



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 22, 2024 – 01:47 PM EDT

PDB ID : 6R44
Title : Structure of the SBP FpvC in complex with Ni²⁺ ion from *P.aeruginosa* from P21 space group
Authors : Morera, S.; Marty, L.
Deposited on : 2019-03-21
Resolution : 1.99 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)	:	1.20.1
EDS	:	2.37.1
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)	:	2.37.1

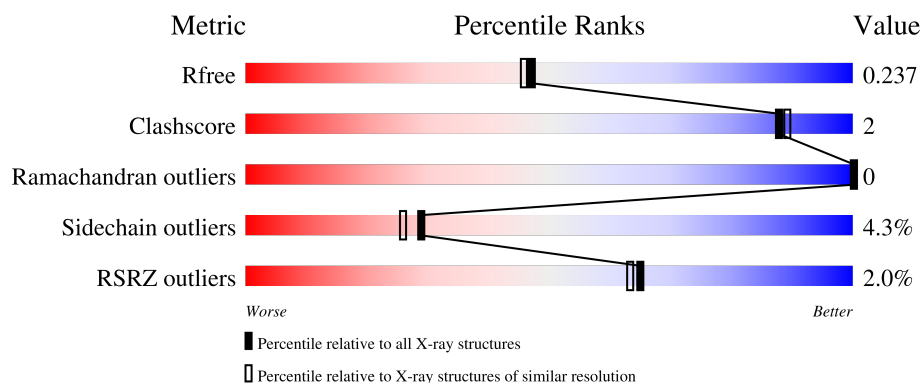
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

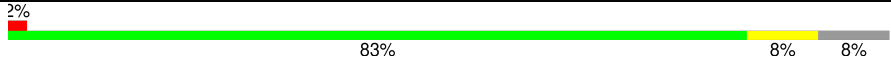

The reported resolution of this entry is 1.99 Å.

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	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (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 $\leq 5\%$. 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	294	
1	B	294	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 4439 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 Probable adhesion protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	270	Total	C	N	O	S	0	0	0
			2095	1334	366	393	2			
1	B	269	Total	C	N	O	S	0	2	0
			2095	1334	365	394	2			

There are 28 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	37	MET	-	initiating methionine	UNP Q9I174
A	318	GLU	-	expression tag	UNP Q9I174
A	319	ILE	-	expression tag	UNP Q9I174
A	320	LEU	-	expression tag	UNP Q9I174
A	321	TYR	-	expression tag	UNP Q9I174
A	322	PHE	-	expression tag	UNP Q9I174
A	323	GLN	-	expression tag	UNP Q9I174
A	324	SER	-	expression tag	UNP Q9I174
A	325	HIS	-	expression tag	UNP Q9I174
A	326	HIS	-	expression tag	UNP Q9I174
A	327	HIS	-	expression tag	UNP Q9I174
A	328	HIS	-	expression tag	UNP Q9I174
A	329	HIS	-	expression tag	UNP Q9I174
A	330	HIS	-	expression tag	UNP Q9I174
B	37	MET	-	initiating methionine	UNP Q9I174
B	318	GLU	-	expression tag	UNP Q9I174
B	319	ILE	-	expression tag	UNP Q9I174
B	320	LEU	-	expression tag	UNP Q9I174
B	321	TYR	-	expression tag	UNP Q9I174
B	322	PHE	-	expression tag	UNP Q9I174
B	323	GLN	-	expression tag	UNP Q9I174
B	324	SER	-	expression tag	UNP Q9I174
B	325	HIS	-	expression tag	UNP Q9I174
B	326	HIS	-	expression tag	UNP Q9I174
B	327	HIS	-	expression tag	UNP Q9I174

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Chain	Residue	Modelled	Actual	Comment	Reference
B	328	HIS	-	expression tag	UNP Q9I174
B	329	HIS	-	expression tag	UNP Q9I174
B	330	HIS	-	expression tag	UNP Q9I174

- Molecule 2 is NICKEL (II) ION (three-letter code: NI) (formula: Ni).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Ni 1 1	0	0
2	B	1	Total Ni 1 1	0	0

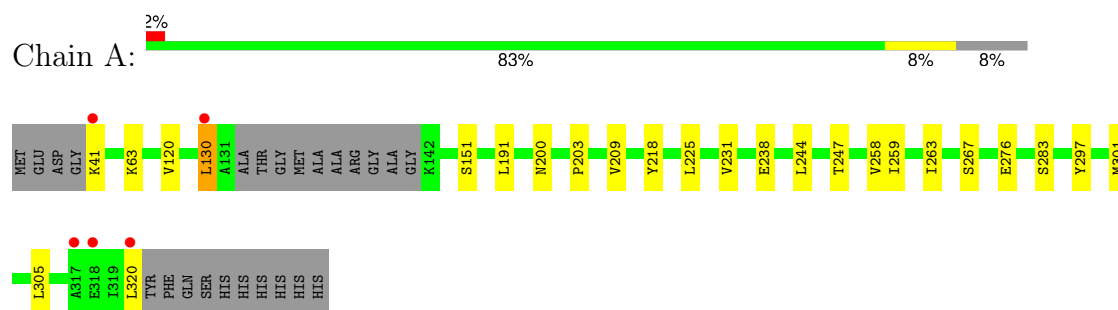
- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	143	Total O 143 143	0	0
3	B	104	Total O 104 104	0	0

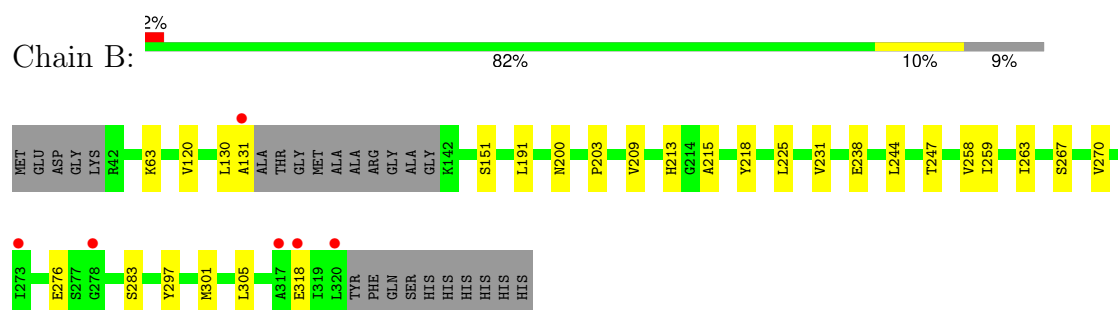
3 Residue-property plots [i](#)

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: Probable adhesion protein



- Molecule 1: Probable adhesion protein



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	66.92Å 41.38Å 104.62Å 90.00° 95.85° 90.00°	Depositor
Resolution (Å)	43.19 – 1.99 43.19 – 1.99	Depositor EDS
% Data completeness (in resolution range)	99.1 (43.19-1.99) 98.8 (43.19-1.99)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.16	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.17 (at 2.00Å)	Xtriage
Refinement program	BUSTER 2.10.3	Depositor
R, R_{free}	0.195 , 0.226 0.209 , 0.237	Depositor DCC
R_{free} test set	1949 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	32.5	Xtriage
Anisotropy	0.153	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 40.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.53$, $\langle L^2 \rangle = 0.36$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	4439	wwPDB-VP
Average B, all atoms (Å ²)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 43.53 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.7395e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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:
NI

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	0.52	0/2135	0.68	1/2898 (0.0%)
1	B	0.49	0/2141	0.66	0/2907
All	All	0.50	0/4276	0.67	1/5805 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	130	LEU	C-N-CA	5.58	135.65	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	2095	0	2130	7	0
1	B	2095	0	2130	10	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	143	0	0	0	0
3	B	104	0	0	0	0
All	All	4439	0	4260	17	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 2.

All (17) 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:263:ILE:HG13	1:A:283:SER:HB3	1.61	0.82
1:A:191:LEU:HD23	1:A:305:LEU:HD12	1.78	0.65
1:B:263:ILE:HG13	1:B:283:SER:HB3	1.85	0.58
1:B:151:SER:HB2	1:B:218:TYR:HB3	1.87	0.55
1:B:191:LEU:HD23	1:B:305:LEU:HD12	1.86	0.55
1:A:151:SER:HB2	1:A:218:TYR:HB3	1.88	0.54
1:B:203:PRO:HG3	1:B:225:LEU:HD11	1.90	0.54
1:A:203:PRO:HG3	1:A:225:LEU:HD11	1.91	0.53
1:A:297:TYR:CZ	1:A:301:MET:HG3	2.46	0.51
1:A:209:VAL:HG22	1:A:258:VAL:HG22	1.91	0.51
1:B:209:VAL:HG22	1:B:258:VAL:HG22	1.91	0.50
1:B:297:TYR:CZ	1:B:301:MET:HG3	2.47	0.50
1:B:267:SER:HB2	1:B:270:VAL:HG23	1.94	0.49
1:A:231:VAL:HG22	1:A:247:THR:HG21	2.00	0.43
1:B:130:LEU:HB2	1:B:131:ALA:HB2	2.00	0.42
1:B:231:VAL:HG22	1:B:247:THR:HG21	2.00	0.42
1:B:213:HIS:HD2	1:B:215:ALA:HB2	1.86	0.40

There are no symmetry-related clashes.

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	266/294 (90%)	259 (97%)	7 (3%)	0	100	100
1	B	267/294 (91%)	261 (98%)	6 (2%)	0	100	100
All	All	533/588 (91%)	520 (98%)	13 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	222/238 (93%)	211 (95%)	11 (5%)	24	20
1	B	223/238 (94%)	215 (96%)	8 (4%)	35	34
All	All	445/476 (94%)	426 (96%)	19 (4%)	29	26

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	41	LYS
1	A	63	LYS
1	A	120	VAL
1	A	130	LEU
1	A	200	ASN
1	A	238	GLU
1	A	244	LEU
1	A	259	ILE
1	A	267	SER
1	A	276	GLU
1	A	320	LEU
1	B	63	LYS
1	B	120	VAL
1	B	200	ASN
1	B	238	GLU
1	B	244	LEU
1	B	259	ILE
1	B	276	GLU
1	B	318	GLU

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 2 ligands modelled in this entry, 2 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 [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	270/294 (91%)	-0.11	5 (1%) 66 65	20, 35, 66, 104	0
1	B	269/294 (91%)	0.00	6 (2%) 62 60	25, 40, 69, 105	0
All	All	539/588 (91%)	-0.06	11 (2%) 65 63	20, 38, 69, 105	0

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	320	LEU	6.2
1	B	320	LEU	5.8
1	A	317	ALA	4.6
1	A	41	LYS	3.9
1	B	317	ALA	2.8
1	B	318	GLU	2.8
1	A	318	GLU	2.3
1	B	131	ALA	2.3
1	A	130	LEU	2.2
1	B	273	ILE	2.1
1	B	278	GLY	2.1

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, 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	NI	B	401	1/1	0.99	0.11	27,27,27,27	0
2	NI	A	401	1/1	1.00	0.11	24,24,24,24	0

6.5 Other polymers [i](#)

There are no such residues in this entry.