LEU:HD13	1:C:95:LEU:HA	1.85	0.42
1:A:70:LEU:O	1:A:74:VAL:HG23	2.20	0.42
1:A:168:LEU:HD23	1:A:168:LEU:HA	1.91	0.42
1:B:118:THR:CG2	1:B:175:VAL:HG12	2.50	0.42
1:C:91:PRO:HB3	1:C:187:TRP:CE3	2.55	0.42
1:A:137:LEU:HD23	1:A:137:LEU:HA	1.92	0.41
1:C:125:TRP:CZ3	1:C:160:ASP:HB2	2.55	0.41
1:B:6:LEU:HD12	1:B:7:PRO:HD2	2.01	0.41
1:D:150:PRO:HG2	1:D:153:ILE:CD1	2.50	0.41
1:B:110:ARG:HG3	1:B:182:TRP:CE2	2.55	0.41
1:A:146:GLN:OE1	1:A:146:GLN:N	2.49	0.41
1:A:59:ILE:HG23	1:A:60:LEU:N	2.35	0.41
1:A:84:SER:HA	1:A:85:PRO:HD3	1.81	0.41
1:A:79:TRP:CZ2	1:A:83:LEU:HD11	2.56	0.40
1:A:171:LYS:HB3	1:A:172:ASN:H	1.58	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:171:LYS:HE2	3:D:1393:HOH:O	2.21	0.40
1:A:143:TYR:HE2	3:C:1565:HOH:O	2.04	0.40
1:C:11:TRP:HE3	1:C:12:ASP:O	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	196/207 (95%)	187 (95%)	8 (4%)	1 (0%)	29 23
1	B	196/207 (95%)	186 (95%)	8 (4%)	2 (1%)	15 9
1	C	196/207 (95%)	186 (95%)	9 (5%)	1 (0%)	29 23
1	D	196/207 (95%)	185 (94%)	10 (5%)	1 (0%)	29 23
All	All	784/828 (95%)	744 (95%)	35 (4%)	5 (1%)	25 19

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	148	ASN
1	A	148	ASN
1	B	148	ASN
1	C	148	ASN
1	B	89	ASP

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	156/163 (96%)	153 (98%)	3 (2%)	57	61
1	B	156/163 (96%)	153 (98%)	3 (2%)	57	61
1	C	156/163 (96%)	152 (97%)	4 (3%)	46	48
1	D	156/163 (96%)	153 (98%)	3 (2%)	57	61
All	All	624/652 (96%)	611 (98%)	13 (2%)	53	57

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	11	TRP
1	A	171	LYS
1	A	199	SER
1	B	11	TRP
1	B	167	TYR
1	B	171	LYS
1	C	94	GLU
1	C	95	LEU
1	C	101	ASP
1	C	171	LYS
1	D	38	LYS
1	D	167	TYR
1	D	171	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	23	GLN
1	B	23	GLN
1	B	62	ASN
1	B	191	GLN
1	C	62	ASN
1	D	62	ASN

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 carbohydrates in this entry.

5.6 Ligand geometry

Of 4 ligands modelled in this entry, 4 are monoatomic - leaving 0 for Mogul analysis.

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

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

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.