Full wwPDB X-ray Structure Validation Report ⓘ

Oct 26, 2024 – 02:24 PM EDT

PDB ID	:	3ITE
Title	:	The third adenylation domain of the fungal SidN non-ribosomal peptide synthetase
Authors	:	Lee, T.V.; Lott, J.S.; Johnson, R.D.; Johnson, L.J.; Arcus, V.L.
Deposited on	:	2009-08-28
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 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:

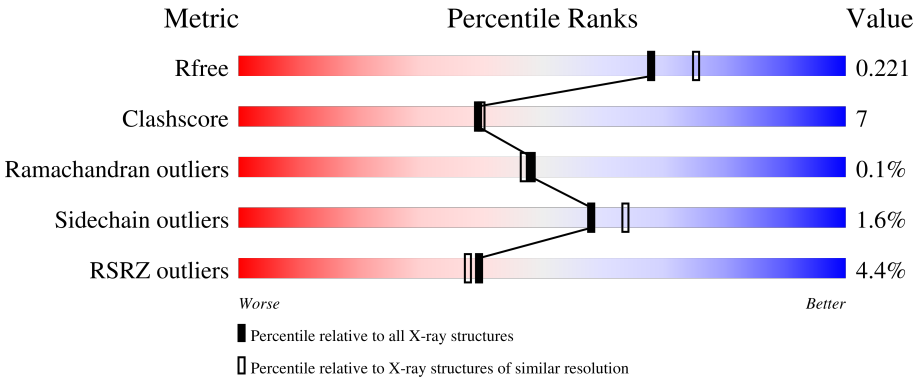
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.003 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

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))
R_{free}	164625	9409 (2.00-2.00)
Clashscore	180529	10737 (2.00-2.00)
Ramachandran outliers	177936	10628 (2.00-2.00)
Sidechain outliers	177891	10627 (2.00-2.00)
RSRZ outliers	164620	9409 (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 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	562	2% 65% 6% • 28%
1	B	562	5% 75% 13% • 10%

2 Entry composition

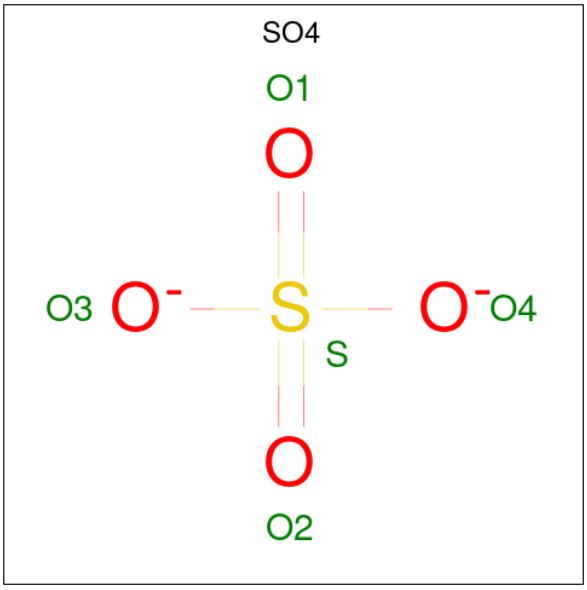
There are 4 unique types of molecules in this entry. The entry contains 7397 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 SidN siderophore synthetase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	402	Total	C	N	O	S	Se	0	1	1
			3075	1944	536	580	6	9			
1	B	503	Total	C	N	O	S	Se	0	0	1
			3855	2437	668	733	7	10			

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O_4S).



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

- Molecule 3 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Cl 1 1	0	0
3	B	1	Total Cl 1 1	0	0

- Molecule 4 is water.

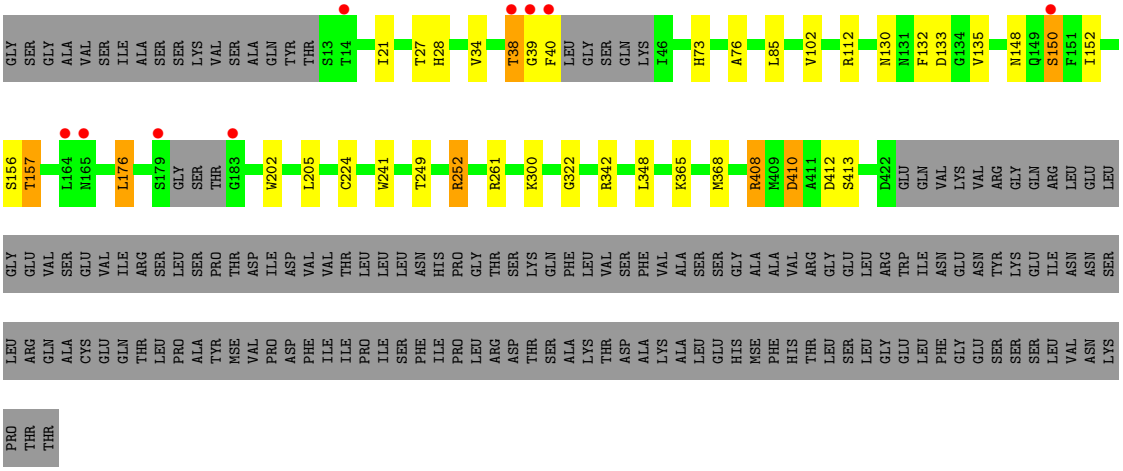
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	230	Total O 230 230	0	0
4	B	225	Total O 225 225	0	0

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.

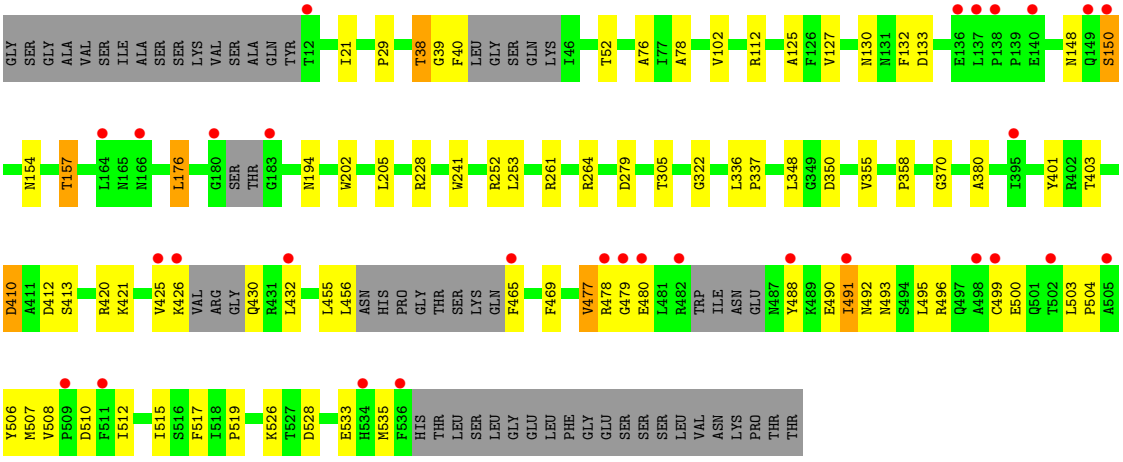
• Molecule 1: SidN siderophore synthetase

Chain A:



• Molecule 1: SidN siderophore synthetase

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	50.60Å 75.28Å 84.14Å 114.85° 94.78° 90.18°	Depositor
Resolution (Å)	42.62 – 2.00 42.62 – 2.00	Depositor EDS
% Data completeness (in resolution range)	95.7 (42.62-2.00) 96.2 (42.62-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.08	Depositor
$< I/\sigma(I) >$ [1]	2.71 (at 2.00Å)	Xtriage
Refinement program	PHENIX (phenix.refine)	Depositor
R, R_{free}	0.194 , 0.228 0.190 , 0.221	Depositor DCC
R_{free} test set	3690 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å^2)	24.7	Xtriage
Anisotropy	0.718	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 46.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.159 for -h,k,-k-l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	7397	wwPDB-VP
Average B, all atoms (Å^2)	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.23% 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: SO4, CL

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	0.90	0/3135	0.87	3/4243 (0.1%)
1	B	0.82	0/3918	0.82	3/5299 (0.1%)
All	All	0.85	0/7053	0.84	6/9542 (0.1%)

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	252	ARG	NE-CZ-NH2	-12.62	113.99	120.30
1	B	252	ARG	NE-CZ-NH2	-10.95	114.83	120.30
1	A	252	ARG	NE-CZ-NH1	9.44	125.02	120.30
1	B	252	ARG	NE-CZ-NH1	9.40	125.00	120.30
1	A	176	LEU	CA-CB-CG	-7.14	98.89	115.30
1	B	176	LEU	CA-CB-CG	-6.86	99.52	115.30

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	3075	0	3059	30	0
1	B	3855	0	3851	68	0
2	A	5	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	5	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	230	0	0	7	0
4	B	225	0	0	4	0
All	All	7397	0	6910	92	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 (92) 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:492:ASN:OD1	1:B:496:ARG:HG3	1.77	0.84
1:A:156:SER:CB	1:B:479:GLY:HA2	2.20	0.72
1:B:425:VAL:HG13	1:B:455:LEU:HD22	1.75	0.68
1:B:432:LEU:HD13	1:B:507:MSE:HG2	1.76	0.68
1:B:432:LEU:HD12	1:B:507:MSE:HE2	1.81	0.63
1:B:477:VAL:HG13	1:B:517:PHE:CD2	2.36	0.60
1:A:156:SER:HB3	1:B:479:GLY:HA2	1.82	0.60
1:A:152:ILE:HG21	1:B:480:GLU:HB3	1.84	0.60
1:B:491:ILE:C	1:B:491:ILE:HD12	2.22	0.59
1:A:28:HIS:ND1	4:A:826:HOH:O	2.33	0.57
1:B:205:LEU:HD13	1:B:348:LEU:HD21	1.86	0.57
1:B:425:VAL:HG11	1:B:455:LEU:HB2	1.86	0.57
1:A:365:LYS:HB2	1:A:368[A]:MSE:SE	2.54	0.57
1:A:27:THR:HG21	1:B:253:LEU:HD23	1.87	0.56
1:B:322:GLY:HA2	4:B:959:HOH:O	2.05	0.56
1:B:130:ASN:HB3	1:B:133:ASP:CG	2.27	0.55
1:A:39:GLY:O	1:A:40:PHE:HB2	2.07	0.54
1:B:358:PRO:HB3	1:B:421:LYS:HD2	1.90	0.54
1:B:38:THR:HG22	1:B:39:GLY:H	1.73	0.54
1:B:420:ARG:HG2	1:B:526:LYS:HG2	1.89	0.54
1:B:425:VAL:HG12	1:B:425:VAL:O	2.07	0.53
1:B:21:ILE:HD11	1:B:241:TRP:CE3	2.44	0.53
1:A:38:THR:HG22	1:A:39:GLY:H	1.74	0.53
1:B:112:ARG:HB3	4:B:979:HOH:O	2.09	0.53
1:A:156:SER:HB2	1:B:479:GLY:HA2	1.92	0.52
1:B:490:GLU:O	1:B:493:ASN:HB2	2.09	0.52
1:B:504:PRO:HB2	1:B:506:TYR:CE1	2.44	0.52
1:B:519:PRO:HB2	1:B:528:ASP:HB3	1.90	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:426:LYS:HA	1:B:430:GLN:O	2.10	0.51
1:A:130:ASN:HB3	1:A:133:ASP:CG	2.31	0.51
1:A:21:ILE:HD11	1:A:241:TRP:CE3	2.46	0.51
1:B:425:VAL:O	1:B:432:LEU:HB3	2.10	0.51
1:B:492:ASN:ND2	1:B:512:ILE:H	2.09	0.49
1:A:202:TRP:CE2	1:A:348:LEU:HD13	2.48	0.49
1:B:469:PHE:HB3	1:B:515:ILE:HD13	1.94	0.49
1:A:322:GLY:HA2	4:A:829:HOH:O	2.12	0.49
1:A:205:LEU:HD13	1:A:348:LEU:HD21	1.95	0.48
1:B:425:VAL:CG1	1:B:455:LEU:HD22	2.43	0.48
1:B:495:LEU:O	1:B:499:CYS:CB	2.62	0.48
1:B:420:ARG:CG	1:B:526:LYS:HG2	2.43	0.48
1:A:252:ARG:NH2	4:A:909:HOH:O	2.47	0.47
1:A:76:ALA:HB1	1:A:102:VAL:HG21	1.96	0.47
1:B:504:PRO:HB2	1:B:506:TYR:CD1	2.50	0.47
1:A:408:ARG:NH1	4:A:843:HOH:O	2.48	0.46
1:B:412:ASP:O	1:B:413:SER:HB2	2.16	0.46
1:A:148:ASN:OD1	1:A:150:SER:HB3	2.16	0.46
1:A:40:PHE:HA	1:A:261:ARG:NH1	2.30	0.46
1:B:39:GLY:O	1:B:40:PHE:HB2	2.15	0.46
1:A:130:ASN:HA	4:A:928:HOH:O	2.16	0.45
1:B:355:VAL:HG12	1:B:370:GLY:HA3	1.97	0.45
1:B:148:ASN:OD1	1:B:150:SER:HB3	2.17	0.45
1:B:503:LEU:HD23	1:B:504:PRO:HD2	1.98	0.45
1:B:154:ASN:O	1:B:157:THR:HB	2.17	0.45
1:B:465:PHE:HB3	1:B:510:ASP:OD2	2.17	0.45
1:B:228:ARG:NH2	4:B:750:HOH:O	2.50	0.44
1:B:40:PHE:HA	1:B:261:ARG:NH1	2.33	0.44
1:B:76:ALA:HB1	1:B:102:VAL:HG21	1.99	0.44
1:B:488:TYR:HB3	1:B:491:ILE:HG23	1.99	0.44
1:A:34:VAL:HG23	1:A:85:LEU:HD22	2.00	0.43
1:B:432:LEU:CD1	1:B:507:MSE:HG2	2.46	0.43
1:B:455:LEU:HD12	1:B:465:PHE:O	2.18	0.43
1:B:506:TYR:OH	1:B:507:MSE:HE3	2.19	0.43
1:B:495:LEU:O	1:B:499:CYS:HB2	2.19	0.43
1:A:300:LYS:HE2	1:A:342:ARG:HG2	2.01	0.43
1:B:495:LEU:O	1:B:499:CYS:HB3	2.18	0.43
1:B:336:LEU:HB3	1:B:337:PRO:HD2	2.01	0.43
1:B:500:GLU:HG3	1:B:508:VAL:HG11	2.00	0.43
1:B:456:LEU:HD21	1:B:533:GLU:HG2	2.01	0.43
1:B:264:ARG:HD3	4:B:951:HOH:O	2.18	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:157:THR:HA	1:B:478:ARG:HD3	2.00	0.42
1:B:350:ASP:OD1	1:B:350:ASP:C	2.58	0.42
1:A:410:ASP:HB3	1:A:412:ASP:OD1	2.20	0.42
1:A:73:HIS:CE1	4:A:732:HOH:O	2.73	0.42
1:B:401:TYR:CE2	1:B:403:THR:HA	2.55	0.42
1:B:477:VAL:HG13	1:B:517:PHE:CE2	2.54	0.42
1:A:412:ASP:O	1:A:413:SER:HB2	2.19	0.41
1:B:78:ALA:O	1:B:125:ALA:HA	2.20	0.41
1:A:224:CYS:HB2	1:A:249:THR:HB	2.03	0.41
1:B:500:GLU:HG3	1:B:508:VAL:HG21	2.03	0.41
1:B:127:VAL:HG11	1:B:132:PHE:CD2	2.55	0.41
1:B:490:GLU:O	1:B:493:ASN:N	2.54	0.41
1:A:202:TRP:CZ2	1:A:348:LEU:CD1	3.03	0.41
1:B:279:ASP:OD1	1:B:305:THR:OG1	2.36	0.41
1:B:456:LEU:CD2	1:B:533:GLU:HG2	2.50	0.41
1:B:410:ASP:HB3	1:B:412:ASP:OD1	2.20	0.41
1:B:535:MSE:HE2	1:B:535:MSE:HB3	2.03	0.41
1:B:202:TRP:CE2	1:B:348:LEU:HD13	2.56	0.40
1:B:492:ASN:OD1	1:B:492:ASN:C	2.59	0.40
1:A:132:PHE:HA	1:A:135:VAL:HG21	2.04	0.40
1:B:194:ASN:OD1	1:B:380:ALA:HA	2.22	0.40
1:A:112:ARG:HB3	4:A:907:HOH:O	2.21	0.40
1:B:29:PRO:O	1:B:52:THR:HB	2.22	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	397/562 (71%)	388 (98%)	9 (2%)	0	100 100
1	B	491/562 (87%)	464 (94%)	26 (5%)	1 (0%)	44 42

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	888/1124 (79%)	852 (96%)	35 (4%)	1 (0%)	48 47

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	477	VAL

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	335/463 (72%)	329 (98%)	6 (2%)	54 59
1	B	423/463 (91%)	417 (99%)	6 (1%)	62 68
All	All	758/926 (82%)	746 (98%)	12 (2%)	58 64

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	38	THR
1	A	150	SER
1	A	157	THR
1	A	176	LEU
1	A	408	ARG
1	A	410	ASP
1	B	38	THR
1	B	150	SER
1	B	157	THR
1	B	176	LEU
1	B	410	ASP
1	B	491	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	28	HIS
1	B	208	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 oligosaccharides in this entry.

5.6 Ligand geometry

Of 4 ligands modelled in this entry, 2 are monoatomic - leaving 2 for Mogul analysis.

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	558	-	4,4,4	0.26	0	6,6,6	0.71	0
2	SO4	B	558	-	4,4,4	0.34	0	6,6,6	0.77	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.

No monomer is involved in short contacts.

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, 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	394/562 (70%)	-0.31	9 (2%)	61	59	14, 26, 60, 83	0
1	B	493/562 (87%)	0.07	30 (6%)	28	26	15, 33, 92, 126	0
All	All	887/1124 (78%)	-0.10	39 (4%)	39	38	14, 29, 81, 126	0

All (39) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	180	GLY	4.4
1	B	536	PHE	4.1
1	B	140	GLU	3.7
1	B	425	VAL	3.4
1	B	164	LEU	3.3
1	B	12	THR	3.1
1	B	499	CYS	3.1
1	A	179	SER	3.1
1	A	164	LEU	3.1
1	A	39	GLY	3.1
1	B	491	ILE	3.1
1	B	502	THR	2.8
1	B	465	PHE	2.8
1	B	166	ASN	2.7
1	B	150	SER	2.6
1	B	498	ALA	2.6
1	B	479	GLY	2.5
1	B	511	PHE	2.5
1	B	478	ARG	2.5
1	B	482	ARG	2.5
1	A	38	THR	2.5
1	B	488	TYR	2.5
1	A	14	THR	2.5
1	B	426	LYS	2.4

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Mol	Chain	Res	Type	RSRZ
1	B	136	GLU	2.3
1	B	432	LEU	2.3
1	B	534	HIS	2.2
1	A	165	ASN	2.2
1	B	138	PRO	2.2
1	B	149	GLN	2.2
1	A	40	PHE	2.1
1	B	395	ILE	2.1
1	B	505	ALA	2.1
1	A	183	GLY	2.1
1	B	480	GLU	2.1
1	B	137	LEU	2.1
1	A	150	SER	2.1
1	B	183	GLY	2.0
1	B	509	PRO	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 monosaccharides 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, 95^{th} 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	B	558	5/5	0.93	0.09	30,46,48,54	0
2	SO4	A	558	5/5	0.98	0.05	27,40,46,46	0
3	CL	A	559	1/1	0.99	0.03	24,24,24,24	0
3	CL	B	559	1/1	0.99	0.04	22,22,22,22	0

6.5 Other polymers (i)

There are no such residues in this entry.