Full wwPDB X-ray Structure Validation Report ⓘ

Dec 25, 2020 – 01:13 am GMT

PDB ID	:	6Z34
Title	:	CymD monoaromatic hydrocarbon channel
Authors	:	van den Berg, B.
Deposited on	:	2020-05-19
Resolution	:	2.27 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 ①) were used in the production of this report:

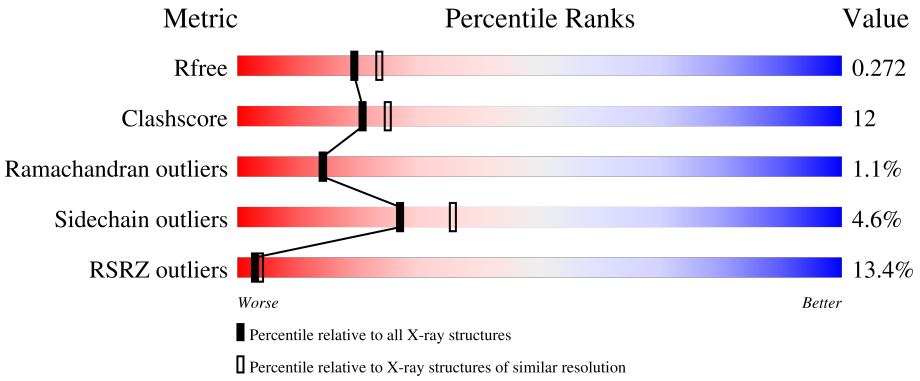
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.16
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.16

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 2.27 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	6980 (2.30-2.26)
Clashscore	141614	7711 (2.30-2.26)
Ramachandran outliers	138981	7597 (2.30-2.26)
Sidechain outliers	138945	7598 (2.30-2.26)
RSRZ outliers	127900	6849 (2.30-2.26)

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 <=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	442	12% 62% 22% · 14%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2899 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 CymD.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	382	Total	C	N	O	S	0	0	0
			2886	1839	489	549	9			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	436	HIS	-	expression tag	UNP O33458
A	437	HIS	-	expression tag	UNP O33458
A	438	HIS	-	expression tag	UNP O33458
A	439	HIS	-	expression tag	UNP O33458
A	440	HIS	-	expression tag	UNP O33458
A	441	HIS	-	expression tag	UNP O33458

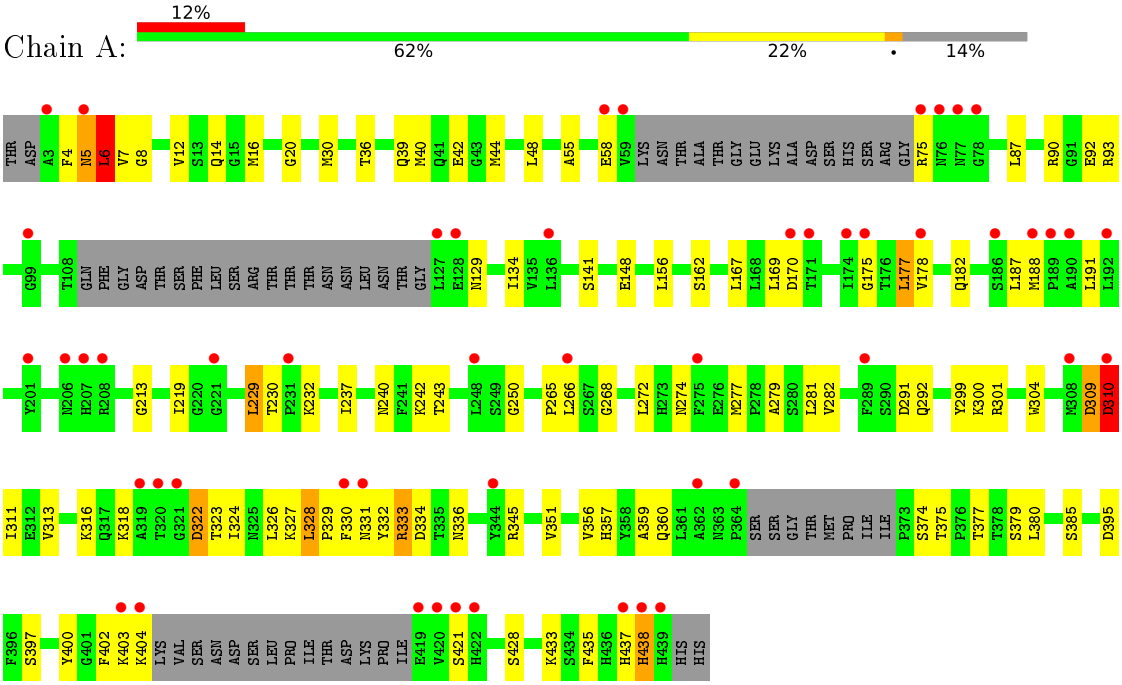
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	13	Total	O	0	0
			13	13		

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: CymD



4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α, β, γ	78.89Å 87.58Å 132.78Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	43.79 – 2.27 43.79 – 2.27	Depositor EDS
% Data completeness (in resolution range)	98.5 (43.79-2.27) 98.6 (43.79-2.27)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.48 (at 2.27Å)	Xtriage
Refinement program	PHENIX 1.11.1_2575	Depositor
R, R_{free}	0.212 , 0.271 0.212 , 0.272	Depositor DCC
R_{free} test set	1068 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å^2)	51.9	Xtriage
Anisotropy	0.483	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 69.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	2899	wwPDB-VP
Average B, all atoms (Å^2)	75.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.63% 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

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	0.40	0/2951	0.66	3/4007 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	177	LEU	CA-CB-CG	9.30	136.69	115.30
1	A	328	LEU	CA-CB-CG	5.80	128.64	115.30
1	A	48	LEU	CA-CB-CG	5.77	128.57	115.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	6	LEU	Peptide

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	2886	0	2811	70	0
2	A	13	0	0	0	0
All	All	2899	0	2811	70	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 12.

All (70) 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:327:LYS:HG3	1:A:329:PRO:HD3	1.50	0.93
1:A:5:ASN:O	1:A:7:VAL:N	2.15	0.80
1:A:326:LEU:HD12	1:A:328:LEU:CD2	2.19	0.72
1:A:326:LEU:HD12	1:A:328:LEU:HD22	1.72	0.71
1:A:377:THR:HB	1:A:403:LYS:HG2	1.77	0.67
1:A:359:ALA:HB3	1:A:377:THR:HG23	1.76	0.66
1:A:397:SER:HB3	1:A:428:SER:HB3	1.80	0.63
1:A:326:LEU:CD1	1:A:328:LEU:HD22	2.29	0.63
1:A:156:LEU:HD11	1:A:219:ILE:HD11	1.81	0.62
1:A:6:LEU:O	1:A:357:HIS:NE2	2.33	0.61
1:A:58:GLU:HB2	1:A:421:SER:HB3	1.81	0.61
1:A:55:ALA:HB3	1:A:75:ARG:HH22	1.66	0.61
1:A:230:THR:HG22	1:A:232:LYS:H	1.65	0.61
1:A:375:THR:HG21	1:A:404:LYS:HA	1.83	0.59
1:A:182:GLN:HE21	1:A:327:LYS:HE2	1.67	0.59
1:A:433:LYS:HD2	1:A:435:PHE:CE1	2.38	0.59
1:A:237:ILE:HD11	1:A:281:LEU:HD11	1.85	0.59
1:A:385:SER:OG	1:A:395:ASP:OD1	2.20	0.58
1:A:177:LEU:HD21	1:A:326:LEU:HD21	1.87	0.57
1:A:326:LEU:CD1	1:A:328:LEU:CD2	2.82	0.57
1:A:316:LYS:HB2	1:A:323:THR:HG22	1.88	0.55
1:A:44:MET:CE	1:A:87:LEU:HD11	2.37	0.54
1:A:175:GLY:HA2	1:A:178:VAL:HG12	1.91	0.53
1:A:268:GLY:HA2	1:A:318:LYS:HB2	1.90	0.52
1:A:309:ASP:O	1:A:311:ILE:N	2.42	0.52
1:A:326:LEU:HD12	1:A:328:LEU:HD21	1.91	0.52
1:A:333:ARG:N	1:A:333:ARG:HD2	2.24	0.51
1:A:12:VAL:O	1:A:16:MET:HE2	2.09	0.51
1:A:265:PRO:O	1:A:266:LEU:HD13	2.11	0.51
1:A:359:ALA:HB3	1:A:377:THR:CG2	2.41	0.50
1:A:40:MET:O	1:A:90:ARG:NE	2.37	0.50
1:A:5:ASN:O	1:A:5:ASN:ND2	2.45	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:326:LEU:HD13	1:A:327:LYS:N	2.26	0.50
1:A:301:ARG:HE	1:A:334:ASP:HB3	1.76	0.50
1:A:177:LEU:HD12	1:A:182:GLN:OE1	2.13	0.49
1:A:274:ASN:HB2	1:A:310:ASP:O	2.13	0.48
1:A:272:LEU:HD22	1:A:313:VAL:HG22	1.95	0.48
1:A:7:VAL:O	1:A:14:GLN:HA	2.14	0.48
1:A:242:LYS:HG2	1:A:279:ALA:H	1.78	0.47
1:A:299:TYR:OH	1:A:336:ASN:OD1	2.08	0.47
1:A:351:VAL:HB	1:A:385:SER:HB2	1.97	0.47
1:A:6:LEU:HB2	1:A:300:LYS:NZ	2.30	0.46
1:A:129:ASN:OD1	1:A:167:LEU:HD12	2.16	0.46
1:A:304:TRP:HB3	1:A:332:TYR:HB2	1.97	0.46
1:A:30:MET:HG2	1:A:141:SER:CB	2.46	0.46
1:A:292:GLN:HA	1:A:345:ARG:HB2	1.99	0.45
1:A:188:MET:HG2	1:A:324:ILE:CD1	2.46	0.45
1:A:357:HIS:HB3	1:A:379:SER:OG	2.16	0.45
1:A:175:GLY:O	1:A:178:VAL:HG12	2.17	0.45
1:A:274:ASN:ND2	1:A:310:ASP:HB3	2.32	0.45
1:A:282:VAL:HG22	1:A:300:LYS:HB2	1.98	0.45
1:A:148:GLU:H	1:A:148:GLU:CD	2.20	0.45
1:A:92:GLU:CD	1:A:93:ARG:H	2.21	0.44
1:A:326:LEU:C	1:A:326:LEU:HD13	2.38	0.44
1:A:44:MET:HB3	1:A:44:MET:HE2	1.87	0.44
1:A:360:GLN:OE1	1:A:374:SER:OG	2.35	0.44
1:A:55:ALA:CB	1:A:75:ARG:HH22	2.29	0.44
1:A:356:VAL:HG22	1:A:380:LEU:HD13	1.99	0.43
1:A:169:LEU:HA	1:A:169:LEU:HD23	1.80	0.43
1:A:331:ASN:O	1:A:333:ARG:NH1	2.52	0.43
1:A:42:GLU:HA	1:A:90:ARG:HB3	2.01	0.42
1:A:36:THR:O	1:A:39:GLN:HB2	2.19	0.42
1:A:229:LEU:HD12	1:A:230:THR:N	2.35	0.42
1:A:326:LEU:HD11	1:A:328:LEU:CD1	2.50	0.42
1:A:243:THR:HB	1:A:277:MET:HG3	2.02	0.41
1:A:134:ILE:HB	1:A:162:SER:HB3	2.03	0.41
1:A:213:GLY:O	1:A:250:GLY:HA3	2.21	0.41
1:A:6:LEU:HD22	1:A:8:GLY:HA2	2.02	0.41
1:A:437:HIS:O	1:A:438:HIS:ND1	2.54	0.40
1:A:187:LEU:HD13	1:A:322:ASP:HB3	2.04	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	372/442 (84%)	350 (94%)	18 (5%)	4 (1%)	14 14

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	6	LEU
1	A	310	ASP
1	A	4	PHE
1	A	20	GLY

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	304/357 (85%)	290 (95%)	14 (5%)	27 35

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	ASN
1	A	170	ASP
1	A	191	LEU
1	A	229	LEU
1	A	240	ASN
1	A	291	ASP
1	A	309	ASP

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Mol	Chain	Res	Type
1	A	310	ASP
1	A	322	ASP
1	A	330	PHE
1	A	333	ARG
1	A	400	TYR
1	A	402	PHE
1	A	438	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	5	ASN
1	A	437	HIS

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 monosaccharides in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

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

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	382/442 (86%)	0.80	51 (13%) 3 4	43, 68, 123, 152	0

All (51) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	3	ALA	6.4
1	A	421	SER	6.2
1	A	127	LEU	5.9
1	A	310	ASP	5.8
1	A	319	ALA	5.6
1	A	364	PRO	4.8
1	A	174	ILE	4.6
1	A	438	HIS	4.2
1	A	77	ASN	4.0
1	A	178	VAL	4.0
1	A	58	GLU	4.0
1	A	78	GLY	4.0
1	A	59	VAL	3.9
1	A	275	PHE	3.8
1	A	404	LYS	3.7
1	A	420	VAL	3.7
1	A	208	ARG	3.7
1	A	439	HIS	3.6
1	A	128	GLU	3.6
1	A	330	PHE	3.5
1	A	75	ARG	3.5
1	A	266	LEU	3.5
1	A	422	HIS	3.4
1	A	76	ASN	3.2
1	A	231	PRO	3.1
1	A	170	ASP	2.8
1	A	320	THR	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	419	GLU	2.7
1	A	437	HIS	2.7
1	A	403	LYS	2.6
1	A	248	LEU	2.6
1	A	201	TYR	2.5
1	A	5	ASN	2.5
1	A	192	LEU	2.5
1	A	206	ASN	2.4
1	A	171	THR	2.4
1	A	331	ASN	2.4
1	A	207	HIS	2.3
1	A	362	ALA	2.3
1	A	189	PRO	2.3
1	A	186	SER	2.3
1	A	136	LEU	2.2
1	A	321	GLY	2.2
1	A	344	TYR	2.2
1	A	190	ALA	2.2
1	A	188	MET	2.2
1	A	221	GLY	2.2
1	A	99	GLY	2.2
1	A	308	MET	2.1
1	A	175	GLY	2.1
1	A	289	PHE	2.0

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)

There are no ligands in this entry.

6.5 Other polymers (i)

There are no such residues in this entry.