



wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 19, 2024 – 01:35 AM EDT

PDB ID : 4BJL
Title : LOCW, A LAMBDA 1 TYPE LIGHT-CHAIN DIMER (BENCE-JONES PROTEIN) CRYSTALLIZED IN DISTILLED WATER
Authors : Schiffer, M.; Huang, D.B.
Deposited on : 1995-05-26
Resolution : 2.40 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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
Mogul	:	2022.3.0, CSD as543be (2022)
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

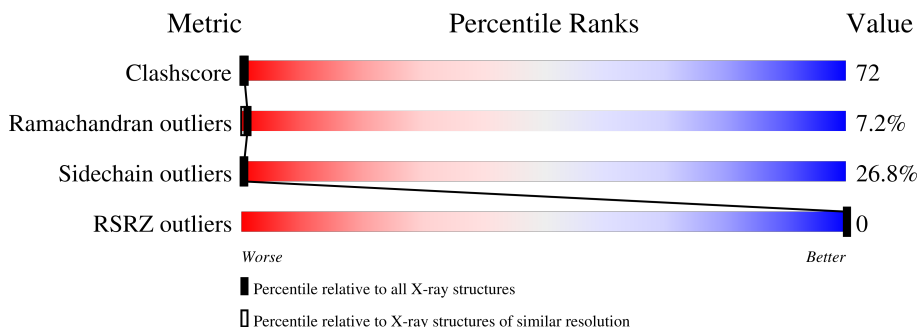
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

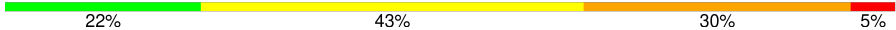
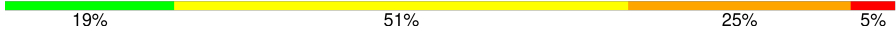
The reported resolution of this entry is 2.40 Å.

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))
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

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	216	
1	B	216	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 3460 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 LOC - LAMBDA 1 TYPE LIGHT-CHAIN DIMER.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	216	Total	C	N	O	S	0	0	0
			1598	992	266	335	5			
1	B	216	Total	C	N	O	S	0	0	0
			1598	992	266	335	5			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	19	THR	ILE	conflict	PIR S25754
A	31	GLU	GLY	conflict	PIR S25754
A	33	SER	THR	conflict	PIR S25754
A	35	THR	ASN	conflict	PIR S25754
A	39	HIS	GLN	conflict	PIR S25754
A	41	SER	PRO	conflict	PIR S25754
A	43	THR	ARG	conflict	PIR S25754
A	50	TYR	HIS	conflict	PIR S25754
A	51	GLU	SER	conflict	PIR S25754
A	52	ASP	ASN	conflict	PIR S25754
A	54	SER	GLN	conflict	PIR S25754
A	56	ALA	PRO	conflict	PIR S25754
A	60	SER	PRO	conflict	PIR S25754
A	65	ALA	GLY	conflict	PIR S25754
A	81	PRO	SER	conflict	PIR S25754
A	85	THR	ALA	conflict	PIR S25754
A	?	-	ASN	deletion	PIR S25754
A	97	ASP	GLY	conflict	PIR S25754
A	98	VAL	ARG	conflict	PIR S25754
A	99	ALA	TYR	conflict	PIR S25754
B	19	THR	ILE	conflict	PIR S25754
B	31	GLU	GLY	conflict	PIR S25754
B	33	SER	THR	conflict	PIR S25754
B	35	THR	ASN	conflict	PIR S25754
B	39	HIS	GLN	conflict	PIR S25754

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Chain	Residue	Modelled	Actual	Comment	Reference
B	41	SER	PRO	conflict	PIR S25754
B	43	THR	ARG	conflict	PIR S25754
B	50	TYR	HIS	conflict	PIR S25754
B	51	GLU	SER	conflict	PIR S25754
B	52	ASP	ASN	conflict	PIR S25754
B	54	SER	GLN	conflict	PIR S25754
B	56	ALA	PRO	conflict	PIR S25754
B	60	SER	PRO	conflict	PIR S25754
B	65	ALA	GLY	conflict	PIR S25754
B	81	PRO	SER	conflict	PIR S25754
B	85	THR	ALA	conflict	PIR S25754
B	?	-	ASN	deletion	PIR S25754
B	97	ASP	GLY	conflict	PIR S25754
B	98	VAL	ARG	conflict	PIR S25754
B	99	ALA	TYR	conflict	PIR S25754

- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	112	Total O 112 112	0	0
2	B	152	Total O 152 152	0	0

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	118.92Å 73.55Å 49.83Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	10.00 – 2.40 9.99 – 2.25	Depositor EDS
% Data completeness (in resolution range)	60.0 (10.00-2.40) 49.2 (9.99-2.25)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$	-	Xtriage
Refinement program	PROLSQ, X-PLOR	Depositor
R, R_{free}	0.155 , (Not available) 0.151 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	26.4	Xtriage
Anisotropy	0.558	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.13 , 101.7	EDS
L-test for twinning ¹	$\langle L \rangle = 0.41$, $\langle L^2 \rangle = 0.23$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	3460	wwPDB-VP
Average B, all atoms (Å ²)	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.45% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Theoretical 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: PCA

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	1.02	0/1628	1.99	47/2226 (2.1%)
1	B	1.02	0/1628	2.01	55/2226 (2.5%)
All	All	1.02	0/3256	2.00	102/4452 (2.3%)

There are no bond length outliers.

The worst 5 of 102 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	127	GLU	CA-CB-CG	15.46	147.42	113.40
1	B	193	ARG	NE-CZ-NH1	13.99	127.29	120.30
1	B	97	ASP	CB-CG-OD1	-10.22	109.10	118.30
1	A	55	ARG	NE-CZ-NH1	-9.62	115.49	120.30
1	B	55	ARG	NE-CZ-NH2	-9.42	115.59	120.30

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	1598	0	1536	251	0
1	B	1598	0	1537	219	0
2	A	112	0	0	15	0
2	B	152	0	0	26	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	3460	0	3073	454	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 72.

The worst 5 of 454 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:38:GLN:HG3	1:A:85:THR:CG2	1.62	1.27
1:B:52:ASP:HB2	2:B:742:HOH:O	1.28	1.26
1:B:84:GLU:OE1	1:B:170:LYS:HE2	1.46	1.12
1:A:38:GLN:CG	1:A:85:THR:HG21	1.80	1.12
1:B:130:GLN:HE21	1:B:130:GLN:HA	1.00	1.11

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	214/216 (99%)	174 (81%)	25 (12%)	15 (7%)	1	0
1	B	214/216 (99%)	171 (80%)	27 (13%)	16 (8%)	1	0
All	All	428/432 (99%)	345 (81%)	52 (12%)	31 (7%)	1	0

5 of 31 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	3	VAL
1	A	31	GLU
1	A	77	SER
1	A	96	LEU

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Mol	Chain	Res	Type
1	A	97	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	181/181 (100%)	126 (70%)	55 (30%)	0	0
1	B	181/181 (100%)	139 (77%)	42 (23%)	1	1
All	All	362/362 (100%)	265 (73%)	97 (27%)	0	0

5 of 97 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	17	ARG
1	B	62	ARG
1	B	21	SER
1	B	33	SER
1	B	108	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 12 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	112	GLN
1	B	130	GLN
1	B	201	HIS
1	B	174	ASN
1	A	188	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

2 non-standard protein/DNA/RNA residues 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	$\# Z > 2$
1	PCA	A	1	1	6,7,9	1.03	1 (16%)	7,8,12	1.60	2 (28%)
1	PCA	B	1	1	6,7,9	0.84	0	7,8,12	1.35	1 (14%)

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
1	PCA	A	1	1	-	0/0/9/13	0/1/1/1
1	PCA	B	1	1	-	0/0/9/13	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	1	PCA	O-C	2.40	1.29	1.20

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1	PCA	CB-CA-C	3.35	117.25	112.66
1	B	1	PCA	CB-CA-C	2.75	116.43	112.66
1	A	1	PCA	O-C-CA	-2.11	119.35	124.77

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	1	PCA	1	0

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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	215/216 (99%)	-1.14	0 100 100	5, 22, 43, 56	0
1	B	215/216 (99%)	-1.25	0 100 100	5, 20, 32, 52	0
All	All	430/432 (99%)	-1.19	0 100 100	5, 21, 41, 56	0

There are no RSRZ outliers to report.

6.2 Non-standard residues in protein, DNA, RNA chains [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
1	PCA	B	1	7/9	0.90	0.13	42,42,42,42	0
1	PCA	A	1	7/9	0.91	0.19	40,41,42,42	0

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.