



Full wwPDB X-ray Structure Validation Report ⓘ

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PDB ID : 5FTX
Title : Structure of surface layer protein SbsC, domains 4-9
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Deposited on : 2016-01-18
Resolution : 4.10 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

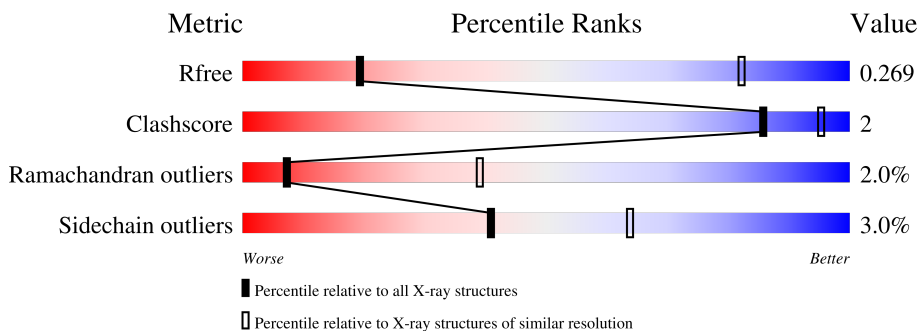
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION


The reported resolution of this entry is 4.10 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	1193 (4.50-3.70)
Clashscore	141614	1003 (4.44-3.76)
Ramachandran outliers	138981	1005 (4.48-3.72)
Sidechain outliers	138945	1199 (4.50-3.70)

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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	653	 89% 10%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 9477 atoms, of which 4767 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 SURFACE LAYER PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	H	N	O				S
1	A	651	9470	2926	4767	774	1002	1	0	0	0

- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	5	Total	Ca	0	0
			5	5		

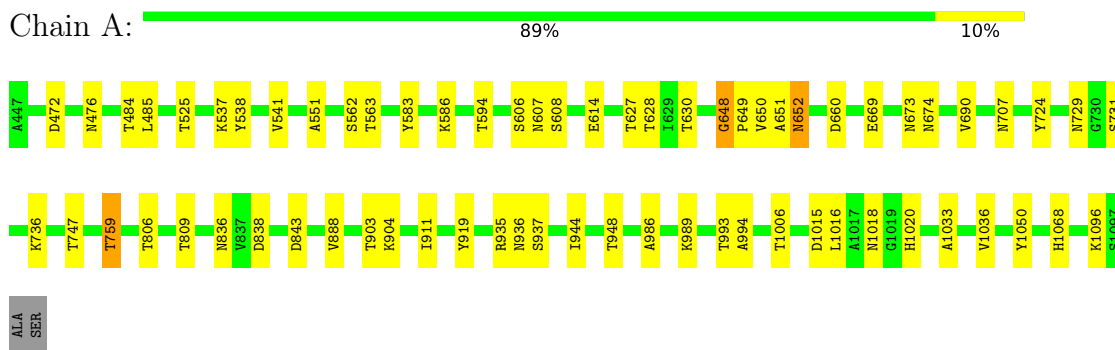
- Molecule 3 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	2	Total	Zn	0	0
			2	2		

3 Residue-property plots

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: SURFACE LAYER PROTEIN



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	100.63Å 48.13Å 196.14Å 90.00° 96.60° 90.00°	Depositor
Resolution (Å)	33.04 – 4.10 42.53 – 3.46	Depositor EDS
% Data completeness (in resolution range)	96.7 (33.04-4.10) 87.7 (42.53-3.46)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.35 (at 3.48Å)	Xtrriage
Refinement program	PHENIX (PHENIX.REFINE)	Depositor
R, R_{free}	0.203 , 0.268 0.208 , 0.269	Depositor DCC
R_{free} test set	553 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	9.5	Xtrriage
Anisotropy	2.074	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.27 , 12.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.56	EDS
Total number of atoms	9477	wwPDB-VP
Average B, all atoms (Å ²)	106.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.03% 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 [i](#)

5.1 Standard geometry [i](#)

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

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	0.25	0/4750	0.47	0/6482

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	4703	4767	4770	21	2
2	A	5	0	0	0	0
3	A	2	0	0	0	2
All	All	4710	4767	4770	21	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 2.

All (21) 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:660:ASP:OD2	1:A:673:ASN:ND2	2.28	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:648:GLY:H	1:A:649:PRO:HD3	1.64	0.61
1:A:648:GLY:H	1:A:649:PRO:CD	2.15	0.60
1:A:669:GLU:OE2	1:A:674:ASN:ND2	2.35	0.59
1:A:707:ASN:ND2	1:A:736:LYS:O	2.36	0.59
1:A:586:LYS:NZ	1:A:614:GLU:OE2	2.39	0.55
1:A:648:GLY:HA2	1:A:690:VAL:HG11	1.92	0.51
1:A:551:ALA:O	1:A:583:TYR:OH	2.29	0.50
1:A:594:THR:OG1	1:A:630:THR:OG1	2.29	0.50
1:A:472:ASP:OD1	1:A:476:ASN:N	2.43	0.49
1:A:836:ASN:OD1	1:A:838:ASP:N	2.47	0.48
1:A:484:THR:OG1	1:A:485:LEU:N	2.47	0.47
1:A:627:THR:OG1	1:A:628:THR:N	2.50	0.45
1:A:903:THR:OG1	1:A:904:LYS:N	2.50	0.45
1:A:986:ALA:HA	1:A:1036:VAL:HA	2.00	0.44
1:A:1033:ALA:O	1:A:1050:TYR:OH	2.32	0.44
1:A:993:THR:OG1	1:A:994:ALA:N	2.50	0.43
1:A:562:SER:OG	1:A:563:THR:N	2.51	0.42
1:A:606:SER:O	1:A:608:SER:N	2.53	0.42
1:A:935:ARG:O	1:A:937:SER:N	2.52	0.42
1:A:919:TYR:HB3	1:A:944:ILE:HD11	2.03	0.41

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:1020:HIS:HE2	3:A:2107:ZN:ZN[4_547]	1.35	0.25
1:A:1068:HIS:HE2	3:A:2106:ZN:ZN[4_557]	1.42	0.18

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	649/653 (99%)	572 (88%)	64 (10%)	13 (2%)	7 39

All (13) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	607	ASN
1	A	747	THR
1	A	936	ASN
1	A	1018	ASN
1	A	648	GLY
1	A	650	VAL
1	A	759	THR
1	A	948	THR
1	A	651	ALA
1	A	652	ASN
1	A	731	SER
1	A	1015	ASP
1	A	541	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	525/527 (100%)	509 (97%)	16 (3%)	41 64

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	525	THR
1	A	537	LYS
1	A	538	TYR
1	A	652	ASN
1	A	724	TYR
1	A	729	ASN
1	A	759	THR
1	A	806	THR

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Mol	Chain	Res	Type
1	A	809	THR
1	A	843	ASP
1	A	888	VAL
1	A	911	ILE
1	A	989	LYS
1	A	1006	THR
1	A	1016	LEU
1	A	1096	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 7 ligands modelled in this entry, 7 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 [i](#)

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.