Full wwPDB X-ray Structure Validation Report ⓘ

Feb 11, 2024 – 07:23 PM EST

PDB ID	:	3DL8
Title	:	Structure of the complex of aquifex aeolicus SecYEG and bacillus subtilis SecA
Authors	:	Nam, Y.; Zimmer, J.; Rapoport, T.A.
Deposited on	:	2008-06-26
Resolution	:	7.50 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:

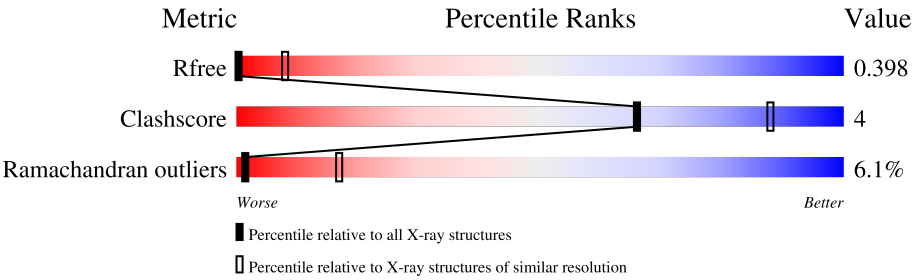
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 7.50 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	1004 (10.00-3.90)
Clashscore	141614	1069 (10.00-3.90)
Ramachandran outliers	138981	1002 (10.00-3.90)

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%

Mol	Chain	Length	Quality of chain
1	A	779	91% 8% •
1	B	779	91% 7% •
2	G	429	85% 9% • 5%
2	H	429	85% 9% • 5%
3	C	65	54% 46%
3	D	65	54% 46%
4	E	107	58% • 39%
4	F	107	58% • 39%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 10232 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 Protein translocase subunit secA.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
1	A	773	Total	C	N	O	0	0	0
			3092	1546	773	773			
1	B	773	Total	C	N	O	0	0	0
			3092	1546	773	773			

- Molecule 2 is a protein called Preprotein translocase subunit secY.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	G	406	Total	C	N	O	0	0	0
			1624	812	406	406			
2	H	406	Total	C	N	O	0	0	0
			1624	812	406	406			

- Molecule 3 is a protein called SecE.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	35	Total	C	N	O	0	0	0
			140	70	35	35			
3	D	35	Total	C	N	O	0	0	0
			140	70	35	35			

- Molecule 4 is a protein called Protein-export membrane protein secG.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	E	65	Total	C	N	O	0	0	0
			260	130	65	65			
4	F	65	Total	C	N	O	0	0	0
			260	130	65	65			

There are 14 discrepancies between the modelled and reference sequences:

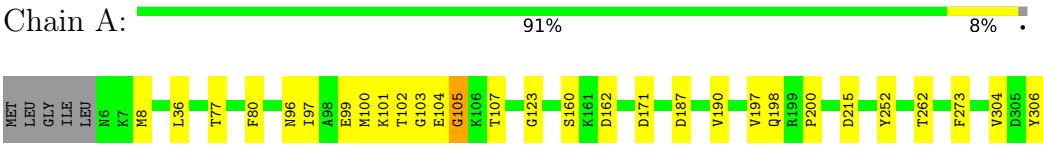
Chain	Residue	Modelled	Actual	Comment	Reference
E	101	GLY	-	expression tag	UNP O66505
E	102	HIS	-	expression tag	UNP O66505
E	103	HIS	-	insertion	UNP O66505
E	104	HIS	-	expression tag	UNP O66505
E	105	HIS	-	expression tag	UNP O66505
E	106	HIS	-	expression tag	UNP O66505
E	107	HIS	-	expression tag	UNP O66505
F	101	GLY	-	expression tag	UNP O66505
F	102	HIS	-	expression tag	UNP O66505
F	103	HIS	-	expression tag	UNP O66505
F	104	HIS	-	expression tag	UNP O66505
F	105	HIS	-	expression tag	UNP O66505
F	106	HIS	-	expression tag	UNP O66505
F	107	HIS	-	expression tag	UNP O66505

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. 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.

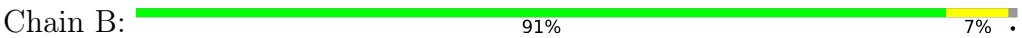
• Molecule 1: Protein translocase subunit secA

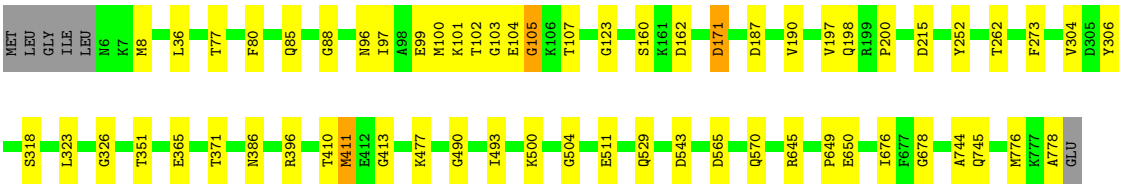
Chain A:



• Molecule 1: Protein translocase subunit secA

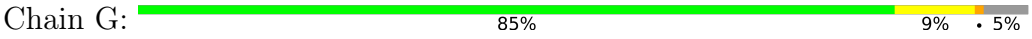
Chain B:

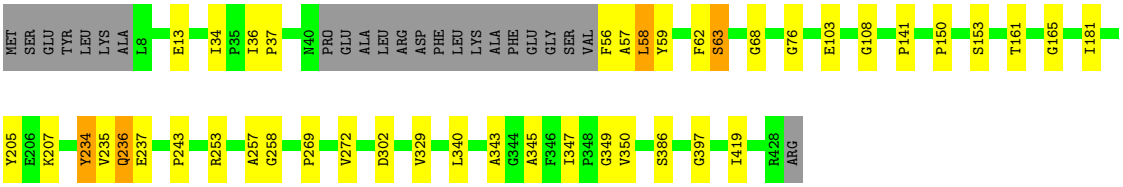




• Molecule 2: Preprotein translocase subunit secY

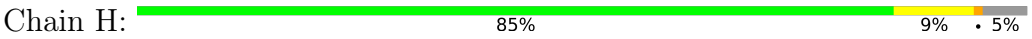
Chain G:

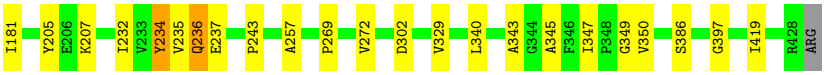




• Molecule 2: Preprotein translocase subunit secY

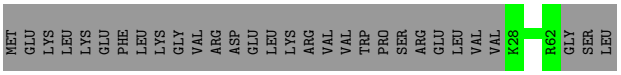
Chain H:





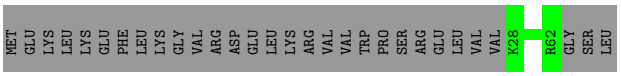
• Molecule 3: SecE

Chain C:



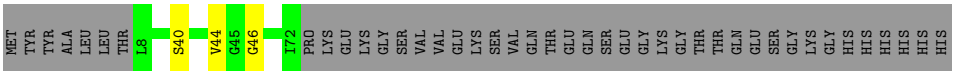
• Molecule 3: SecE

Chain D:



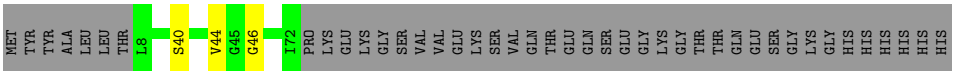
• Molecule 4: Protein-export membrane protein secG

Chain E:



• Molecule 4: Protein-export membrane protein secG

Chain F:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	146.36Å 167.97Å 187.72Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	14.99 – 7.50 48.09 – 7.49	Depositor EDS
% Data completeness (in resolution range)	99.5 (14.99-7.50) 99.0 (48.09-7.49)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.28 (at 7.37Å)	Xtriage
Refinement program	CNS 1.2	Depositor
R, R_{free}	0.365 , 0.390 0.397 , 0.398	Depositor DCC
R_{free} test set	604 reflections (9.72%)	wwPDB-VP
Wilson B-factor (Å^2)	530.1	Xtriage
Anisotropy	0.140	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.59 , -10.0	EDS
L-test for twinning[2]	$< \|L\| > = 0.43$, $< L^2 > = 0.26$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.60	EDS
Total number of atoms	10232	wwPDB-VP
Average B, all atoms (Å^2)	452.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.91% 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	0.88	0/3091	0.90	2/3862 (0.1%)
1	B	0.88	0/3091	0.90	2/3862 (0.1%)
2	G	0.98	0/1622	0.96	2/2024 (0.1%)
2	H	0.97	0/1622	0.96	2/2024 (0.1%)
3	C	0.94	0/139	0.75	0/172
3	D	0.94	0/139	0.75	0/172
4	E	1.02	0/259	0.93	0/322
4	F	1.02	0/259	0.93	0/322
All	All	0.92	0/10222	0.92	8/12760 (0.1%)

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	160	SER	N-CA-C	-7.19	91.59	111.00
1	B	160	SER	N-CA-C	-7.17	91.63	111.00
1	A	304	VAL	C-N-CA	6.29	137.41	121.70
1	B	304	VAL	C-N-CA	6.25	137.31	121.70
2	H	302	ASP	C-N-CA	-5.36	108.31	121.70
2	G	235	VAL	C-N-CA	5.31	134.97	121.70
2	G	302	ASP	C-N-CA	-5.29	108.49	121.70
2	H	235	VAL	C-N-CA	5.26	134.85	121.70

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	3092	0	856	18	0
1	B	3092	0	856	12	0
2	G	1624	0	446	17	0
2	H	1624	0	446	13	0
3	C	140	0	36	0	0
3	D	140	0	36	0	0
4	E	260	0	86	1	0
4	F	260	0	86	1	0
All	All	10232	0	2848	52	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 4.

All (52) 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:776:MET:O	1:B:778:ALA:O	1.54	1.25
1:A:776:MET:O	1:B:778:ALA:C	1.98	1.02
1:A:778:ALA:C	1:B:776:MET:O	1.99	1.00
1:A:778:ALA:O	1:B:776:MET:O	1.83	0.95
2:H:103:GLU:H	2:H:108:GLY:HA3	1.39	0.86
2:G:103:GLU:H	2:G:108:GLY:HA3	1.39	0.85
1:A:726:ASP:O	2:G:258:GLY:CA	2.29	0.80
1:A:726:ASP:O	2:G:258:GLY:HA2	1.84	0.77
2:H:103:GLU:H	2:H:108:GLY:CA	2.03	0.72
2:G:103:GLU:H	2:G:108:GLY:CA	2.03	0.71
1:A:726:ASP:C	2:G:258:GLY:HA2	2.16	0.64
1:A:726:ASP:O	2:G:258:GLY:HA3	2.00	0.62
2:H:57:ALA:O	2:H:59:TYR:N	2.33	0.62
2:G:57:ALA:O	2:G:59:TYR:N	2.33	0.61
1:B:103:GLY:H	1:B:529:GLN:H	1.47	0.61
2:H:56:PHE:O	2:H:63:SER:CA	2.48	0.61
2:G:56:PHE:O	2:G:63:SER:CA	2.48	0.60
1:A:103:GLY:H	1:A:529:GLN:H	1.47	0.59
2:G:56:PHE:O	2:G:63:SER:C	2.42	0.58
2:G:343:ALA:O	2:G:349:GLY:HA3	2.03	0.58
2:H:343:ALA:O	2:H:349:GLY:HA3	2.03	0.58
2:H:56:PHE:O	2:H:63:SER:C	2.42	0.57
1:A:500:LYS:CA	1:A:504:GLY:HA2	2.35	0.57
1:B:500:LYS:CA	1:B:504:GLY:HA2	2.35	0.56
2:H:57:ALA:O	2:H:58:LEU:C	2.46	0.53
2:G:57:ALA:O	2:G:58:LEU:C	2.46	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:103:GLY:N	1:B:529:GLN:H	2.09	0.51
1:A:778:ALA:CA	1:B:776:MET:O	2.59	0.50
1:A:103:GLY:N	1:A:529:GLN:H	2.09	0.50
1:A:331:GLU:N	2:G:253:ARG:O	2.35	0.49
1:B:123:GLY:HA2	1:B:171:ASP:O	2.14	0.47
2:H:103:GLU:N	2:H:108:GLY:HA3	2.20	0.47
1:A:123:GLY:HA2	1:A:171:ASP:O	2.14	0.47
2:G:103:GLU:N	2:G:108:GLY:HA3	2.20	0.47
4:E:44:VAL:C	4:E:46:GLY:H	2.20	0.45
1:A:411:MET:C	1:A:413:GLY:H	2.21	0.45
4:F:44:VAL:C	4:F:46:GLY:H	2.20	0.44
2:H:62:PHE:O	2:H:63:SER:O	2.35	0.44
2:G:62:PHE:O	2:G:63:SER:O	2.35	0.44
1:B:411:MET:C	1:B:413:GLY:H	2.21	0.44
2:H:161:THR:O	2:H:165:GLY:HA3	2.19	0.43
2:G:161:THR:O	2:G:165:GLY:HA3	2.19	0.43
1:A:105:GLY:O	1:A:107:THR:N	2.50	0.42
2:G:234:TYR:C	2:G:236:GLN:H	2.23	0.42
2:H:153:SER:C	2:H:155:ILE:N	2.72	0.42
1:A:528:ARG:C	1:A:530:GLY:H	2.24	0.41
1:B:105:GLY:O	1:B:107:THR:N	2.50	0.41
1:B:85:GLN:C	1:B:88:GLY:H	2.25	0.41
2:H:234:TYR:C	2:H:236:GLN:H	2.23	0.40
2:G:234:TYR:C	2:G:236:GLN:N	2.74	0.40
1:A:357:PHE:O	1:A:361:PHE:N	2.54	0.40
2:H:232:ILE:C	2:H:234:TYR:N	2.74	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	771/779 (99%)	638 (83%)	86 (11%)	47 (6%)	1 17
1	B	771/779 (99%)	638 (83%)	85 (11%)	48 (6%)	1 17
2	G	402/429 (94%)	321 (80%)	52 (13%)	29 (7%)	1 14
2	H	402/429 (94%)	319 (79%)	54 (13%)	29 (7%)	1 14
3	C	33/65 (51%)	33 (100%)	0	0	100 100
3	D	33/65 (51%)	33 (100%)	0	0	100 100
4	E	63/107 (59%)	57 (90%)	5 (8%)	1 (2%)	9 44
4	F	63/107 (59%)	57 (90%)	5 (8%)	1 (2%)	9 44
All	All	2538/2760 (92%)	2096 (83%)	287 (11%)	155 (6%)	1 17

All (155) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	36	LEU
1	A	80	PHE
1	A	99	GLU
1	A	100	MET
1	A	101	LYS
1	A	197	VAL
1	A	306	TYR
1	A	326	GLY
1	A	371	THR
1	A	543	ASP
1	A	570	GLN
1	A	645	ARG
1	A	649	PRO
1	A	650	GLU
1	A	744	ALA
1	B	36	LEU
1	B	80	PHE
1	B	99	GLU
1	B	100	MET
1	B	101	LYS
1	B	197	VAL
1	B	306	TYR
1	B	326	GLY
1	B	371	THR
1	B	543	ASP
1	B	570	GLN
1	B	645	ARG

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Mol	Chain	Res	Type
1	B	649	PRO
1	B	650	GLU
1	B	744	ALA
2	G	36	ILE
2	G	37	PRO
2	G	58	LEU
2	G	63	SER
2	G	236	GLN
2	G	347	ILE
2	G	350	VAL
2	H	36	ILE
2	H	37	PRO
2	H	58	LEU
2	H	63	SER
2	H	236	GLN
2	H	347	ILE
2	H	350	VAL
1	A	8	MET
1	A	102	THR
1	A	104	GLU
1	A	198	GLN
1	A	252	TYR
1	A	351	THR
1	A	410	THR
1	A	477	LYS
1	A	490	GLY
1	A	676	ILE
1	B	8	MET
1	B	102	THR
1	B	104	GLU
1	B	198	GLN
1	B	252	TYR
1	B	351	THR
1	B	410	THR
1	B	477	LYS
1	B	490	GLY
1	B	676	ILE
2	G	181	ILE
2	G	237	GLU
2	G	257	ALA
2	G	340	LEU
2	G	419	ILE

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Mol	Chain	Res	Type
2	H	181	ILE
2	H	237	GLU
2	H	257	ALA
2	H	340	LEU
2	H	419	ILE
4	E	40	SER
4	F	40	SER
1	A	187	ASP
1	A	262	THR
1	A	323	LEU
1	A	493	ILE
1	A	511	GLU
1	A	565	ASP
1	A	678	GLY
1	B	187	ASP
1	B	262	THR
1	B	323	LEU
1	B	493	ILE
1	B	511	GLU
1	B	565	ASP
1	B	678	GLY
2	G	13	GLU
2	G	207	LYS
2	G	234	TYR
2	G	329	VAL
2	G	345	ALA
2	H	13	GLU
2	H	207	LYS
2	H	234	TYR
2	H	329	VAL
2	H	345	ALA
1	A	77	THR
1	A	96	ASN
1	A	162	ASP
1	A	273	PHE
1	A	365	GLU
1	A	386	ASN
1	A	745	GLN
1	B	77	THR
1	B	96	ASN
1	B	162	ASP
1	B	200	PRO

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Mol	Chain	Res	Type
1	B	273	PHE
1	B	365	GLU
1	B	386	ASN
1	B	745	GLN
2	G	150	PRO
2	G	153	SER
2	G	205	TYR
2	G	269	PRO
2	G	272	VAL
2	H	150	PRO
2	H	153	SER
2	H	205	TYR
2	H	269	PRO
2	H	272	VAL
1	A	200	PRO
1	A	318	SER
1	A	411	MET
1	B	318	SER
1	B	411	MET
2	G	76	GLY
2	G	141	PRO
2	G	243	PRO
2	G	386	SER
2	G	397	GLY
2	H	76	GLY
2	H	141	PRO
2	H	243	PRO
2	H	386	SER
2	H	397	GLY
1	A	105	GLY
1	A	215	ASP
1	B	105	GLY
1	B	171	ASP
1	B	215	ASP
2	G	68	GLY
2	H	68	GLY
1	A	97	ILE
1	A	396	ARG
1	B	97	ILE
1	B	396	ARG
1	A	190	VAL
1	B	190	VAL

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Mol	Chain	Res	Type
2	G	34	ILE
2	H	34	ILE

5.3.2 Protein sidechains

There are no protein residues with a non-rotameric sidechain to report in this entry.

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

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.