



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 9, 2026 – 03:52 AM UTC

PDB ID : 4FKM / pdb_00004fkm
Title : Structure of unliganded and reductively methylated FhuD2 from staphylococcus aureus
Authors : Podkowa, K.J.; Heinrichs, D.E.; Shilton, B.H.
Deposited on : 2012-06-13
Resolution : 2.20 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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

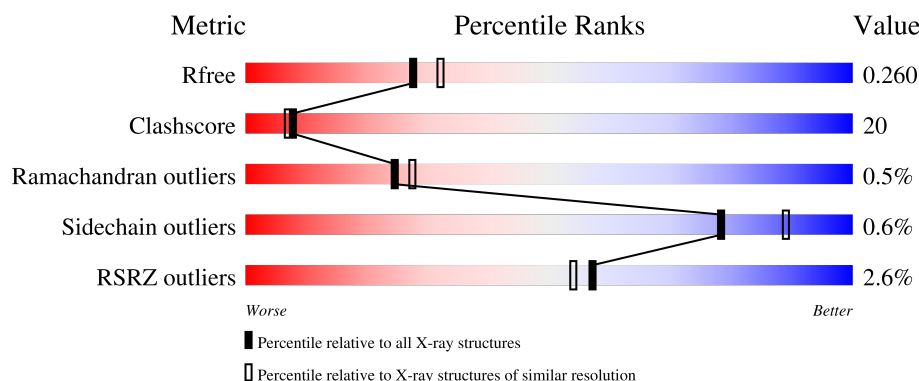
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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}	180053	6164 (2.20-2.20)
Clashscore	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)
RSRZ outliers	180081	6166 (2.20-2.20)

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	261	% 68% 27% ..
1	B	261	3% 63% 31% ..

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
1	MLY	A	296	-	-	X	-
1	MLY	A	90	-	-	X	-
1	MLY	B	90	-	-	X	-

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4484 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 Similar to ferric hydroxamate receptor 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	256	Total	C	N	O	Se	0	0	0
			2131	1400	338	389	4			
1	B	257	Total	C	N	O	Se	0	0	0
			2136	1403	339	390	4			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	42	GLY	-	expression tag	UNP Q99RY8
A	43	SER	-	expression tag	UNP Q99RY8
B	42	GLY	-	expression tag	UNP Q99RY8
B	43	SER	-	expression tag	UNP Q99RY8

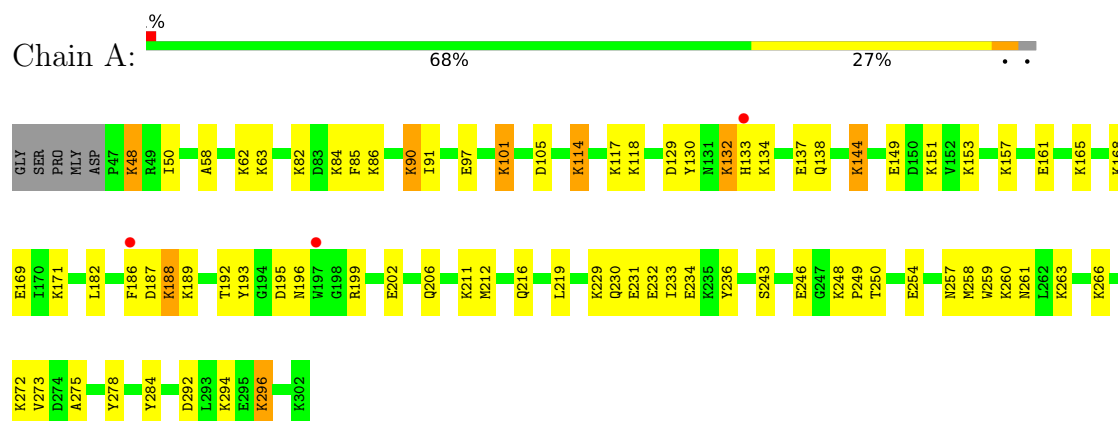
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	126	Total	O	0	0
			126	126		
2	B	91	Total	O	0	0
			91	91		

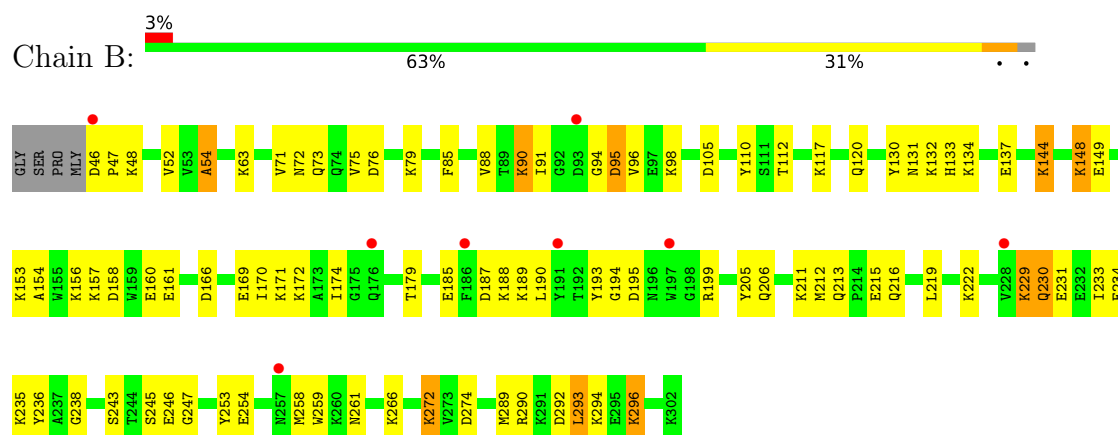
3 Residue-property plots

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: Similar to ferric hydroxamate receptor 1



- Molecule 1: Similar to ferric hydroxamate receptor 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	66.00Å 75.22Å 100.94Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	60.00 – 2.20 60.00 – 2.20	Depositor EDS
% Data completeness (in resolution range)	98.8 (60.00-2.20) 99.5 (60.00-2.20)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.81 (at 2.20Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.216 , 0.264 0.212 , 0.260	Depositor DCC
R_{free} test set	2397 reflections (4.93%)	wwPDB-VP
Wilson B-factor (Å ²)	24.1	Xtriage
Anisotropy	0.629	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 52.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	4484	wwPDB-VP
Average B, all atoms (Å ²)	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 37.83 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 4.0428e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: MLY

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	0.36	0/1682	0.81	3/2302 (0.1%)
1	B	0.38	0/1687	0.78	4/2310 (0.2%)
All	All	0.37	0/3369	0.80	7/4612 (0.2%)

There are no bond length outliers.

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	138	GLN	N-CA-C	-6.57	104.04	111.07
1	B	54	ALA	CA-C-N	5.61	125.71	119.32
1	B	54	ALA	C-N-CA	5.61	125.71	119.32
1	B	52	VAL	N-CA-C	5.27	114.19	106.55
1	A	50	ILE	N-CA-C	5.27	115.44	107.80

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	2131	0	2210	74	0
1	B	2136	0	2211	103	0
2	A	126	0	0	10	0
2	B	91	0	0	9	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	4484	0	4421	173	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 20.

The worst 5 of 173 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:231:GLU:HA	1:A:258:MSE:HE1	1.52	0.91
1:B:154:ALA:O	1:B:157:MLY:HG3	1.74	0.88
1:B:134:MLY:HD2	1:B:137:GLU:OE1	1.76	0.85
1:A:130:TYR:HE2	1:A:132:MLY:HE3	1.42	0.84
1:A:85:PHE:O	1:A:90:MLY:HH12	1.78	0.83

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	211/261 (81%)	203 (96%)	8 (4%)	0	100	100
1	B	212/261 (81%)	205 (97%)	5 (2%)	2 (1%)	14	14
All	All	423/522 (81%)	408 (96%)	13 (3%)	2 (0%)	24	27

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	95	ASP
1	B	230	GLN

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	171/170 (101%)	171 (100%)	0	100	100
1	B	171/170 (101%)	169 (99%)	2 (1%)	63	78
All	All	342/340 (101%)	340 (99%)	2 (1%)	78	89

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	290	ARG
1	B	293	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	73	GLN
1	B	131	ASN
1	B	217	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](#)

88 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	MLY	B	153	1	9,10,11	0.75	0	6,11,13	1.05	0
1	MLY	B	266	1	9,10,11	0.71	0	6,11,13	0.75	0
1	MLY	B	291	1	9,10,11	0.71	0	6,11,13	0.88	0
1	MLY	B	299	1	9,10,11	0.76	0	6,11,13	0.42	0
1	MLY	B	263	1	9,10,11	0.78	0	6,11,13	0.48	0
1	MLY	B	188	1	9,10,11	0.80	0	6,11,13	0.69	0
1	MLY	B	90	1	9,10,11	0.69	0	6,11,13	1.87	3 (50%)
1	MLY	A	188	1	9,10,11	0.72	0	6,11,13	1.13	1 (16%)
1	MLY	A	294	1	9,10,11	0.79	0	6,11,13	0.64	0
1	MLY	A	79	1	9,10,11	0.80	0	6,11,13	0.34	0
1	MLY	B	48	1	9,10,11	0.73	0	6,11,13	0.59	0
1	MLY	B	148	1	9,10,11	0.75	0	6,11,13	1.35	1 (16%)
1	MLY	A	272	1	9,10,11	0.80	0	6,11,13	0.71	0
1	MLY	B	103	1	9,10,11	0.76	0	6,11,13	0.73	0
1	MLY	B	189	1	9,10,11	0.84	0	6,11,13	0.59	0
1	MLY	A	171	1	9,10,11	0.75	0	6,11,13	0.87	0
1	MLY	B	165	1	9,10,11	0.80	0	6,11,13	0.88	0
1	MLY	B	235	1	9,10,11	0.77	0	6,11,13	1.03	1 (16%)
1	MLY	A	263	1	9,10,11	0.86	0	6,11,13	0.40	0
1	MLY	B	117	1	9,10,11	0.79	0	6,11,13	0.72	0
1	MLY	A	153	1	9,10,11	0.71	0	6,11,13	0.62	0
1	MLY	B	132	1	9,10,11	0.72	0	6,11,13	1.15	0
1	MLY	B	211	1	9,10,11	0.74	0	6,11,13	1.17	1 (16%)
1	MLY	A	86	1	9,10,11	0.80	0	6,11,13	1.17	0
1	MLY	B	157	1	9,10,11	0.84	0	6,11,13	0.58	0
1	MLY	A	235	1	9,10,11	0.80	0	6,11,13	0.57	0
1	MLY	A	299	1	9,10,11	0.81	0	6,11,13	0.51	0
1	MLY	B	63	1	9,10,11	0.80	0	6,11,13	1.69	2 (33%)
1	MLY	A	168	1	9,10,11	0.76	0	6,11,13	1.62	1 (16%)
1	MLY	B	222	1	9,10,11	0.76	0	6,11,13	1.42	1 (16%)
1	MLY	A	248	1	9,10,11	0.78	0	6,11,13	0.92	0
1	MLY	A	63	1	9,10,11	0.79	0	6,11,13	1.56	2 (33%)
1	MLY	A	165	1	9,10,11	0.76	0	6,11,13	1.39	1 (16%)
1	MLY	A	211	1	9,10,11	0.76	0	6,11,13	1.54	1 (16%)
1	MLY	B	114	1	9,10,11	0.81	0	6,11,13	0.62	0
1	MLY	B	156	1	9,10,11	0.79	0	6,11,13	0.76	0
1	MLY	A	48	1	9,10,11	0.69	0	6,11,13	2.67	1 (16%)
1	MLY	B	248	1	9,10,11	0.85	0	6,11,13	0.98	0
1	MLY	A	103	1	9,10,11	0.71	0	6,11,13	0.77	0
1	MLY	B	82	1	9,10,11	0.78	0	6,11,13	0.81	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	MLY	B	172	1	9,10,11	0.79	0	6,11,13	0.42	0
1	MLY	A	151	1	9,10,11	0.79	0	6,11,13	1.49	1 (16%)
1	MLY	A	118	1	9,10,11	0.75	0	6,11,13	1.12	1 (16%)
1	MLY	B	121	1	9,10,11	0.77	0	6,11,13	0.49	0
1	MLY	A	117	1	9,10,11	0.76	0	6,11,13	0.81	0
1	MLY	A	121	1	9,10,11	0.81	0	6,11,13	0.42	0
1	MLY	B	229	1	9,10,11	0.83	0	6,11,13	3.30	3 (50%)
1	MLY	B	168	1	9,10,11	0.76	0	6,11,13	0.91	0
1	MLY	A	62	1	9,10,11	0.74	0	6,11,13	0.65	0
1	MLY	B	101	1	9,10,11	0.79	0	6,11,13	0.85	0
1	MLY	A	229	1	9,10,11	0.76	0	6,11,13	1.04	0
1	MLY	A	260	1	9,10,11	0.83	0	6,11,13	1.03	1 (16%)
1	MLY	B	218	1	9,10,11	0.78	0	6,11,13	0.59	0
1	MLY	A	84	1	9,10,11	0.73	0	6,11,13	0.83	0
1	MLY	A	132	1	9,10,11	0.89	0	6,11,13	2.23	4 (66%)
1	MLY	A	302	1	10,11,11	0.85	0	10,13,13	0.71	0
1	MLY	B	272	1	9,10,11	0.73	0	6,11,13	1.51	1 (16%)
1	MLY	A	291	1	9,10,11	0.86	0	6,11,13	0.64	0
1	MLY	B	134	1	9,10,11	0.84	0	6,11,13	0.70	0
1	MLY	A	172	1	9,10,11	0.74	0	6,11,13	0.91	0
1	MLY	A	218	1	9,10,11	0.74	0	6,11,13	0.59	0
1	MLY	B	151	1	9,10,11	0.79	0	6,11,13	0.35	0
1	MLY	B	98	1	9,10,11	0.72	0	6,11,13	1.04	0
1	MLY	A	222	1	9,10,11	0.75	0	6,11,13	0.87	0
1	MLY	B	79	1	9,10,11	0.82	0	6,11,13	0.66	0
1	MLY	B	144	1	9,10,11	0.71	0	6,11,13	1.18	1 (16%)
1	MLY	B	118	1	9,10,11	0.80	0	6,11,13	0.71	0
1	MLY	B	296	1	9,10,11	0.78	0	6,11,13	2.03	2 (33%)
1	MLY	B	260	1	9,10,11	0.75	0	6,11,13	0.73	0
1	MLY	A	266	1	9,10,11	0.80	0	6,11,13	0.68	0
1	MLY	A	134	1	9,10,11	0.78	0	6,11,13	0.74	0
1	MLY	A	296	1	9,10,11	0.76	0	6,11,13	1.61	1 (16%)
1	MLY	A	156	1	9,10,11	0.81	0	6,11,13	0.71	0
1	MLY	B	294	1	9,10,11	0.76	0	6,11,13	0.50	0
1	MLY	A	157	1	9,10,11	0.81	0	6,11,13	0.64	0
1	MLY	A	189	1	9,10,11	0.74	0	6,11,13	1.30	1 (16%)
1	MLY	B	302	1	10,11,11	0.88	0	10,13,13	0.59	0
1	MLY	A	98	1	9,10,11	0.77	0	6,11,13	0.54	0
1	MLY	B	86	1	9,10,11	0.78	0	6,11,13	1.00	0
1	MLY	B	62	1	9,10,11	0.70	0	6,11,13	0.68	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	MLY	A	144	1	9,10,11	0.67	0	6,11,13	0.94	1 (16%)
1	MLY	B	171	1	9,10,11	0.80	0	6,11,13	0.60	0
1	MLY	A	82	1	9,10,11	0.75	0	6,11,13	1.23	1 (16%)
1	MLY	A	101	1	9,10,11	0.86	0	6,11,13	1.43	1 (16%)
1	MLY	A	90	1	9,10,11	0.79	0	6,11,13	1.92	2 (33%)
1	MLY	A	148	1	9,10,11	0.79	0	6,11,13	0.75	0
1	MLY	A	114	1	9,10,11	0.80	0	6,11,13	1.76	2 (33%)
1	MLY	B	84	1	9,10,11	0.69	0	6,11,13	1.19	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
1	MLY	B	153	1	-	0/8/9/11	-
1	MLY	B	266	1	-	0/8/9/11	-
1	MLY	B	291	1	-	0/8/9/11	-
1	MLY	B	299	1	-	0/8/9/11	-
1	MLY	B	263	1	-	1/8/9/11	-
1	MLY	B	188	1	-	0/8/9/11	-
1	MLY	B	90	1	-	0/8/9/11	-
1	MLY	A	188	1	-	0/8/9/11	-
1	MLY	A	294	1	-	0/8/9/11	-
1	MLY	A	79	1	-	0/8/9/11	-
1	MLY	B	48	1	-	2/8/9/11	-
1	MLY	B	148	1	-	0/8/9/11	-
1	MLY	A	272	1	-	1/8/9/11	-
1	MLY	B	103	1	-	0/8/9/11	-
1	MLY	B	189	1	-	0/8/9/11	-
1	MLY	A	171	1	-	0/8/9/11	-
1	MLY	B	165	1	-	0/8/9/11	-
1	MLY	B	235	1	-	0/8/9/11	-
1	MLY	A	263	1	-	0/8/9/11	-
1	MLY	B	117	1	-	0/8/9/11	-
1	MLY	A	153	1	-	0/8/9/11	-
1	MLY	B	132	1	-	0/8/9/11	-
1	MLY	B	211	1	-	0/8/9/11	-
1	MLY	A	86	1	-	0/8/9/11	-
1	MLY	B	157	1	-	0/8/9/11	-
1	MLY	A	235	1	-	0/8/9/11	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	MLY	A	299	1	-	0/8/9/11	-
1	MLY	B	63	1	-	0/8/9/11	-
1	MLY	A	168	1	-	0/8/9/11	-
1	MLY	B	222	1	-	2/8/9/11	-
1	MLY	A	248	1	-	0/8/9/11	-
1	MLY	A	63	1	-	0/8/9/11	-
1	MLY	A	165	1	-	2/8/9/11	-
1	MLY	A	211	1	-	0/8/9/11	-
1	MLY	B	114	1	-	0/8/9/11	-
1	MLY	B	156	1	-	0/8/9/11	-
1	MLY	A	48	1	-	3/8/9/11	-
1	MLY	B	248	1	-	1/8/9/11	-
1	MLY	A	103	1	-	0/8/9/11	-
1	MLY	B	82	1	-	0/8/9/11	-
1	MLY	B	172	1	-	1/8/9/11	-
1	MLY	A	151	1	-	0/8/9/11	-
1	MLY	A	118	1	-	0/8/9/11	-
1	MLY	B	121	1	-	0/8/9/11	-
1	MLY	A	117	1	-	2/8/9/11	-
1	MLY	A	121	1	-	0/8/9/11	-
1	MLY	B	229	1	-	0/8/9/11	-
1	MLY	B	168	1	-	0/8/9/11	-
1	MLY	A	62	1	-	0/8/9/11	-
1	MLY	B	101	1	-	3/8/9/11	-
1	MLY	A	229	1	-	0/8/9/11	-
1	MLY	A	260	1	-	0/8/9/11	-
1	MLY	B	218	1	-	0/8/9/11	-
1	MLY	A	84	1	-	0/8/9/11	-
1	MLY	A	132	1	-	1/8/9/11	-
1	MLY	A	302	1	-	2/11/11/11	-
1	MLY	B	272	1	-	0/8/9/11	-
1	MLY	A	291	1	-	0/8/9/11	-
1	MLY	B	134	1	-	0/8/9/11	-
1	MLY	A	172	1	-	1/8/9/11	-
1	MLY	A	218	1	-	0/8/9/11	-
1	MLY	B	151	1	-	0/8/9/11	-
1	MLY	B	98	1	-	1/8/9/11	-
1	MLY	A	222	1	-	0/8/9/11	-
1	MLY	B	79	1	-	0/8/9/11	-
1	MLY	B	144	1	-	2/8/9/11	-
1	MLY	B	118	1	-	0/8/9/11	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	MLY	B	296	1	-	0/8/9/11	-
1	MLY	B	260	1	-	1/8/9/11	-
1	MLY	A	266	1	-	1/8/9/11	-
1	MLY	A	134	1	-	0/8/9/11	-
1	MLY	A	296	1	-	0/8/9/11	-
1	MLY	A	156	1	-	0/8/9/11	-
1	MLY	B	294	1	-	0/8/9/11	-
1	MLY	A	157	1	-	0/8/9/11	-
1	MLY	A	189	1	-	1/8/9/11	-
1	MLY	B	302	1	-	0/11/11/11	-
1	MLY	A	98	1	-	0/8/9/11	-
1	MLY	B	86	1	-	2/8/9/11	-
1	MLY	B	62	1	-	1/8/9/11	-
1	MLY	A	144	1	-	1/8/9/11	-
1	MLY	B	171	1	-	1/8/9/11	-
1	MLY	A	82	1	-	0/8/9/11	-
1	MLY	A	101	1	-	2/8/9/11	-
1	MLY	A	90	1	-	1/8/9/11	-
1	MLY	A	148	1	-	0/8/9/11	-
1	MLY	A	114	1	-	2/8/9/11	-
1	MLY	B	84	1	-	0/8/9/11	-

There are no bond length outliers.

The worst 5 of 39 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	229	MLY	CH1-NZ-CE	-7.35	81.59	110.75
1	A	48	MLY	CH2-NZ-CE	-6.27	85.86	110.75
1	A	90	MLY	CH2-NZ-CH1	-3.89	99.74	109.72
1	B	296	MLY	CH1-NZ-CE	-3.77	95.79	110.75
1	A	168	MLY	CH2-NZ-CH1	3.74	119.31	109.72

There are no chirality outliers.

5 of 38 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	48	MLY	O-C-CA-CB
1	A	172	MLY	O-C-CA-CB
1	A	189	MLY	O-C-CA-CB
1	A	266	MLY	O-C-CA-CB
1	B	48	MLY	C-CA-CB-CG

There are no ring outliers.

43 monomers are involved in 100 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	B	153	MLY	1	0
1	B	266	MLY	3	0
1	B	188	MLY	1	0
1	B	90	MLY	11	0
1	A	188	MLY	1	0
1	A	294	MLY	2	0
1	B	48	MLY	2	0
1	B	148	MLY	1	0
1	A	272	MLY	2	0
1	B	189	MLY	1	0
1	A	171	MLY	1	0
1	A	263	MLY	2	0
1	B	117	MLY	1	0
1	A	153	MLY	1	0
1	B	132	MLY	2	0
1	A	86	MLY	2	0
1	B	157	MLY	4	0
1	A	248	MLY	1	0
1	B	156	MLY	1	0
1	A	48	MLY	1	0
1	B	172	MLY	4	0
1	A	117	MLY	1	0
1	B	229	MLY	1	0
1	A	62	MLY	1	0
1	A	229	MLY	1	0
1	A	84	MLY	1	0
1	A	132	MLY	3	0
1	B	272	MLY	2	0
1	B	134	MLY	4	0
1	B	98	MLY	2	0
1	B	79	MLY	2	0
1	B	144	MLY	1	0
1	B	296	MLY	6	0
1	A	266	MLY	2	0
1	A	134	MLY	3	0
1	A	296	MLY	12	0
1	B	294	MLY	4	0
1	A	157	MLY	1	0
1	A	144	MLY	1	0
1	B	171	MLY	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	101	MLY	3	0
1	A	90	MLY	8	0
1	A	114	MLY	1	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides 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	208/261 (79%)	-0.06	3 (1%) 73 71	13, 22, 38, 49	0
1	B	209/261 (80%)	0.25	8 (3%) 44 41	13, 26, 49, 60	0
All	All	417/522 (79%)	0.10	11 (2%) 57 54	13, 24, 46, 60	0

The worst 5 of 11 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	176	GLN	3.8
1	B	186	PHE	3.5
1	A	186	PHE	2.6
1	A	133	HIS	2.5
1	B	228	VAL	2.3

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	MLY	B	229	11/12	0.55	0.26	52,58,72,73	0
1	MLY	B	189	11/12	0.56	0.24	48,54,66,67	0
1	MLY	B	302	12/12	0.58	0.21	53,57,61,61	0
1	MLY	B	188	11/12	0.61	0.22	55,58,65,65	0
1	MLY	A	114	11/12	0.64	0.25	41,46,62,62	0
1	MLY	A	132	11/12	0.70	0.26	42,48,62,63	0
1	MLY	B	172	11/12	0.70	0.19	40,43,56,56	0
1	MLY	B	218	11/12	0.71	0.18	41,45,55,55	0
1	MLY	B	222	11/12	0.71	0.17	48,51,58,59	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
1	MLY	B	263	11/12	0.72	0.24	43,48,62,63	0
1	MLY	B	134	11/12	0.75	0.19	27,35,53,54	0
1	MLY	A	148	11/12	0.76	0.20	32,36,52,52	0
1	MLY	B	114	11/12	0.78	0.16	37,42,56,57	0
1	MLY	B	168	11/12	0.78	0.16	31,36,49,49	0
1	MLY	B	266	11/12	0.79	0.16	38,41,50,51	0
1	MLY	B	103	11/12	0.79	0.19	26,30,50,50	0
1	MLY	B	260	11/12	0.80	0.16	46,49,53,53	0
1	MLY	A	222	11/12	0.80	0.15	38,41,48,49	0
1	MLY	B	157	11/12	0.81	0.20	22,28,49,49	0
1	MLY	B	101	11/12	0.81	0.14	27,34,52,53	0
1	MLY	B	117	11/12	0.81	0.15	33,37,56,56	0
1	MLY	A	188	11/12	0.81	0.17	42,46,55,55	0
1	MLY	B	86	11/12	0.82	0.15	26,31,43,45	0
1	MLY	A	302	12/12	0.82	0.15	29,35,43,44	0
1	MLY	B	121	11/12	0.82	0.18	23,30,51,51	0
1	MLY	B	79	11/12	0.82	0.22	21,29,50,51	0
1	MLY	A	101	11/12	0.83	0.14	21,25,43,43	0
1	MLY	B	235	11/12	0.83	0.15	38,42,52,53	0
1	MLY	B	299	11/12	0.83	0.15	31,34,49,50	0
1	MLY	A	299	11/12	0.83	0.15	19,24,41,41	0
1	MLY	A	168	11/12	0.84	0.15	19,25,46,47	0
1	MLY	A	48	11/12	0.84	0.14	23,28,35,35	0
1	MLY	B	211	11/12	0.84	0.14	28,34,49,51	0
1	MLY	B	98	11/12	0.85	0.12	28,35,43,45	0
1	MLY	A	153	11/12	0.85	0.14	24,29,39,43	0
1	MLY	B	165	11/12	0.85	0.14	26,29,43,44	0
1	MLY	B	118	11/12	0.85	0.13	28,33,46,46	0
1	MLY	B	171	11/12	0.85	0.13	36,39,42,42	0
1	MLY	A	79	11/12	0.85	0.22	21,30,51,51	0
1	MLY	A	263	11/12	0.86	0.17	24,31,48,49	0
1	MLY	B	84	11/12	0.86	0.12	24,27,37,39	0
1	MLY	A	86	11/12	0.86	0.11	27,31,39,42	0
1	MLY	A	151	11/12	0.86	0.15	29,36,51,52	0
1	MLY	A	218	11/12	0.87	0.13	27,30,43,44	0
1	MLY	B	132	11/12	0.87	0.12	29,33,40,41	0
1	MLY	A	189	11/12	0.87	0.13	33,37,41,42	0
1	MLY	B	144	11/12	0.87	0.11	11,17,23,25	0
1	MLY	B	248	11/12	0.87	0.13	36,38,40,41	0
1	MLY	B	63	11/12	0.88	0.13	22,25,36,38	0
1	MLY	A	90	11/12	0.88	0.13	22,26,36,37	0
1	MLY	A	165	11/12	0.88	0.15	19,25,46,48	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
1	MLY	A	248	11/12	0.88	0.12	26,27,33,33	0
1	MLY	A	260	11/12	0.88	0.12	24,27,38,38	0
1	MLY	A	134	11/12	0.88	0.14	26,37,49,50	0
1	MLY	B	296	11/12	0.88	0.15	22,23,35,37	0
1	MLY	A	98	11/12	0.88	0.12	22,27,41,42	0
1	MLY	A	117	11/12	0.88	0.16	27,35,53,53	0
1	MLY	B	90	11/12	0.89	0.12	25,27,35,36	0
1	MLY	A	211	11/12	0.89	0.12	18,23,36,37	0
1	MLY	A	296	11/12	0.89	0.14	16,19,32,36	0
1	MLY	B	62	11/12	0.90	0.13	20,23,33,35	0
1	MLY	A	157	11/12	0.90	0.11	23,28,37,37	0
1	MLY	A	118	11/12	0.90	0.14	26,32,50,52	0
1	MLY	A	84	11/12	0.90	0.09	22,23,30,30	0
1	MLY	A	171	11/12	0.90	0.12	16,21,38,38	0
1	MLY	A	103	11/12	0.90	0.12	18,22,37,37	0
1	MLY	B	48	11/12	0.90	0.10	23,29,31,31	0
1	MLY	A	156	11/12	0.91	0.09	22,24,35,35	0
1	MLY	A	63	11/12	0.91	0.12	20,22,37,37	0
1	MLY	A	172	11/12	0.91	0.12	21,26,46,46	0
1	MLY	A	266	11/12	0.91	0.12	28,33,45,45	0
1	MLY	B	148	11/12	0.91	0.11	21,24,40,41	0
1	MLY	B	272	11/12	0.91	0.11	18,22,38,40	0
1	MLY	B	291	11/12	0.91	0.10	19,24,32,32	0
1	MLY	B	294	11/12	0.91	0.10	22,26,42,43	0
1	MLY	A	294	11/12	0.91	0.10	14,16,31,32	0
1	MLY	A	82	11/12	0.91	0.10	21,23,33,34	0
1	MLY	A	235	11/12	0.91	0.10	24,29,36,37	0
1	MLY	A	121	11/12	0.92	0.09	20,23,35,36	0
1	MLY	B	151	11/12	0.92	0.11	22,29,48,49	0
1	MLY	B	156	11/12	0.92	0.09	19,21,32,33	0
1	MLY	B	82	11/12	0.92	0.10	19,23,28,29	0
1	MLY	A	229	11/12	0.92	0.09	26,28,30,32	0
1	MLY	A	291	11/12	0.93	0.09	13,17,33,33	0
1	MLY	B	153	11/12	0.93	0.08	18,21,26,27	0
1	MLY	A	62	11/12	0.93	0.08	18,20,27,27	0
1	MLY	A	144	11/12	0.93	0.09	20,21,33,34	0
1	MLY	A	272	11/12	0.93	0.09	14,17,32,33	0

6.3 Carbohydrates

There are no oligosaccharides in this entry.

6.4 Ligands

There are no ligands in this entry.

6.5 Other polymers

There are no such residues in this entry.