Full wwPDB X-ray Structure Validation Report

May 18, 2020 – 02:38 am BST

PDB ID	:	3B3J
Title	:	The 2.55 A crystal structure of the apo catalytic domain of coactivator-associated arginine methyl transferase I(CARM1:28-507, residues 28-146 and 479-507 not ordered)
Authors	:	Troffer-Charlier, N.; Cura, V.; Hassenboehler, P.; Moras, D.; Cavarelli, J.
Deposited on	:	2007-10-22
Resolution	:	2.55 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:

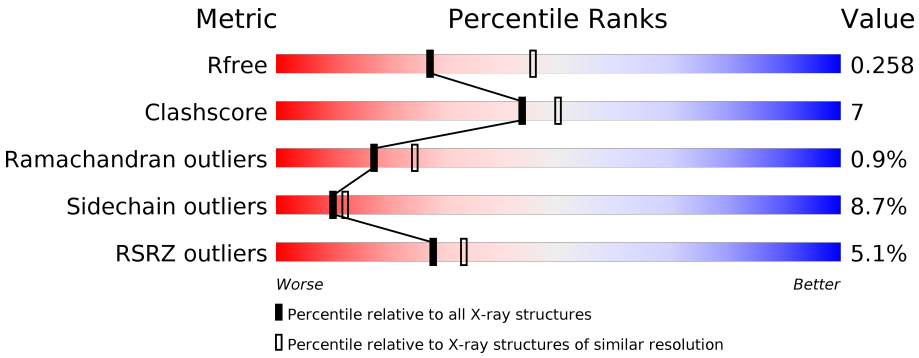
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, 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 2.55 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	1284 (2.56-2.52)
Clashscore	141614	1332 (2.56-2.52)
Ramachandran outliers	138981	1315 (2.56-2.52)
Sidechain outliers	138945	1315 (2.56-2.52)
RSRZ outliers	127900	1272 (2.56-2.52)

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% 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	480	4% 56% 10% • 31%

2 Entry composition

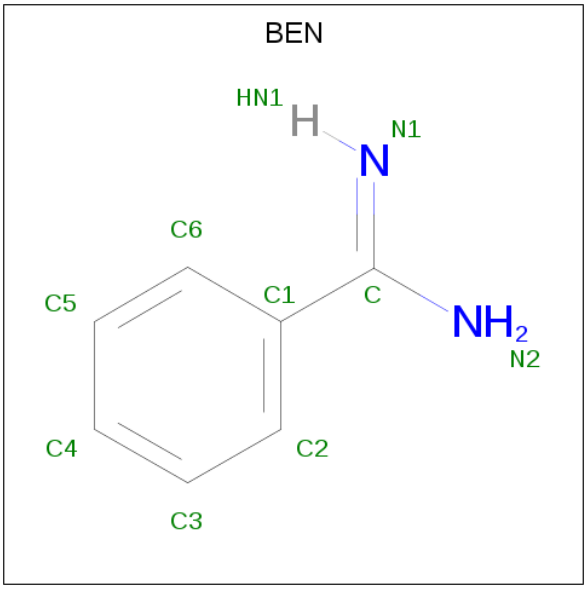
There are 3 unique types of molecules in this entry. The entry contains 2753 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Histone-arginine methyltransferase CARM1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	332	Total	C	N	O	S	0	0	0
			2664	1725	440	485	14			

- Molecule 2 is BENZAMIDINE (three-letter code: BEN) (formula: $C_7H_8N_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	N	0	0
			9	7	2		
2	A	1	Total	C	N	0	0
			9	7	2		
2	A	1	Total	C	N	0	0
			9	7	2		
2	A	1	Total	C	N	0	0
			9	7	2		
2	A	1	Total	C	N	0	0
			9	7	2		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C N 9 7 2	0	0

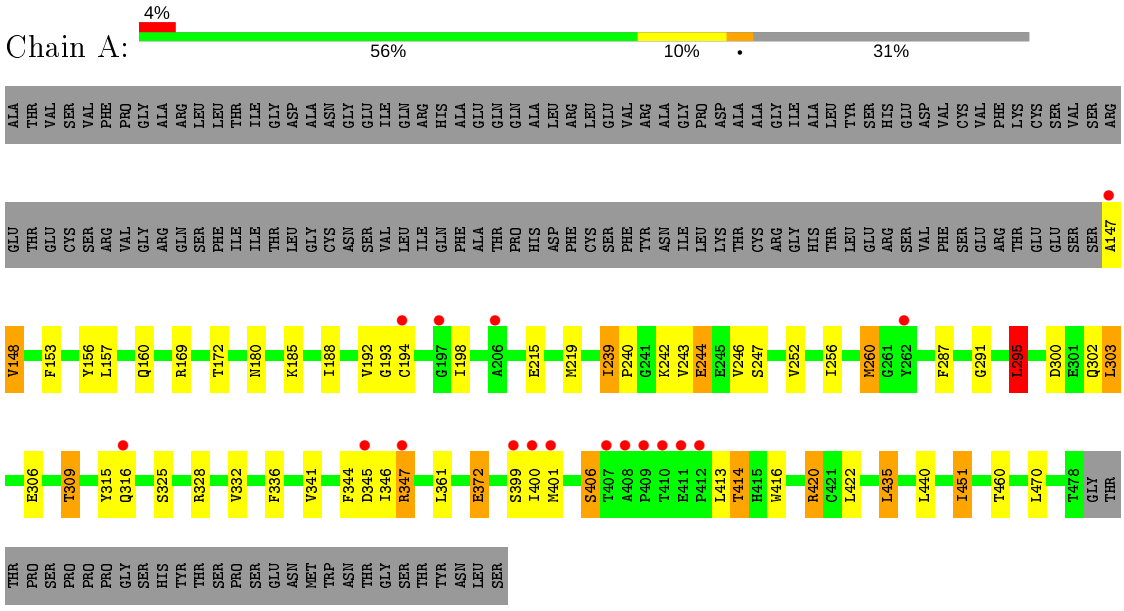
- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	35	Total O 35 35	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 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: Histone-arginine methyltransferase CARM1



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 62 2 2	Depositor
Cell constants a, b, c, α, β, γ	136.02Å 136.02Å 125.30Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	117.85 – 2.55 46.08 – 2.55	Depositor EDS
% Data completeness (in resolution range)	99.1 (117.85-2.55) 99.2 (46.08-2.55)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	0.06	Depositor
$< I/\sigma(I) >$ [1]	4.49 (at 2.54Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.235 , 0.269 0.223 , 0.258	Depositor DCC
R_{free} test set	1165 reflections (5.14%)	wwPDB-VP
Wilson B-factor (Å^2)	56.2	Xtriage
Anisotropy	0.077	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 57.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	2753	wwPDB-VP
Average B, all atoms (Å^2)	44.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.81% 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: BEN

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	0.66	0/2733	0.75	4/3705 (0.1%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	300	ASP	CB-CG-OD1	6.30	123.97	118.30
1	A	295	LEU	CA-CB-CG	6.26	129.70	115.30
1	A	420	ARG	NE-CZ-NH2	-6.12	117.24	120.30
1	A	435	LEU	CA-CB-CG	5.38	127.67	115.30

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	2664	0	2623	36	0
2	A	54	0	42	3	0
3	A	35	0	0	2	0
All	All	2753	0	2665	36	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 7.

All (36) 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:345:ASP:O	1:A:347:ARG:N	2.08	0.87
1:A:256:ILE:HG22	1:A:287:PHE:HB3	1.79	0.65
1:A:306:GLU:HA	1:A:309:THR:HG23	1.77	0.64
1:A:420:ARG:HD3	3:A:6036:HOH:O	2.03	0.59
1:A:169:ARG:HG2	1:A:416:TRP:CH2	2.39	0.58
1:A:188:ILE:HG22	1:A:252:VAL:HG12	1.87	0.56
1:A:451:ILE:HD11	1:A:470:LEU:HD11	1.88	0.55
1:A:244:GLU:CD	1:A:244:GLU:H	2.12	0.53
1:A:372:GLU:HG2	1:A:440:LEU:HD23	1.89	0.53
1:A:156:TYR:CD2	2:A:2001:BEN:C5	2.93	0.52
1:A:242:LYS:O	1:A:246:VAL:HB	2.11	0.51
1:A:372:GLU:HG2	1:A:440:LEU:CD2	2.42	0.49
1:A:344:PHE:CE2	1:A:420:ARG:HD2	2.48	0.49
1:A:332:VAL:HG12	1:A:336:PHE:CE2	2.49	0.48
1:A:302:GLN:O	1:A:306:GLU:HG3	2.14	0.47
1:A:416:TRP:O	2:A:4001:BEN:N2	2.46	0.47
1:A:345:ASP:OD1	1:A:345:ASP:N	2.39	0.46
1:A:345:ASP:C	1:A:347:ARG:H	2.09	0.46
1:A:260:MET:HE3	1:A:260:MET:HB2	1.78	0.46
1:A:160:GLN:HA	1:A:160:GLN:NE2	2.30	0.45
1:A:344:PHE:CD2	1:A:420:ARG:HD2	2.52	0.45
1:A:239:ILE:HA	1:A:240:PRO:HD3	1.79	0.45
1:A:400:ILE:HG22	1:A:401:MET:HB2	1.98	0.44
1:A:406:SER:HA	1:A:416:TRP:CE3	2.53	0.44
1:A:451:ILE:HD11	1:A:470:LEU:HD21	1.99	0.44
1:A:291:GLY:HA3	2:A:6001:BEN:HN22	1.83	0.43
1:A:246:VAL:HG13	1:A:247:SER:N	2.33	0.43
1:A:315:TYR:O	1:A:325:SER:HA	2.18	0.43
1:A:420:ARG:CD	3:A:6036:HOH:O	2.63	0.43
1:A:303:LEU:HD13	1:A:422:LEU:HD21	2.00	0.42
1:A:180:ASN:HD21	1:A:401:MET:H	1.67	0.42
1:A:413:LEU:HB3	1:A:414:THR:H	1.81	0.42
1:A:147:ALA:O	1:A:148:VAL:HB	2.19	0.41
1:A:328:ARG:O	1:A:332:VAL:HG23	2.21	0.41
1:A:295:LEU:N	1:A:295:LEU:CD1	2.84	0.41
1:A:153:PHE:CE1	1:A:341:VAL:HG11	2.57	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	330/480 (69%)	312 (94%)	15 (4%)	3 (1%)	17 24

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	193	GLY
1	A	346	ILE
1	A	148	VAL

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	288/415 (69%)	263 (91%)	25 (9%)	10 12

All (25) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	157	LEU
1	A	172	THR
1	A	185	LYS
1	A	192	VAL
1	A	194	CYS
1	A	198	ILE
1	A	215	GLU
1	A	219	MET

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Mol	Chain	Res	Type
1	A	239	ILE
1	A	243	VAL
1	A	244	GLU
1	A	260	MET
1	A	295	LEU
1	A	303	LEU
1	A	309	THR
1	A	316	GLN
1	A	347	ARG
1	A	361	LEU
1	A	372	GLU
1	A	399	SER
1	A	406	SER
1	A	414	THR
1	A	435	LEU
1	A	451	ILE
1	A	460	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	160	GLN
1	A	165	GLN
1	A	180	ASN
1	A	316	GLN
1	A	415	HIS

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)

6 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	BEN	A	3001	-	9,9,9	0.79	0	7,11,11	0.94	0
2	BEN	A	1001	-	9,9,9	1.40	1 (11%)	7,11,11	1.07	1 (14%)
2	BEN	A	4001	-	9,9,9	0.93	1 (11%)	7,11,11	0.35	0
2	BEN	A	6001	-	9,9,9	0.60	0	7,11,11	0.69	0
2	BEN	A	2001	-	9,9,9	0.94	1 (11%)	7,11,11	0.43	0
2	BEN	A	5001	-	9,9,9	0.87	1 (11%)	7,11,11	0.72	0

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
2	BEN	A	3001	-	-	4/4/4/4	0/1/1/1
2	BEN	A	1001	-	-	2/4/4/4	0/1/1/1
2	BEN	A	4001	-	-	4/4/4/4	0/1/1/1
2	BEN	A	6001	-	-	0/4/4/4	0/1/1/1
2	BEN	A	2001	-	-	0/4/4/4	0/1/1/1
2	BEN	A	5001	-	-	0/4/4/4	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1001	BEN	C1-C	3.22	1.53	1.47
2	A	4001	BEN	C1-C	2.34	1.51	1.47
2	A	5001	BEN	C1-C	2.19	1.51	1.47
2	A	2001	BEN	C1-C	2.15	1.51	1.47

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	1001	BEN	C1-C-N2	2.64	122.03	118.05

There are no chirality outliers.

All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	3001	BEN	N2-C-C1-C2
2	A	3001	BEN	N2-C-C1-C6
2	A	1001	BEN	N2-C-C1-C2
2	A	1001	BEN	N2-C-C1-C6
2	A	4001	BEN	N2-C-C1-C2
2	A	4001	BEN	N2-C-C1-C6
2	A	3001	BEN	N1-C-C1-C2
2	A	3001	BEN	N1-C-C1-C6
2	A	4001	BEN	N1-C-C1-C2
2	A	4001	BEN	N1-C-C1-C6

There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	4001	BEN	1	0
2	A	6001	BEN	1	0
2	A	2001	BEN	1	0

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

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, 95^{th} 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	332/480 (69%)	0.47	17 (5%) 28 33	27, 42, 64, 80	0

All (17) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	408	ALA	15.9
1	A	410	THR	9.5
1	A	409	PRO	9.2
1	A	412	PRO	7.2
1	A	411	GLU	6.6
1	A	194	CYS	6.0
1	A	400	ILE	4.3
1	A	407	THR	3.5
1	A	206	ALA	3.2
1	A	401	MET	3.2
1	A	399	SER	3.0
1	A	345	ASP	2.5
1	A	262	TYR	2.4
1	A	197	GLY	2.3
1	A	147	ALA	2.3
1	A	316	GLN	2.1
1	A	347	ARG	2.1

6.2 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates

There are no carbohydrates in this entry.

6.4 Ligands

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, 95^{th} 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	BEN	A	1001	9/9	0.68	0.30	59,61,61,62	0
2	BEN	A	4001	9/9	0.70	0.31	76,77,78,78	0
2	BEN	A	5001	9/9	0.81	0.31	78,79,79,80	0
2	BEN	A	3001	9/9	0.82	0.28	67,67,67,68	0
2	BEN	A	6001	9/9	0.86	0.29	81,81,81,82	0
2	BEN	A	2001	9/9	0.89	0.24	65,65,66,66	0

6.5 Other polymers

There are no such residues in this entry.