



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 05:13 AM UTC

PDB ID : 3O60 / pdb_00003o60
Title : The Crystal Structure of Lin0861 from *Listeria innocua* to 2.8Å
Authors : Stein, A.J.; Rakowski, E.; Feldmann, B.; Joachimiak, A.; Midwest Center for Structural Genomics (MCSG)
Deposited on : 2010-07-28
Resolution : 2.80 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 types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

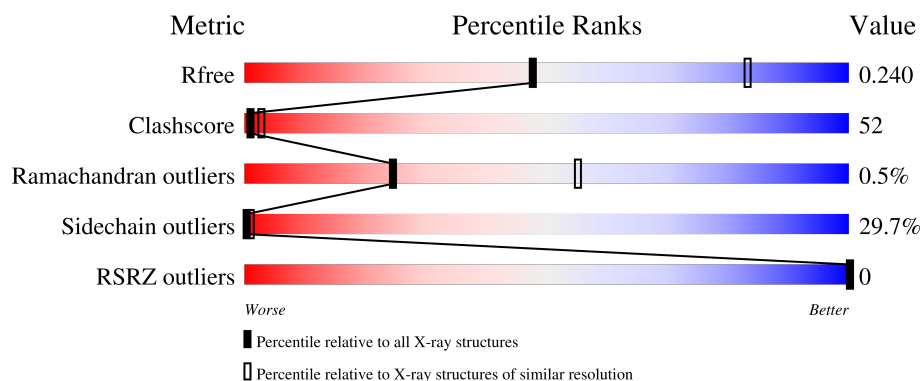
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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}	180053	3866 (2.80-2.80)
Clashscore	190562	4276 (2.80-2.80)
Ramachandran outliers	187476	4196 (2.80-2.80)
Sidechain outliers	187428	4198 (2.80-2.80)
RSRZ outliers	180081	3869 (2.80-2.80)

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 $\leq 5\%$. 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	185	
1	B	185	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	SO4	A	187	-	-	X	-

2 Entry composition [i](#)

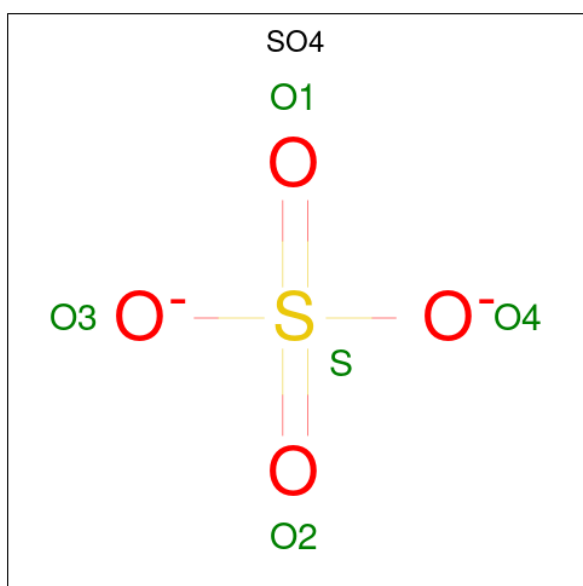
There are 2 unique types of molecules in this entry. The entry contains 2917 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Lin0861 protein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	182	Total	C	N	O	S	Se	0	0	0
			1449	936	241	267	2	3			
1	B	182	Total	C	N	O	S	Se	0	0	0
			1448	931	244	269	2	2			

- Molecule 2 is SULFATE ION (CCD ID: SO4) (formula: O₄S).

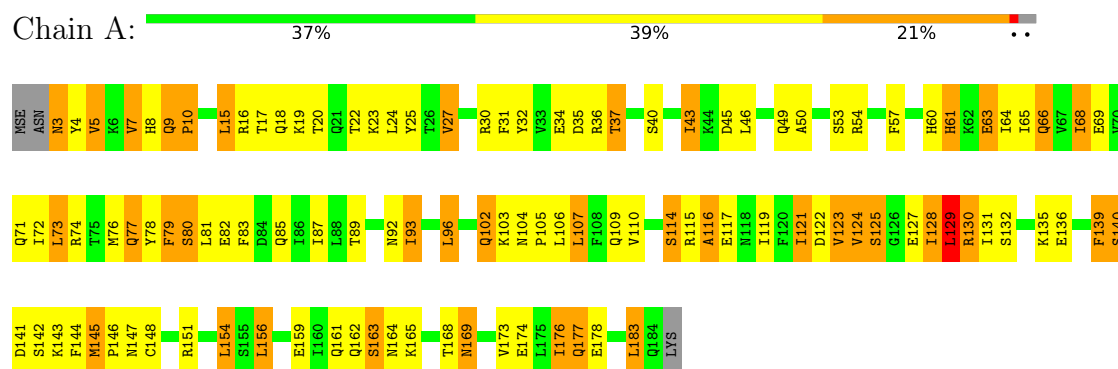


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		

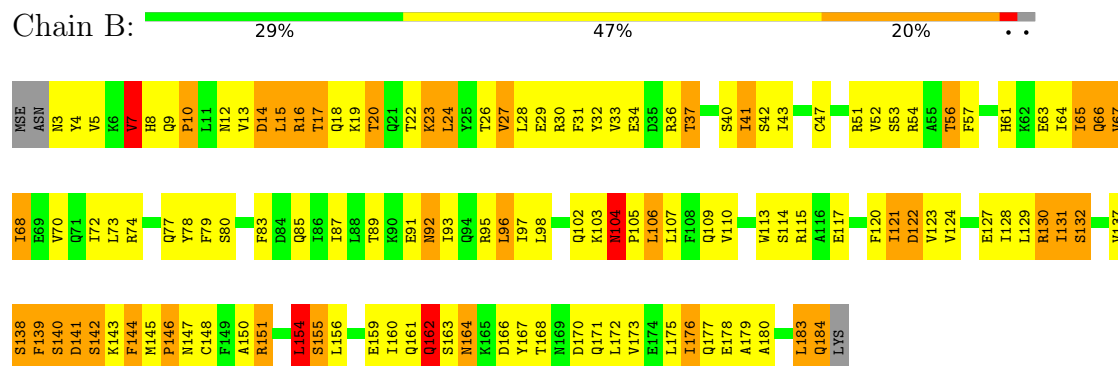
3 Residue-property plots [i](#)

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: Lin0861 protein



• Molecule 1: Lin0861 protein



4 Data and refinement statistics

Property	Value	Source
Space group	P 41	Depositor
Cell constants a, b, c, α , β , γ	95.46Å 95.46Å 96.84Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	42.69 – 2.80 42.69 – 2.80	Depositor EDS
% Data completeness (in resolution range)	94.9 (42.69-2.80) 94.9 (42.69-2.80)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.64 (at 2.81Å)	Xtriage
Refinement program	PHENIX 1.5_2	Depositor
R, R_{free}	0.220 , 0.246 (Not available) , 0.240	Depositor DCC
R_{free} test set	1094 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å ²)	62.2	Xtriage
Anisotropy	0.452	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 38.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.010 for -h,-l,-k 0.003 for -h,l,k 0.007 for l,-k,h 0.011 for -l,-k,-h 0.477 for h,-k,-l	Xtriage
Reported twinning fraction	0.499 for h,-k,-l	Depositor
Outliers	0 of 21372 reflections	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	2917	wwPDB-VP
Average B, all atoms (Å ²)	60.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.27% 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

Bond lengths and bond angles in the following residue types are not validated in this section: SO4

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	1.29	3/1471 (0.2%)	1.15	11/1994 (0.6%)
1	B	1.39	7/1469 (0.5%)	1.06	10/1992 (0.5%)
All	All	1.34	10/2940 (0.3%)	1.10	21/3986 (0.5%)

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	B	0	1

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	116	ALA	CA-CB	-7.29	1.43	1.53
1	A	124	VAL	CA-CB	-6.84	1.46	1.54
1	B	7	VAL	CA-CB	-6.33	1.46	1.54
1	B	27	VAL	CA-CB	-6.16	1.47	1.54
1	B	160	ILE	CA-CB	-5.85	1.47	1.54
1	B	150	ALA	CA-CB	-5.22	1.45	1.53
1	A	128	ILE	CA-CB	-5.18	1.48	1.54
1	B	104	ASN	C-O	-5.14	1.20	1.24
1	B	131	ILE	CA-CB	-5.06	1.48	1.54
1	B	154	LEU	C-O	-5.05	1.18	1.24

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	140	SER	N-CA-CB	-19.38	81.58	110.07

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	143	LYS	N-CA-C	-9.17	102.67	114.04
1	A	7	VAL	N-CA-C	7.07	117.86	110.72
1	A	9	GLN	N-CA-C	-6.76	100.20	110.07
1	A	125	SER	N-CA-C	-6.23	105.80	113.41
1	A	128	ILE	CB-CA-C	-6.18	103.79	112.14
1	B	178	GLU	N-CA-C	-6.03	104.70	111.28
1	A	129	LEU	N-CA-C	-5.96	104.86	111.36
1	B	37	THR	CB-CA-C	-5.67	99.48	109.62
1	A	140	SER	CA-C-N	-5.66	114.89	122.42
1	A	140	SER	C-N-CA	-5.66	114.89	122.42
1	B	151	ARG	N-CA-C	-5.62	105.30	111.82
1	B	131	ILE	CB-CA-C	-5.55	104.65	112.14
1	B	160	ILE	CB-CA-C	-5.50	104.84	112.04
1	B	10	PRO	N-CA-C	-5.35	101.45	112.47
1	B	170	ASP	N-CA-C	-5.10	105.72	111.28
1	A	79	PHE	N-CA-C	-5.10	105.63	111.14
1	B	139	PHE	N-CA-C	5.06	116.77	108.52
1	B	103	LYS	N-CA-C	5.01	118.55	112.23
1	B	162	GLN	N-CA-C	-5.01	107.56	113.97
1	A	139	PHE	N-CA-C	-5.00	102.37	110.32

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	130	ARG	Sidechain

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	1449	0	1417	154	2
1	B	1448	0	1403	151	2
2	A	10	0	0	5	0
2	B	10	0	0	2	0
All	All	2917	0	2820	296	2

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 52.

All (296) 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:A:110:VAL:O	1:A:114:SER:HB2	1.36	1.21
1:B:89:THR:O	1:B:93:ILE:HD12	1.41	1.19
1:B:53:SER:OG	1:B:56:THR:OG1	1.59	1.17
1:A:96:LEU:O	1:A:96:LEU:HD23	1.48	1.11
1:B:16:ARG:HH11	1:B:16:ARG:CG	1.61	1.10
1:B:3:ASN:HD21	1:B:5:VAL:CG2	1.63	1.10
1:A:139:PHE:HB3	1:A:145:MSE:HG3	1.34	1.10
1:B:3:ASN:HD21	1:B:5:VAL:HG21	1.17	1.09
1:A:145:MSE:HE3	1:A:145:MSE:HA	1.19	1.09
1:A:177:GLN:HE21	1:A:177:GLN:N	1.49	1.09
1:B:30:ARG:O	1:B:34:GLU:HG3	1.52	1.08
1:A:145:MSE:HA	1:A:145:MSE:CE	1.84	1.06
1:B:3:ASN:ND2	1:B:5:VAL:HG23	1.73	1.02
1:B:19:LYS:O	1:B:23:LYS:HG2	1.57	1.01
1:A:121:ILE:O	1:A:125:SER:HB2	1.61	1.00
1:A:25:TYR:OH	1:A:107:LEU:HD23	1.61	0.99
1:B:23:LYS:O	1:B:27:VAL:HG23	1.62	0.99
1:A:96:LEU:C	1:A:96:LEU:CD2	2.36	0.98
1:B:3:ASN:ND2	1:B:5:VAL:CG2	2.25	0.97
1:A:96:LEU:HD23	1:A:96:LEU:C	1.88	0.97
1:A:176:ILE:HG22	1:A:177:GLN:HE22	1.25	0.97
1:A:27:VAL:HG21	1:A:50:ALA:HB2	1.48	0.95
1:A:30:ARG:HH11	1:A:49:GLN:HG3	1.30	0.95
1:A:30:ARG:NH1	1:A:49:GLN:HG3	1.81	0.95
1:A:76:MSE:CG	1:A:127:GLU:HG3	1.96	0.95
1:B:16:ARG:HH11	1:B:16:ARG:HG2	1.30	0.95
1:B:3:ASN:CG	1:B:5:VAL:HG23	1.91	0.94
1:A:177:GLN:HE21	1:A:177:GLN:CA	1.77	0.94
1:A:30:ARG:NH1	1:A:49:GLN:CG	2.31	0.94
1:A:32:TYR:OH	1:A:109:GLN:NE2	2.04	0.91
1:B:16:ARG:O	1:B:20:THR:HG22	1.71	0.90
1:A:114:SER:O	1:A:115:ARG:HB2	1.70	0.89
1:A:9:GLN:OE1	1:A:130:ARG:NH2	2.04	0.89
1:B:164:ASN:N	1:B:164:ASN:HD22	1.70	0.88
1:A:177:GLN:CA	1:A:177:GLN:NE2	2.35	0.87
1:A:78:TYR:O	1:A:82:GLU:HG3	1.75	0.86
1:B:14:ASP:O	1:B:18:GLN:HG3	1.75	0.86

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:22:THR:HG21	1:B:85:GLN:O	1.76	0.86
1:A:176:ILE:HG22	1:A:177:GLN:NE2	1.89	0.85
1:B:30:ARG:O	1:B:34:GLU:CG	2.23	0.85
1:B:16:ARG:HH11	1:B:16:ARG:HG3	1.38	0.85
1:B:66:GLN:O	1:B:70:VAL:HG23	1.77	0.83
1:A:3:ASN:HD22	1:A:5:VAL:HG12	1.44	0.83
1:A:7:VAL:HG21	1:A:83:PHE:CD2	2.13	0.83
1:B:176:ILE:HG22	1:B:176:ILE:O	1.79	0.82
1:B:89:THR:O	1:B:93:ILE:CD1	2.26	0.81
1:B:162:GLN:NE2	1:B:163:SER:N	2.29	0.80
1:A:68:ILE:HD12	1:A:110:VAL:CG1	2.12	0.79
1:B:19:LYS:O	1:B:23:LYS:CG	2.31	0.78
1:A:68:ILE:O	1:A:72:ILE:HG13	1.84	0.78
1:A:177:GLN:N	1:A:177:GLN:NE2	2.30	0.77
1:A:7:VAL:HG21	1:A:83:PHE:CE2	2.19	0.77
1:B:23:LYS:O	1:B:27:VAL:CG2	2.33	0.77
1:A:78:TYR:OH	1:B:85:GLN:OE1	2.05	0.75
1:B:145:MSE:HB3	1:B:146:PRO:HD3	1.69	0.75
1:A:145:MSE:HB2	1:A:146:PRO:CD	2.17	0.74
1:A:43:ILE:HD13	1:A:57:PHE:CE2	2.22	0.74
1:B:144:PHE:CD1	1:B:144:PHE:C	2.66	0.74
1:B:63:GLU:H	1:B:66:GLN:HE21	1.32	0.74
1:A:32:TYR:CE1	1:A:109:GLN:NE2	2.55	0.74
1:A:68:ILE:CD1	1:A:110:VAL:CG1	2.67	0.73
1:A:32:TYR:CZ	1:A:109:GLN:NE2	2.57	0.72
1:A:177:GLN:NE2	1:A:177:GLN:HA	2.03	0.72
1:B:154:LEU:O	1:B:154:LEU:HD22	1.89	0.72
1:B:122:ASP:C	1:B:122:ASP:OD1	2.30	0.72
1:A:7:VAL:HG13	1:A:131:ILE:HD12	1.72	0.72
1:B:167:TYR:CB	1:B:172:LEU:HD21	2.20	0.72
1:B:164:ASN:HD22	1:B:164:ASN:H	1.36	0.72
1:B:141:ASP:C	1:B:141:ASP:OD1	2.32	0.71
1:A:30:ARG:HH12	1:A:49:GLN:CG	2.04	0.71
1:B:9:GLN:O	1:B:10:PRO:C	2.29	0.71
1:A:96:LEU:O	1:A:96:LEU:CD2	2.32	0.70
1:A:53:SER:CB	2:A:187:SO4:O1	2.40	0.70
1:A:68:ILE:HD12	1:A:110:VAL:HG12	1.73	0.70
1:A:19:LYS:O	1:A:23:LYS:HG3	1.91	0.69
1:A:65:ILE:HD11	1:A:116:ALA:HB2	1.75	0.69
1:B:16:ARG:HG2	1:B:16:ARG:NH1	1.97	0.69
1:B:167:TYR:HB3	1:B:172:LEU:CD2	2.23	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:8:HIS:CD2	1:B:9:GLN:N	2.60	0.68
1:B:57:PHE:O	1:B:61:HIS:N	2.25	0.68
1:A:85:GLN:NE2	1:B:78:TYR:OH	2.27	0.68
1:A:31:PHE:O	1:A:36:ARG:HB2	1.94	0.68
1:A:9:GLN:CD	1:A:9:GLN:H	2.02	0.67
1:A:3:ASN:HD22	1:A:5:VAL:CG1	2.08	0.67
1:B:139:PHE:O	1:B:140:SER:C	2.37	0.67
1:A:119:ILE:O	1:A:123:VAL:HG23	1.94	0.67
1:B:29:GLU:O	1:B:33:VAL:HG23	1.94	0.67
1:B:167:TYR:HB3	1:B:172:LEU:HD21	1.77	0.66
1:A:68:ILE:CD1	1:A:110:VAL:HG11	2.24	0.66
1:B:162:GLN:NE2	1:B:162:GLN:C	2.54	0.66
1:B:16:ARG:CG	1:B:16:ARG:NH1	2.34	0.66
1:A:145:MSE:HB2	1:A:146:PRO:HD3	1.77	0.66
1:B:3:ASN:OD1	1:B:5:VAL:HG23	1.94	0.66
1:B:159:GLU:O	1:B:162:GLN:NE2	2.29	0.65
1:A:16:ARG:O	1:A:20:THR:HG23	1.97	0.65
1:A:79:PHE:HE1	1:A:96:LEU:HD22	1.60	0.65
1:B:141:ASP:O	1:B:142:SER:C	2.39	0.65
1:A:8:HIS:HD2	1:A:80:SER:HB2	1.61	0.65
1:A:53:SER:HB3	2:A:187:SO4:O1	1.96	0.65
1:A:124:VAL:O	1:A:128:ILE:HG13	1.97	0.65
1:A:141:ASP:O	1:A:145:MSE:HG2	1.97	0.65
1:B:8:HIS:HD2	1:B:9:GLN:N	1.94	0.65
1:B:63:GLU:H	1:B:66:GLN:NE2	1.95	0.65
1:B:14:ASP:OD2	1:B:14:ASP:N	2.30	0.64
1:B:36:ARG:NH1	1:B:40:SER:O	2.31	0.64
1:A:76:MSE:HG2	1:A:127:GLU:HG3	1.78	0.64
1:A:34:GLU:O	1:A:35:ASP:HB2	1.96	0.64
1:B:14:ASP:OD2	1:B:17:THR:OG1	2.15	0.64
1:B:141:ASP:O	1:B:143:LYS:N	2.30	0.64
1:A:79:PHE:CE1	1:A:96:LEU:HD22	2.33	0.64
1:A:139:PHE:HB3	1:A:145:MSE:CG	2.20	0.63
1:B:3:ASN:OD1	1:B:4:TYR:N	2.31	0.63
1:A:76:MSE:HG3	1:A:127:GLU:HG3	1.78	0.63
1:A:7:VAL:HG13	1:A:131:ILE:CD1	2.29	0.63
1:B:171:GLN:O	1:B:175:LEU:HG	1.99	0.63
1:A:25:TYR:CD1	1:A:71:GLN:HG3	2.35	0.62
1:A:96:LEU:C	1:A:96:LEU:HD22	2.23	0.62
1:B:104:ASN:N	1:B:104:ASN:OD1	2.33	0.62
1:A:76:MSE:HG2	1:A:127:GLU:CG	2.30	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:31:PHE:CD2	1:B:36:ARG:HD3	2.35	0.62
1:A:76:MSE:SE	1:A:127:GLU:HG3	2.49	0.61
1:A:145:MSE:N	1:A:146:PRO:HD2	2.14	0.61
1:B:9:GLN:C	1:B:10:PRO:O	2.38	0.61
1:A:27:VAL:HG21	1:A:50:ALA:CB	2.27	0.61
1:B:164:ASN:H	1:B:164:ASN:ND2	1.97	0.61
1:B:120:PHE:CZ	1:B:124:VAL:HG21	2.36	0.61
1:B:162:GLN:C	1:B:162:GLN:CD	2.69	0.61
1:B:95:ARG:NH2	2:B:186:SO4:O4	2.33	0.61
1:A:74:ARG:CZ	1:B:85:GLN:HG2	2.31	0.60
1:A:76:MSE:CG	1:A:127:GLU:CG	2.77	0.60
1:B:31:PHE:CD1	1:B:41:ILE:HD13	2.36	0.60
1:A:121:ILE:O	1:A:125:SER:CB	2.44	0.60
1:B:3:ASN:CG	1:B:5:VAL:CG2	2.71	0.59
1:A:89:THR:OG1	1:A:92:ASN:HB2	2.02	0.59
1:A:145:MSE:CE	1:A:145:MSE:CA	2.62	0.59
1:B:91:GLU:OE2	1:B:95:ARG:NE	2.23	0.59
1:A:110:VAL:O	1:A:114:SER:CB	2.31	0.58
1:A:66:GLN:O	1:A:69:GLU:HB3	2.03	0.58
1:A:37:THR:HB	1:A:40:SER:HB3	1.86	0.58
1:A:124:VAL:O	1:A:124:VAL:HG12	2.02	0.58
1:B:121:ILE:CD1	1:B:151:ARG:HG2	2.34	0.58
1:A:76:MSE:O	1:A:80:SER:OG	2.22	0.57
1:B:145:MSE:HB3	1:B:146:PRO:CD	2.34	0.57
1:A:73:LEU:HD22	1:A:77:GLN:HE22	1.69	0.57
1:A:117:GLU:O	1:A:121:ILE:HD12	2.04	0.57
1:A:30:ARG:NH1	1:A:49:GLN:HG2	2.17	0.57
1:B:161:GLN:O	1:B:161:GLN:CG	2.51	0.57
1:B:176:ILE:O	1:B:176:ILE:CG2	2.52	0.57
1:B:30:ARG:C	1:B:34:GLU:HG3	2.29	0.57
1:A:147:ASN:O	1:A:151:ARG:HG3	2.05	0.57
1:B:154:LEU:HD22	1:B:154:LEU:C	2.30	0.57
1:A:45:ASP:O	1:A:49:GLN:HB2	2.05	0.56
1:A:63:GLU:HG3	1:A:64:ILE:H	1.70	0.56
1:A:129:LEU:HD22	1:A:129:LEU:O	2.06	0.56
1:B:91:GLU:O	1:B:95:ARG:HB2	2.05	0.56
1:A:130:ARG:CZ	1:A:131:ILE:HD11	2.36	0.56
1:A:130:ARG:HG2	1:A:131:ILE:HD13	1.88	0.55
1:A:159:GLU:HA	1:A:159:GLU:OE2	2.06	0.55
1:B:91:GLU:O	1:B:95:ARG:N	2.34	0.55
1:B:105:PRO:O	1:B:109:GLN:HG3	2.06	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:8:HIS:CD2	1:A:80:SER:HB2	2.42	0.55
1:B:8:HIS:HD2	1:B:9:GLN:C	2.14	0.55
1:A:61:HIS:HB3	1:A:66:GLN:CD	2.31	0.54
1:A:15:LEU:HD12	1:B:4:TYR:HA	1.90	0.54
1:A:18:GLN:O	1:A:74:ARG:NH2	2.40	0.54
1:B:74:ARG:O	1:B:77:GLN:HB2	2.08	0.54
1:B:129:LEU:O	1:B:132:SER:N	2.41	0.54
1:A:117:GLU:OE1	1:A:117:GLU:N	2.30	0.54
1:B:24:LEU:HD21	1:B:57:PHE:HD1	1.72	0.53
1:A:140:SER:OG	1:A:141:ASP:N	2.30	0.53
1:B:117:GLU:O	1:B:121:ILE:HG13	2.08	0.53
1:B:7:VAL:O	1:B:7:VAL:CG1	2.51	0.53
1:A:87:ILE:O	1:A:92:ASN:ND2	2.34	0.53
1:B:36:ARG:O	1:B:113:TRP:HZ2	1.91	0.53
1:A:25:TYR:CG	1:A:71:GLN:HG3	2.44	0.53
1:A:83:PHE:CE1	1:A:93:ILE:HD13	2.44	0.53
1:A:169:ASN:O	1:A:173:VAL:HG23	2.09	0.53
1:B:16:ARG:HG3	1:B:16:ARG:NH1	2.11	0.53
1:A:124:VAL:O	1:A:124:VAL:CG1	2.56	0.52
1:B:63:GLU:N	1:B:66:GLN:NE2	2.57	0.52
1:A:145:MSE:H	1:A:146:PRO:HD2	1.73	0.52
1:B:24:LEU:HD13	1:B:52:VAL:HG21	1.92	0.52
1:B:175:LEU:C	1:B:177:GLN:H	2.15	0.52
1:A:79:PHE:CE1	1:A:96:LEU:CD2	2.93	0.52
1:A:130:ARG:NH2	1:A:131:ILE:HD11	2.25	0.52
1:A:103:LYS:C	1:A:105:PRO:HD3	2.35	0.52
1:B:7:VAL:O	1:B:7:VAL:HG13	2.10	0.52
1:B:137:VAL:HG12	1:B:138:SER:N	2.24	0.52
1:A:18:GLN:OE1	1:B:85:GLN:HG3	2.10	0.51
1:B:183:LEU:O	1:B:184:GLN:CB	2.59	0.51
1:B:154:LEU:C	1:B:154:LEU:CD2	2.79	0.51
1:A:125:SER:OG	1:A:146:PRO:C	2.54	0.51
1:A:145:MSE:HB2	1:A:146:PRO:HD2	1.93	0.51
1:B:129:LEU:O	1:B:130:ARG:C	2.53	0.51
1:A:25:TYR:CZ	1:A:107:LEU:HD23	2.44	0.51
1:A:129:LEU:O	1:A:132:SER:OG	2.25	0.51
1:B:3:ASN:OD1	1:B:5:VAL:CG2	2.59	0.51
1:A:32:TYR:HE1	1:A:109:GLN:NE2	2.09	0.50
1:B:146:PRO:O	1:B:147:ASN:C	2.53	0.50
1:B:92:ASN:O	1:B:96:LEU:N	2.41	0.50
1:B:117:GLU:OE1	1:B:117:GLU:N	2.30	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:151:ARG:O	1:B:155:SER:OG	2.29	0.50
1:B:28:LEU:HD12	1:B:67:VAL:HG21	1.92	0.50
1:B:37:THR:O	1:B:40:SER:OG	2.30	0.50
1:A:103:LYS:C	1:A:105:PRO:CD	2.85	0.50
1:B:121:ILE:HD13	1:B:151:ARG:HG2	1.92	0.50
1:B:128:ILE:O	1:B:132:SER:OG	2.29	0.50
1:B:154:LEU:O	1:B:154:LEU:CD2	2.57	0.50
1:A:46:LEU:O	1:A:50:ALA:CB	2.61	0.49
1:B:92:ASN:O	1:B:96:LEU:HB2	2.11	0.49
1:B:161:GLN:O	1:B:161:GLN:HG2	2.11	0.49
1:A:103:LYS:O	1:A:105:PRO:HD2	2.12	0.49
1:B:141:ASP:OD1	1:B:141:ASP:O	2.30	0.49
1:B:9:GLN:O	1:B:10:PRO:O	2.30	0.49
1:B:141:ASP:OD1	1:B:143:LYS:N	2.33	0.49
1:B:37:THR:O	1:B:37:THR:OG1	2.30	0.48
1:B:127:GLU:OE1	1:B:130:ARG:HD3	2.12	0.48
1:A:125:SER:OG	1:A:147:ASN:HA	2.13	0.48
1:A:129:LEU:HD22	1:A:129:LEU:C	2.39	0.48
1:B:8:HIS:CD2	1:B:9:GLN:H	2.32	0.48
1:B:53:SER:HA	2:B:187:SO4:O3	2.13	0.48
1:B:154:LEU:HD23	1:B:154:LEU:HA	1.49	0.48
1:A:76:MSE:HE3	1:A:123:VAL:HG12	1.96	0.47
1:A:102:GLN:O	1:A:105:PRO:HD3	2.14	0.47
1:B:98:LEU:O	1:B:102:GLN:HG3	2.13	0.47
1:A:30:ARG:HH12	1:A:49:GLN:CD	2.22	0.47
1:A:145:MSE:N	1:A:146:PRO:CD	2.76	0.47
1:B:12:ASN:C	1:B:13:VAL:HG23	2.40	0.47
1:B:129:LEU:HD12	1:B:129:LEU:HA	1.72	0.47
1:B:32:TYR:OH	1:B:109:GLN:NE2	2.37	0.47
1:B:7:VAL:O	1:B:130:ARG:NH2	2.48	0.47
1:A:53:SER:HB2	2:A:187:SO4:S	2.55	0.47
1:B:115:ARG:C	1:B:117:GLU:OE1	2.58	0.47
1:A:125:SER:OG	1:A:147:ASN:N	2.49	0.46
1:B:17:THR:O	1:B:20:THR:HG23	2.16	0.46
1:A:7:VAL:HG21	1:A:83:PHE:HD2	1.73	0.46
1:A:46:LEU:O	1:A:50:ALA:N	2.48	0.46
1:A:104:ASN:N	1:A:105:PRO:CD	2.78	0.46
1:B:12:ASN:O	1:B:13:VAL:HG23	2.16	0.46
1:B:22:THR:O	1:B:26:THR:OG1	2.33	0.46
1:B:91:GLU:O	1:B:91:GLU:HG3	2.16	0.46
1:B:145:MSE:HE2	1:B:145:MSE:CA	2.46	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:3:ASN:HD21	1:A:135:LYS:HD3	1.81	0.45
1:A:174:GLU:O	1:A:178:GLU:N	2.45	0.45
1:B:122:ASP:OD1	1:B:122:ASP:O	2.35	0.45
1:A:4:TYR:HA	1:B:15:LEU:HD12	1.99	0.45
1:B:98:LEU:HD12	1:B:173:VAL:HG23	1.99	0.45
1:A:135:LYS:O	1:A:136:GLU:CB	2.65	0.45
1:A:183:LEU:HD23	1:A:183:LEU:HA	1.77	0.45
1:B:65:ILE:HG13	1:B:65:ILE:O	2.16	0.45
1:B:93:ILE:O	1:B:97:ILE:HG13	2.17	0.45
1:B:109:GLN:O	1:B:113:TRP:HB2	2.17	0.45
1:A:53:SER:N	2:A:187:SO4:O1	2.45	0.44
1:A:130:ARG:CZ	1:A:131:ILE:CD1	2.96	0.44
1:A:144:PHE:O	1:A:148:CYS:HB3	2.16	0.44
1:A:15:LEU:HA	1:A:15:LEU:HD22	1.82	0.44
1:A:73:LEU:HA	1:A:73:LEU:HD23	1.77	0.44
1:B:28:LEU:HD23	1:B:28:LEU:HA	1.80	0.44
1:B:184:GLN:HE21	1:B:184:GLN:HB3	1.67	0.43
1:A:85:GLN:O	1:B:22:THR:HG21	2.18	0.43
1:B:68:ILE:O	1:B:72:ILE:HG13	2.18	0.43
1:A:129:LEU:HA	1:A:129:LEU:HD23	1.56	0.43
1:A:27:VAL:HB	1:A:46:LEU:HD12	1.99	0.43
1:B:106:LEU:HA	1:B:106:LEU:HD22	1.39	0.43
1:B:175:LEU:C	1:B:177:GLN:N	2.75	0.43
1:B:28:LEU:HD12	1:B:67:VAL:CG2	2.49	0.43
1:B:183:LEU:O	1:B:184:GLN:HB2	2.19	0.43
1:A:53:SER:HB2	2:A:187:SO4:O1	2.18	0.43
1:A:19:LYS:O	1:A:23:LYS:CG	2.64	0.43
1:A:85:GLN:O	1:B:22:THR:CG2	2.66	0.43
1:A:20:THR:HA	1:A:23:LYS:HE3	2.01	0.43
1:B:115:ARG:HE	1:B:115:ARG:HB3	1.52	0.43
1:B:144:PHE:CD1	1:B:144:PHE:O	2.72	0.42
1:A:145:MSE:HE3	1:A:145:MSE:CA	2.13	0.42
1:B:20:THR:O	1:B:24:LEU:HB2	2.18	0.42
1:B:147:ASN:OD1	1:B:147:ASN:N	2.52	0.42
1:A:3:ASN:ND2	1:A:5:VAL:CG1	2.81	0.42
1:A:176:ILE:C	1:A:177:GLN:NE2	2.77	0.42
1:A:49:GLN:CA	1:A:49:GLN:NE2	2.79	0.42
1:B:79:PHE:O	1:B:83:PHE:HB2	2.20	0.42
1:B:128:ILE:O	1:B:128:ILE:HG22	2.15	0.42
1:B:137:VAL:CG1	1:B:138:SER:N	2.83	0.42
1:B:63:GLU:O	1:B:66:GLN:HB2	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:49:GLN:NE2	1:A:49:GLN:HA	2.34	0.41
1:A:156:LEU:HA	1:A:156:LEU:HD23	1.84	0.41
1:A:107:LEU:HD23	1:A:107:LEU:HA	1.88	0.41
1:A:9:GLN:HA	1:A:10:PRO:HD3	1.76	0.41
1:A:163:SER:OG	1:A:165:LYS:O	2.37	0.41
1:B:57:PHE:CD2	1:B:57:PHE:C	2.98	0.41
1:A:9:GLN:OE1	1:A:130:ARG:CZ	2.65	0.41
1:A:154:LEU:HD23	1:A:154:LEU:HA	1.78	0.40
1:B:73:LEU:HD23	1:B:123:VAL:HG13	2.03	0.40
1:B:98:LEU:CD1	1:B:173:VAL:HG23	2.50	0.40
1:B:179:ALA:O	1:B:180:ALA:C	2.63	0.40
1:A:8:HIS:ND1	1:A:9:GLN:O	2.55	0.40
1:A:135:LYS:HD3	1:A:135:LYS:HA	1.80	0.40

All (2) 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:A:177:GLN:OE1	1:B:183:LEU:O[2_654]	1.81	0.39
1:A:141:ASP:OD2	1:B:167:TYR:OH[2_654]	1.97	0.23

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	159/185 (86%)	153 (96%)	5 (3%)	1 (1%)	21	51
1	B	27/185 (15%)	26 (96%)	1 (4%)	0	100	100
All	All	186/370 (50%)	179 (96%)	6 (3%)	1 (0%)	24	55

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	10	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	156/172 (91%)	114 (73%)	42 (27%)	0	1
1	B	154/172 (90%)	104 (68%)	50 (32%)	0	1
All	All	310/344 (90%)	218 (70%)	92 (30%)	0	1

All (92) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3	ASN
1	A	5	VAL
1	A	15	LEU
1	A	17	THR
1	A	24	LEU
1	A	27	VAL
1	A	37	THR
1	A	43	ILE
1	A	54	ARG
1	A	60	HIS
1	A	61	HIS
1	A	63	GLU
1	A	66	GLN
1	A	68	ILE
1	A	73	LEU
1	A	77	GLN
1	A	80	SER
1	A	81	LEU
1	A	93	ILE
1	A	96	LEU
1	A	102	GLN
1	A	106	LEU
1	A	107	LEU

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Mol	Chain	Res	Type
1	A	114	SER
1	A	121	ILE
1	A	122	ASP
1	A	123	VAL
1	A	129	LEU
1	A	130	ARG
1	A	142	SER
1	A	145	MSE
1	A	154	LEU
1	A	156	LEU
1	A	161	GLN
1	A	162	GLN
1	A	163	SER
1	A	164	ASN
1	A	168	THR
1	A	169	ASN
1	A	176	ILE
1	A	177	GLN
1	A	183	LEU
1	B	7	VAL
1	B	14	ASP
1	B	15	LEU
1	B	16	ARG
1	B	17	THR
1	B	20	THR
1	B	23	LYS
1	B	24	LEU
1	B	41	ILE
1	B	42	SER
1	B	43	ILE
1	B	47	CYS
1	B	51	ARG
1	B	54	ARG
1	B	56	THR
1	B	64	ILE
1	B	65	ILE
1	B	66	GLN
1	B	67	VAL
1	B	68	ILE
1	B	80	SER
1	B	87	ILE
1	B	92	ASN

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Mol	Chain	Res	Type
1	B	96	LEU
1	B	104	ASN
1	B	106	LEU
1	B	107	LEU
1	B	110	VAL
1	B	114	SER
1	B	121	ILE
1	B	122	ASP
1	B	131	ILE
1	B	132	SER
1	B	138	SER
1	B	140	SER
1	B	141	ASP
1	B	142	SER
1	B	144	PHE
1	B	146	PRO
1	B	148	CYS
1	B	154	LEU
1	B	155	SER
1	B	156	LEU
1	B	162	GLN
1	B	164	ASN
1	B	166	ASP
1	B	168	THR
1	B	176	ILE
1	B	183	LEU
1	B	184	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	3	ASN
1	A	61	HIS
1	A	66	GLN
1	A	77	GLN
1	A	85	GLN
1	A	109	GLN
1	A	161	GLN
1	A	162	GLN
1	A	169	ASN
1	A	177	GLN
1	B	8	HIS

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Mol	Chain	Res	Type
1	B	49	GLN
1	B	66	GLN
1	B	102	GLN
1	B	109	GLN
1	B	161	GLN
1	B	162	GLN
1	B	164	ASN
1	B	169	ASN
1	B	184	GLN

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

4 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	SO4	A	187	-	4,4,4	0.27	0	6,6,6	0.22	0
2	SO4	B	187	-	4,4,4	0.26	0	6,6,6	0.24	0
2	SO4	B	186	-	4,4,4	0.27	0	6,6,6	0.38	0
2	SO4	A	186	-	4,4,4	0.24	0	6,6,6	0.41	0

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.

3 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	187	SO4	5	0
2	B	187	SO4	1	0
2	B	186	SO4	1	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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	179/185 (96%)	-0.96	0 100 100	46, 61, 75, 86	0
1	B	179/185 (96%)	-1.06	0 100 100	46, 59, 74, 79	0
All	All	358/370 (96%)	-1.01	0 100 100	46, 60, 75, 86	0

There are no RSRZ outliers to report.

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 oligosaccharides 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. 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	B-factors(Å ²)	Q<0.9
2	SO4	A	187	5/5	0.98	0.08	77,80,85,88	0
2	SO4	A	186	5/5	0.99	0.04	66,67,75,77	0
2	SO4	B	186	5/5	0.99	0.04	67,69,72,79	0
2	SO4	B	187	5/5	0.99	0.05	52,53,59,60	0

6.5 Other polymers [i](#)

There are no such residues in this entry.