



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 2, 2021 – 03:17 PM GMT

PDB ID : 5LYR
Title : Structure of the GH99 endo-alpha-mannanase from *Bacteroides xyloisolvans* in complex with mannose-alpha-1,3-noeuromycin
Authors : Petricevic, M.; Sobala, L.F.; Fernandes, P.Z.; Raich, L.; Thompson, A.J.; Bernardo-Seisdedos, G.; Millet, O.; Zhu, S.; Sollogoub, M.; Rovira, C.; Jimenez-Barbero, J.; Davies, G.J.; Williams, S.J.
Deposited on : 2016-09-28
Resolution : 1.14 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 ⓘ](#)) 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 : **FAILED**
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.16

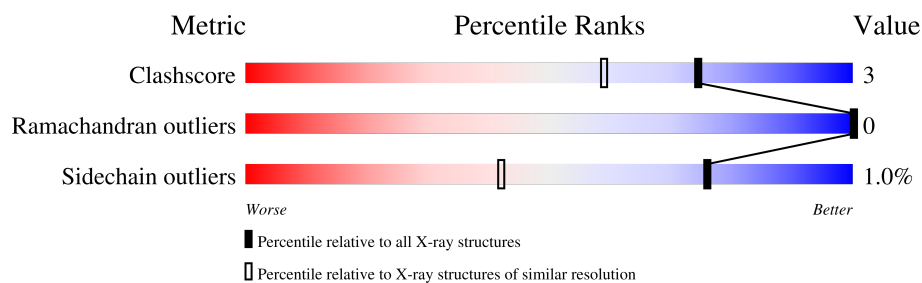
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.14 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	1537 (1.18-1.10)
Ramachandran outliers	138981	1483 (1.18-1.10)
Sidechain outliers	138945	1480 (1.18-1.10)

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 3685 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 Glycosyl hydrolase family 71.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	349	3227	2119	514	583	11	0	67	0

There are 21 discrepancies between the modelled and reference sequences:

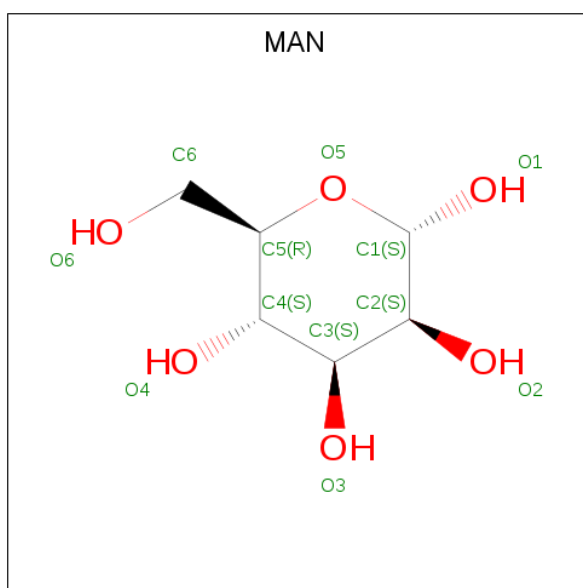
Chain	Residue	Modelled	Actual	Comment	Reference
A	-4	MET	-	initiating methionine	UNP D6D1V7
A	-3	GLY	-	expression tag	UNP D6D1V7
A	-2	SER	-	expression tag	UNP D6D1V7
A	-1	SER	-	expression tag	UNP D6D1V7
A	0	HIS	-	expression tag	UNP D6D1V7
A	1	HIS	-	expression tag	UNP D6D1V7
A	2	HIS	-	expression tag	UNP D6D1V7
A	3	HIS	-	expression tag	UNP D6D1V7
A	4	HIS	-	expression tag	UNP D6D1V7
A	5	HIS	-	expression tag	UNP D6D1V7
A	6	SER	-	expression tag	UNP D6D1V7
A	7	SER	-	expression tag	UNP D6D1V7
A	8	GLY	-	expression tag	UNP D6D1V7
A	9	LEU	-	expression tag	UNP D6D1V7
A	10	VAL	-	expression tag	UNP D6D1V7
A	11	PRO	-	expression tag	UNP D6D1V7
A	12	ARG	-	expression tag	UNP D6D1V7
A	13	GLY	-	expression tag	UNP D6D1V7
A	14	SER	-	expression tag	UNP D6D1V7
A	15	HIS	-	expression tag	UNP D6D1V7
A	16	MET	-	expression tag	UNP D6D1V7

- Molecule 2 is ACETATE ION (three-letter code: ACT) (formula: C₂H₃O₂).



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

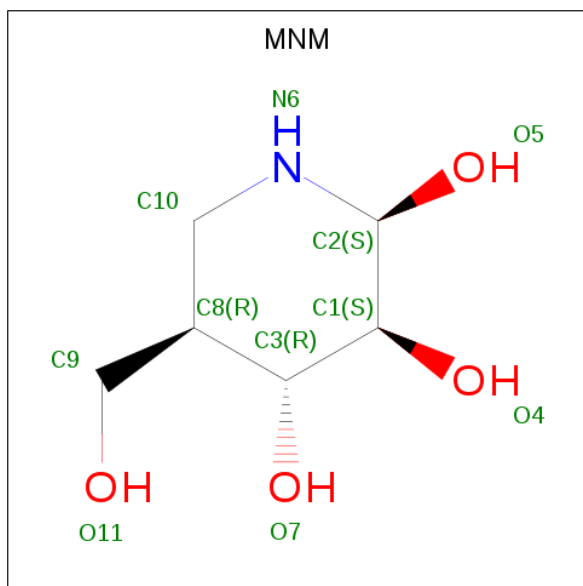
- Molecule 3 is alpha-D-mannopyranose (three-letter code: MAN) (formula: C₆H₁₂O₆).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			11	6	5		

- Molecule 4 is (2S,3S,4R,5R)-2,3,4-TRIHYDROXY-5-HYDROXYMETHYL-PIPERIDINE

(three-letter code: MNM) (formula: C₆H₁₃NO₄).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
4	A	1	11	6	1	4	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
5	A	422	428	428	0	25

SEQUENCE-PLOTS INFOmissingINFO

3 Data and refinement statistics

EDS failed to run properly - this section is therefore incomplete.

Property	Value	Source
Space group	I 4	Depositor
Cell constants a, b, c, α , β , γ	108.51Å 108.51Å 67.61Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	76.73 – 1.14	Depositor
% Data completeness (in resolution range)	94.5 (76.73-1.14)	Depositor
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.20 (at 1.14Å)	Xtrriage
Refinement program	REFMAC 5.8.0155	Depositor
R, R_{free}	0.124 , 0.143	Depositor
Wilson B-factor (Å ²)	15.1	Xtrriage
Anisotropy	0.113	Xtrriage
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.022 for -k,-h,-l	Xtrriage
Total number of atoms	3685	wwPDB-VP
Average B, all atoms (Å ²)	19.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.81% of the height of the origin peak. No significant pseudotranslation is detected.*

¹ Intensities estimated from amplitudes.

² Theoretical 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.

4 Model quality [i](#)

4.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: ACT, MNM, MAN

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	0.57	0/3529	0.75	1/4796 (0.0%)

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 (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	316	ARG	NE-CZ-NH2	7.25	123.93	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	357[B]	GLU	Peptide

4.2 Too-close contacts [i](#)

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	3227	0	3208	21	0
2	A	8	0	6	1	0
3	A	11	0	10	0	0
4	A	11	0	12	1	0
5	A	428	0	0	5	0
All	All	3685	0	3236	21	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 3.

All (21) 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:357[B]:GLU:O	5:A:502[B]:HOH:O	1.84	0.93
1:A:176[B]:ARG:HH21	1:A:176[B]:ARG:HG3	1.34	0.93
1:A:378[B]:SER:HB2	5:A:719[B]:HOH:O	1.67	0.92
1:A:199[A]:LEU:HD11	5:A:759:HOH:O	1.92	0.69
1:A:176[B]:ARG:NH2	1:A:176[B]:ARG:HG3	2.09	0.62
1:A:176[B]:ARG:HH21	1:A:176[B]:ARG:CG	2.08	0.61
1:A:176[B]:ARG:NH2	1:A:176[B]:ARG:CG	2.68	0.56
1:A:47:ASP:OD2	1:A:133[B]:GLU:OE2	2.25	0.55
1:A:199[A]:LEU:CD1	5:A:759:HOH:O	2.50	0.55
1:A:43[B]:CYS:SG	1:A:118:THR:HG21	2.46	0.55
1:A:54[A]:ILE:HG13	1:A:102:ASP:HB2	1.88	0.54
1:A:198[A]:TYR:HA	1:A:240[A]:PHE:CZ	2.45	0.51
1:A:124[B]:THR:HG23	1:A:156:GLU:OE2	2.13	0.48
1:A:155:LEU:HD13	1:A:166[B]:LEU:HD11	1.94	0.48
1:A:252:TYR:CE2	4:A:404:MNM:H1	2.48	0.48
1:A:293[A]:ARG:NH1	5:A:508:HOH:O	2.53	0.42
1:A:57[A]:GLN:HG2	1:A:58[A]:TYR:N	2.35	0.42
1:A:224:ALA:HB3	1:A:226[B]:MET:HE2	2.01	0.41
1:A:166[B]:LEU:HA	1:A:166[B]:LEU:HD12	1.96	0.41
1:A:186[A]:LYS:HE2	2:A:402[A]:ACT:O	2.21	0.41

There are no symmetry-related clashes.

4.3 Torsion angles [i](#)

4.3.1 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	421/385 (109%)	413 (98%)	8 (2%)	0	100	100

There are no Ramachandran outliers to report.

4.3.2 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	357/330 (108%)	354 (99%)	3 (1%)	81	50

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	48	TRP
1	A	315	TYR
1	A	333	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

4.3.3 RNA [i](#)

There are no RNA molecules in this entry.

4.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

4.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

4.6 Ligand geometry [i](#)

4 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
3	MAN	A	403	4	11,11,12	0.36	0	15,15,17	1.01	2 (13%)
2	ACT	A	401	-	1,3,3	1.52	0	0,3,3	0.00	-
4	MNM	A	404	3	9,11,11	1.03	1 (11%)	10,15,15	1.36	1 (10%)
2	ACT	A	402[A]	-	1,3,3	0.21	0	0,3,3	0.00	-

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
3	MAN	A	403	4	-	0/2/19/22	0/1/1/1
4	MNM	A	404	3	-	0/2/19/19	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	404	MNM	C1-C2	2.43	1.55	1.52

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
4	A	404	MNM	C10-N6-C2	2.48	113.76	108.98
3	A	403	MAN	C1-O5-C5	2.24	115.22	112.19
3	A	403	MAN	C1-C2-C3	2.04	112.17	109.67

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	404	MNM	1	0
2	A	402[A]	ACT	1	0

4.7 Other polymers [i](#)

There are no such residues in this entry.

4.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

5 Fit of model and data

5.1 Protein, DNA and RNA chains

EDS failed to run properly - this section is therefore empty.

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

EDS failed to run properly - this section is therefore empty.

5.3 Carbohydrates

EDS failed to run properly - this section is therefore empty.

5.4 Ligands

EDS failed to run properly - this section is therefore empty.

5.5 Other polymers

EDS failed to run properly - this section is therefore empty.