



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 14, 2018 – 01:16 pm GMT

PDB ID : 1W2N
Title : Deacetoxycephalosporin C synthase (with a N-terminal his-tag) in complex with Fe(II) and ampicillin
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Deposited on : 2004-07-07
Resolution : 2.70 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 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	:	trunk31020
Percentile statistics	:	20171227.v01 (using entries in the PDB archive December 27th 2017)
Refmac	:	5.8.0158
CCP4	:	7.0 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	trunk31020

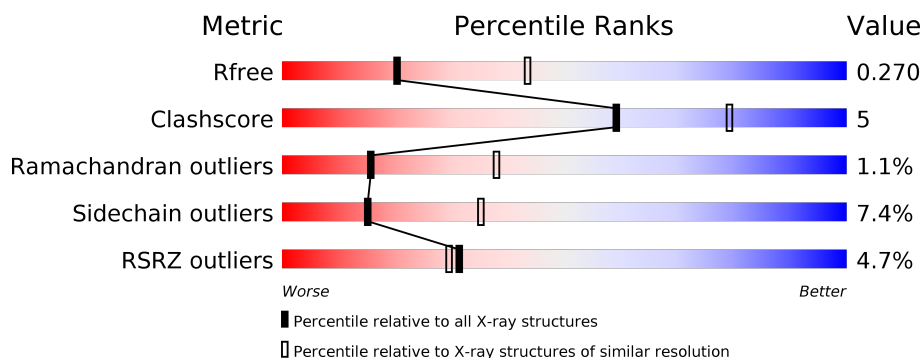
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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}	111664	2449 (2.70-2.70)
Clashscore	122126	2756 (2.70-2.70)
Ramachandran outliers	120053	2716 (2.70-2.70)
Sidechain outliers	120020	2716 (2.70-2.70)
RSRZ outliers	108989	2376 (2.70-2.70)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	331	<div> <div>4%</div> <div>67%</div> <div>14%</div> <div>•</div> <div>16%</div> </div>

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 2155 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 DEACETOXYCEPHALOSPORIN C SYNTHASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	277	Total	C	N	O	S	0	0	0
			2101	1336	360	393	12			

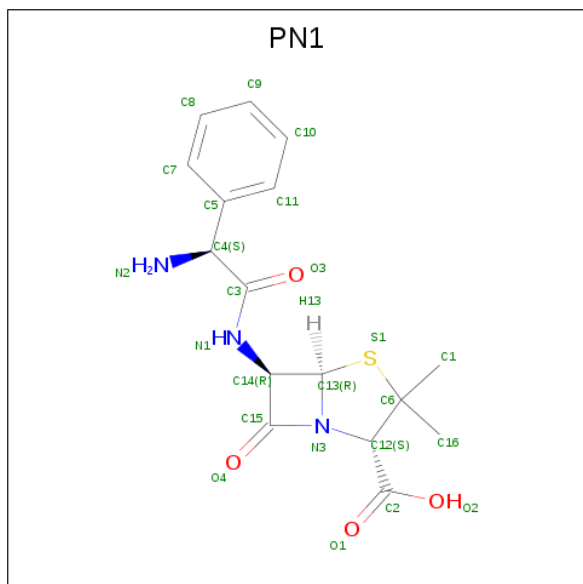
There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-20	MET	-	expression tag	UNP P18548
A	-19	GLY	-	expression tag	UNP P18548
A	-18	SER	-	expression tag	UNP P18548
A	-17	SER	-	expression tag	UNP P18548
A	-16	HIS	-	expression tag	UNP P18548
A	-15	HIS	-	expression tag	UNP P18548
A	-14	HIS	-	expression tag	UNP P18548
A	-13	HIS	-	expression tag	UNP P18548
A	-12	HIS	-	expression tag	UNP P18548
A	-11	HIS	-	expression tag	UNP P18548
A	-10	SER	-	expression tag	UNP P18548
A	-9	SER	-	expression tag	UNP P18548
A	-8	GLY	-	expression tag	UNP P18548
A	-7	LEU	-	expression tag	UNP P18548
A	-6	VAL	-	expression tag	UNP P18548
A	-5	PRO	-	expression tag	UNP P18548
A	-4	ARG	-	expression tag	UNP P18548
A	-3	GLY	-	expression tag	UNP P18548
A	-2	SER	-	expression tag	UNP P18548
A	-1	HIS	-	expression tag	UNP P18548

- Molecule 2 is FE (III) ION (three-letter code: FE) (formula: Fe).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Fe	0	0
			1	1		

- Molecule 3 is (2S,6R)-6-{[(2R)-2-AMINO-2-PHENYLETHANOYL]AMINO}-3,3-DIMETHYL-7-OXO-4-THIA-1-AZABICYCLO[3.2.0]HEPTANE-2-CARBOXYLIC ACID (three-letter code: PN1) (formula: C₁₆H₁₉N₃O₄S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	S	0	0
			24	16	3	4	1		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	29	Total	O	0	0
			29	29		

4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	138.80Å 138.80Å 48.60Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	45.18 – 2.70 45.06 – 2.70	Depositor EDS
% Data completeness (in resolution range)	97.8 (45.18-2.70) 97.8 (45.06-2.70)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.23 (at 2.69Å)	Xtriage
Refinement program	REFMAC 5.1.24	Depositor
R, R_{free}	0.246 , 0.287 0.236 , 0.270	Depositor DCC
R_{free} test set	746 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å ²)	82.9	Xtriage
Anisotropy	0.048	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 51.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.040 for -h,-k,l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	2155	wwPDB-VP
Average B, all atoms (Å ²)	78.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.88% 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: PN1, FE

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	0.75	0/2151	0.95	13/2923 (0.4%)

There are no bond length outliers.

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	2	ASP	CB-CG-OD2	7.72	125.25	118.30
1	A	124	ASP	CB-CG-OD2	7.46	125.01	118.30
1	A	185	ASP	CB-CG-OD2	7.01	124.61	118.30
1	A	214	ASP	CB-CG-OD2	6.45	124.10	118.30
1	A	251	ASP	CB-CG-OD2	5.67	123.41	118.30
1	A	28	ASP	CB-CG-OD2	5.54	123.28	118.30
1	A	168	PRO	N-CA-CB	5.47	109.86	103.30
1	A	36	ASP	CB-CG-OD2	5.33	123.10	118.30
1	A	41	ASP	CB-CG-OD2	5.31	123.08	118.30
1	A	107	ASP	CB-CG-OD2	5.25	123.03	118.30
1	A	146	ASP	CB-CG-OD2	5.10	122.89	118.30
1	A	270	ASP	CB-CG-OD2	5.07	122.86	118.30
1	A	296	ASP	CB-CG-OD2	5.04	122.84	118.30

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	2101	0	1991	21	0
2	A	1	0	0	0	0
3	A	24	0	18	0	0
4	A	29	0	0	1	0
All	All	2155	0	2009	21	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 5.

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:199:ASN:HD22	1:A:199:ASN:C	2.03	0.61
1:A:110:PHE:CD2	1:A:116:GLU:HG3	2.35	0.61
1:A:80:LEU:HD12	1:A:80:LEU:H	1.69	0.58
1:A:178:LEU:C	1:A:178:LEU:HD12	2.26	0.55
1:A:50:LEU:HD21	1:A:115:PHE:HA	1.91	0.52
1:A:253:ILE:O	1:A:253:ILE:HG22	2.09	0.51
1:A:126:GLN:NE2	1:A:193:GLN:OE1	2.43	0.50
1:A:202:VAL:HG11	1:A:214:ASP:HB3	1.95	0.48
1:A:191:LEU:HD22	1:A:224:VAL:HG22	1.96	0.47
1:A:77:PHE:O	1:A:78:THR:HG23	2.15	0.47
1:A:188:MET:HG3	1:A:189:VAL:HG13	1.98	0.46
1:A:199:ASN:ND2	1:A:199:ASN:C	2.68	0.46
1:A:80:LEU:HD12	1:A:80:LEU:N	2.30	0.46
1:A:141:THR:HB	1:A:237:GLN:NE2	2.31	0.46
1:A:215:LEU:HD13	1:A:223:LEU:HD21	1.97	0.46
1:A:199:ASN:ND2	1:A:201:PHE:H	2.14	0.45
1:A:199:ASN:HD21	1:A:201:PHE:HB3	1.81	0.44
1:A:74:ARG:HG2	1:A:74:ARG:O	2.18	0.43
1:A:275:VAL:N	1:A:276:PRO:CD	2.82	0.42
1:A:24:ARG:NH2	4:A:2006:HOH:O	2.51	0.42
1:A:37:CYS:O	1:A:39:LEU:N	2.49	0.42

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	271/331 (82%)	248 (92%)	20 (7%)	3 (1%)	16	38

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	168	PRO
1	A	280	GLU
1	A	59	SER

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	215/278 (77%)	199 (93%)	16 (7%)	15	35

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

Mol	Chain	Res	Type
1	A	23	ARG
1	A	60	GLU
1	A	74	ARG
1	A	80	LEU
1	A	81	GLU
1	A	99	MET
1	A	112	SER
1	A	136	GLU

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Mol	Chain	Res	Type
1	A	162	ARG
1	A	178	LEU
1	A	180	MET
1	A	199	ASN
1	A	249	ARG
1	A	274	SER
1	A	296	ASP
1	A	298	ILE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	15	GLN
1	A	166	GLN
1	A	199	ASN
1	A	237	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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 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
3	PN1	A	315	2	22,26,26	1.62	3 (13%)	32,40,40	2.60	8 (25%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	PN1	A	315	2	-	0/12/47/47	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	315	PN1	C6-S1	-5.35	1.74	1.85
3	A	315	PN1	C15-N3	2.20	1.42	1.37
3	A	315	PN1	C12-N3	2.48	1.49	1.47

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	315	PN1	C13-N3-C12	-9.34	105.62	117.26
3	A	315	PN1	C13-N3-C15	-5.49	86.71	93.92
3	A	315	PN1	C6-S1-C13	-3.71	85.95	94.08
3	A	315	PN1	C12-N3-C15	-2.71	118.47	126.35
3	A	315	PN1	C14-N1-C3	-2.59	115.32	121.89
3	A	315	PN1	C14-C13-N3	3.95	93.06	87.98
3	A	315	PN1	C14-C15-N3	4.03	97.37	91.87
3	A	315	PN1	S1-C13-N3	4.64	111.33	105.10

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 ⓘ

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 [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	277/331 (83%)	0.33	13 (4%) 31 29	51, 73, 123, 128	9 (3%)

All (13) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	82	SER	4.5
1	A	292	ALA	3.4
1	A	250	ARG	3.0
1	A	283	PHE	3.0
1	A	288	ASP	2.8
1	A	70	VAL	2.7
1	A	255	GLY	2.6
1	A	290	GLU	2.5
1	A	249	ARG	2.3
1	A	72	THR	2.2
1	A	291	THR	2.2
1	A	286	SER	2.1
1	A	73	MET	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 carbohydrates 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
3	PN1	A	315	24/24	0.81	0.28	116,118,121,121	0
2	FE	A	312	1/1	0.97	0.24	68,68,68,68	0

6.5 Other polymers [i](#)

There are no such residues in this entry.