Full wwPDB X-ray Structure Validation Report (i)

May 14, 2020 – 12:37 pm BST

PDB ID	:	2YH5
Title	:	Structure of the C-terminal domain of BamC
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Deposited on	:	2011-04-27
Resolution	:	1.25 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 (i) symbol.

The following versions of software and data (see references (1)) were used in the production of this report:

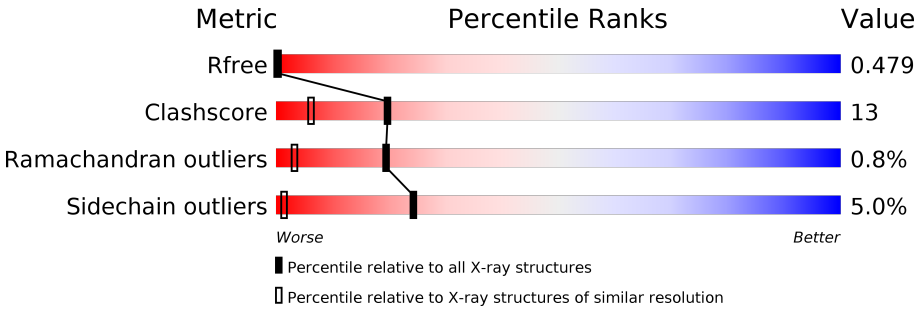
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

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 1.25 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	1023 (1.28-1.24)
Clashscore	141614	1060 (1.28-1.24)
Ramachandran outliers	138981	1029 (1.28-1.24)
Sidechain outliers	138945	1028 (1.28-1.24)

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 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	127	78% 14% • 5%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	PO4	A	1323	-	X	-	-

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 1018 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.

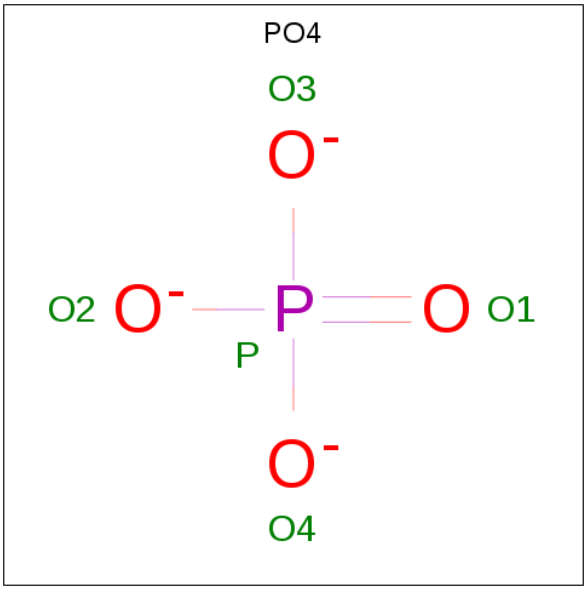
- Molecule 1 is a protein called DAPX PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	121	948	596	157	190	5	5	7	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	321	LEU	-	expression tag	UNP Q47548
A	322	GLU	-	expression tag	UNP Q47548
A	323	HIS	-	expression tag	UNP Q47548
A	324	HIS	-	expression tag	UNP Q47548
A	325	HIS	-	expression tag	UNP Q47548
A	326	HIS	-	expression tag	UNP Q47548
A	327	HIS	-	expression tag	UNP Q47548
A	328	HIS	-	expression tag	UNP Q47548

- Molecule 2 is PHOSPHATE ION (three-letter code: PO4) (formula: O_4P).



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

- Molecule 3 is water.

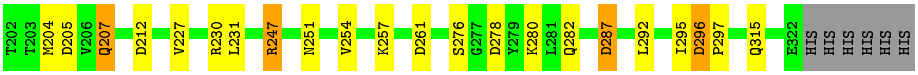
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	60	Total O 60 60	0	0

3 Residue-property plots (i)

These plots are drawn for all protein, RNA and DNA 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: DAPX PROTEIN

Chain A:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	29.74Å 59.12Å 31.06Å 90.00° 116.37° 90.00°	Depositor
Resolution (Å)	29.56 – 1.25 26.65 – 1.24	Depositor EDS
% Data completeness (in resolution range)	100.0 (29.56-1.25) 86.8 (26.65-1.24)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.29 (at 1.24Å)	Xtriage
Refinement program	REFMAC 5.5.0102	Depositor
R, R_{free}	0.146 , 0.184 0.477 , 0.479	Depositor DCC
R_{free} test set	1171 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	13.3	Xtriage
Anisotropy	0.113	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 55.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.046 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.75	EDS
Total number of atoms	1018	wwPDB-VP
Average B, all atoms (Å^2)	18.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.95% 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: PO4

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	1.31	3/985 (0.3%)	1.23	5/1338 (0.4%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	276	SER	CB-OG	-10.51	1.28	1.42
1	A	254	VAL	CB-CG2	-7.95	1.36	1.52
1	A	207	GLN	CB-CG	-5.84	1.36	1.52

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	247	ARG	NE-CZ-NH1	16.96	128.78	120.30
1	A	247	ARG	NE-CZ-NH2	-12.85	113.87	120.30
1	A	212	ASP	CB-CG-OD2	-6.85	112.14	118.30
1	A	287	ASP	CB-CG-OD2	-6.58	112.38	118.30
1	A	278	ASP	CB-CG-OD1	5.27	123.04	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	948	0	949	24	0
2	A	10	0	0	0	0
3	A	60	0	0	8	0
All	All	1018	0	949	24	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 13.

All (24) 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:207:GLN:HB2	3:A:2005:HOH:O	1.42	1.17
1:A:292:LEU:HG	3:A:2049:HOH:O	1.60	0.99
1:A:227:VAL:O	1:A:231[A]:LEU:HD23	1.68	0.94
1:A:230:ARG:NH2	3:A:2019:HOH:O	2.05	0.89
1:A:207:GLN:CG	3:A:2005:HOH:O	2.30	0.78
1:A:205:ASP:OD2	3:A:2004:HOH:O	2.09	0.70
1:A:251:ASN:OD1	1:A:280:LYS:HG3	1.92	0.69
1:A:251:ASN:HB2	1:A:282:GLN:HE22	1.57	0.69
1:A:280:LYS:HE3	1:A:282:GLN:HG2	1.76	0.68
1:A:280:LYS:CE	1:A:295:ILE:HD12	2.27	0.64
1:A:292:LEU:CD2	3:A:2049:HOH:O	2.46	0.62
1:A:280:LYS:HE2	1:A:295:ILE:HD12	1.84	0.59
1:A:280:LYS:HE3	1:A:282:GLN:CG	2.32	0.59
1:A:205:ASP:HA	1:A:315[A]:GLN:HE22	1.68	0.58
1:A:227:VAL:O	1:A:231[A]:LEU:CD2	2.49	0.58
1:A:227:VAL:CG1	1:A:231[A]:LEU:HD21	2.37	0.55
1:A:207:GLN:HG3	3:A:2005:HOH:O	2.01	0.53
1:A:296:ASP:CB	1:A:297:PRO:CD	2.87	0.52
1:A:207:GLN:CB	3:A:2005:HOH:O	2.15	0.52
1:A:296:ASP:HB2	1:A:297:PRO:CD	2.43	0.48
1:A:227:VAL:HG12	1:A:231[A]:LEU:CD2	2.44	0.47
1:A:227:VAL:CG1	1:A:231[A]:LEU:CD2	2.93	0.46
1:A:205:ASP:HA	1:A:315[A]:GLN:NE2	2.31	0.43
1:A:227:VAL:HG13	1:A:231[A]:LEU:HD21	2.00	0.42

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	126/127 (99%)	125 (99%)	0	1 (1%)	19 3

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	287	ASP

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	108/107 (101%)	102 (94%)	6 (6%)	21 1

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	204[A]	MET
1	A	204[B]	MET
1	A	247	ARG
1	A	257	LYS
1	A	261	ASP
1	A	296	ASP

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	229	GLN
1	A	282	GLN
1	A	293	GLN
1	A	307	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 carbohydrates in this entry.

5.6 Ligand geometry

2 ligands are modelled in this entry.

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	PO4	A	1323	-	4,4,4	2.65	2 (50%)	6,6,6	1.89	2 (33%)
2	PO4	A	1324	-	4,4,4	0.99	0	6,6,6	1.72	2 (33%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1323	PO4	P-O2	-4.79	1.40	1.54
2	A	1323	PO4	P-O1	2.24	1.56	1.50

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	1324	PO4	O3-P-O2	3.24	118.37	107.97
2	A	1323	PO4	O3-P-O1	-2.88	100.37	110.89
2	A	1323	PO4	O3-P-O2	2.69	116.59	107.97
2	A	1324	PO4	O4-P-O1	-2.37	102.23	110.89

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

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.