



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 10, 2025 – 02:28 PM EST

PDB ID : 9DZN
Title : KAT6A MYST domain complexed with a H3K14-CoA bisubstrate inhibitor
Authors : Johnson, E.; Greasley, S.; Brodsky, O.
Deposited on : 2024-10-16
Resolution : 1.72 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 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) : 1.21
EDS : 3.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.004 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.40

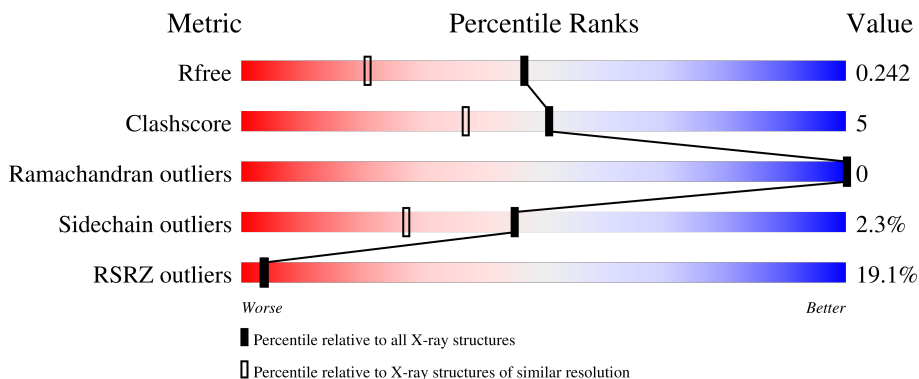
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.72 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}	164625	7106 (1.74-1.70)
Clashscore	180529	7746 (1.74-1.70)
Ramachandran outliers	177936	7654 (1.74-1.70)
Sidechain outliers	177891	7654 (1.74-1.70)
RSRZ outliers	164620	7104 (1.74-1.70)

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	C	19	
2	A	286	

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 2587 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 H3K14.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
1	C	8	47	28	9	10	0	0	0

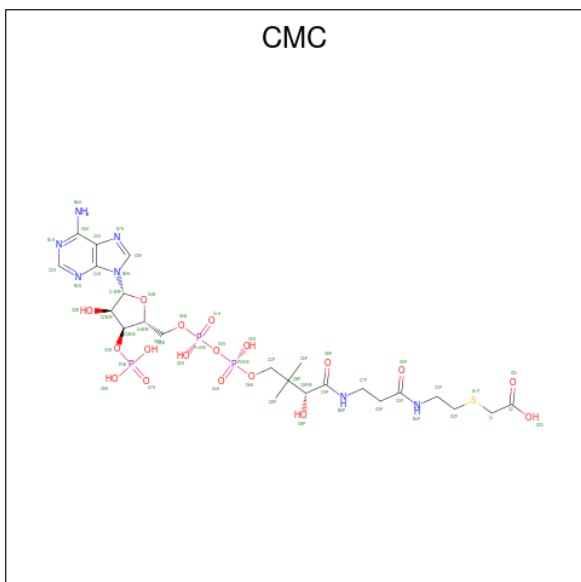
- Molecule 2 is a protein called Histone acetyltransferase KAT6A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	A	276	2286	1483	385	400	18	0	1	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	499	GLY	-	expression tag	UNP Q92794
A	500	SER	-	expression tag	UNP Q92794

- Molecule 3 is CARBOXYMETHYL COENZYME *A (three-letter code: CMC) (formula: $C_{23}H_{38}N_7O_{18}P_3S$) (labeled as "Ligand of Interest" by depositor).

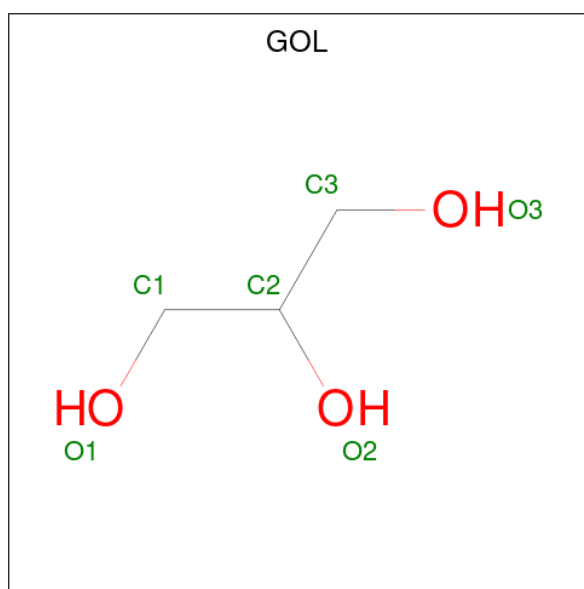


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
3	C	1	Total	C	N	O	P	S	0	0
			51	23	7	17	3	1		

- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Zn	0	0
			1	1		

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



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

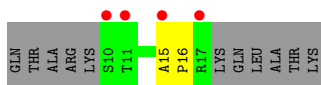
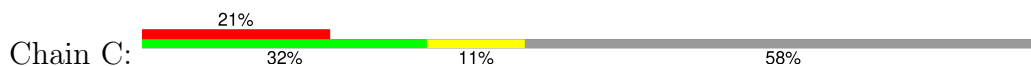
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	C	14	Total	O	0	0
			14	14		
6	A	182	Total	O	0	0
			182	182		

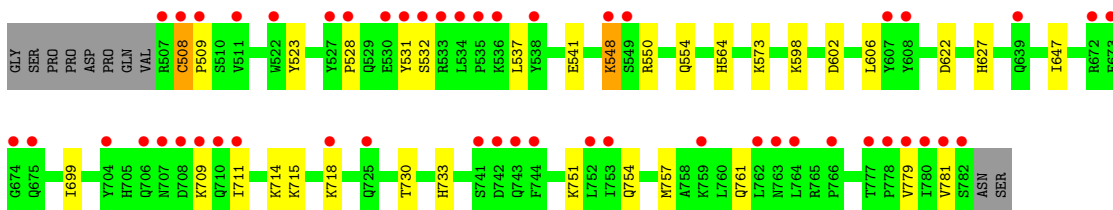
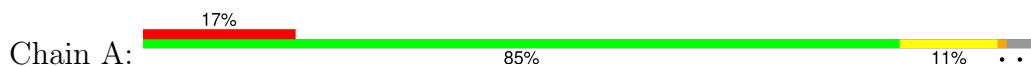
3 Residue-property plots [i](#)

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: Histone H3K14



- Molecule 2: Histone acetyltransferase KAT6A



4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α , β , γ	59.37Å 59.37Å 210.05Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	57.13 – 1.72 57.13 – 1.72	Depositor EDS
% Data completeness (in resolution range)	74.8 (57.13-1.72) 74.8 (57.13-1.72)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.60 (at 1.72Å)	Xtrriage
Refinement program	BUSTER 2.11.8 (3-FEB-2022)	Depositor
R, R_{free}	0.219 , 0.245 0.217 , 0.242	Depositor DCC
R_{free} test set	11710 reflections (4.67%)	wwPDB-VP
Wilson B-factor (Å ²)	27.0	Xtrriage
Anisotropy	0.055	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 39.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	2587	wwPDB-VP
Average B, all atoms (Å ²)	32.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.05% of the height of the origin peak. No significant pseudotranslation is detected.*

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: GOL, ALY, CMC, ZN

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	C	0.86	0/47	0.92	0/62
2	A	0.47	0/2338	0.63	0/3161
All	All	0.48	0/2385	0.63	0/3223

There are no bond length outliers.

There are no bond angle outliers.

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	C	47	0	42	1	0
2	A	2286	0	2283	22	0
3	C	51	0	33	2	0
4	A	1	0	0	0	0
5	A	6	0	8	1	0
6	A	182	0	0	2	0
6	C	14	0	0	0	0
All	All	2587	0	2366	24	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 5.

All (24) 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)
2:A:622:ASP:OD1	2:A:627:HIS:HE1	1.76	0.67
3:C:101:CMC:H141	3:C:101:CMC:HN4	1.60	0.66
2:A:541:GLU:OE1	2:A:627:HIS:HD2	1.80	0.64
2:A:550:ARG:HE	2:A:554:GLN:NE2	1.99	0.60
2:A:733:HIS:HD2	6:A:937:HOH:O	1.85	0.59
2:A:573:LYS:HB3	5:A:802:GOL:H32	1.84	0.59
2:A:757:MET:O	2:A:761:GLN:HG2	2.09	0.53
2:A:751:LYS:HA	2:A:754:GLN:HG2	1.91	0.52
2:A:714:LYS:HE2	2:A:718:LYS:HZ1	1.73	0.52
2:A:509:PRO:HG3	2:A:537:LEU:HD12	1.92	0.51
2:A:531:TYR:CE1	2:A:548:LYS:HG2	2.46	0.51
3:C:101:CMC:H31	2:A:647:ILE:O	2.12	0.50
2:A:714:LYS:HE2	2:A:718:LYS:NZ	2.27	0.48
2:A:714:LYS:CE	2:A:718:LYS:NZ	2.79	0.45
2:A:709:LYS:HE2	2:A:715:LYS:HD2	1.98	0.45
2:A:508:CYS:SG	2:A:532:SER:O	2.67	0.44
2:A:528:PRO:O	2:A:532:SER:N	2.50	0.44
1:C:15:ALA:HA	1:C:16:PRO:HD2	1.79	0.44
2:A:564:HIS:HE1	6:A:916:HOH:O	2.00	0.43
2:A:711:ILE:HG13	2:A:715:LYS:HD3	1.99	0.43
2:A:523:TYR:CE1	2:A:602:ASP:HB2	2.55	0.42
2:A:523:TYR:CZ	2:A:602:ASP:HB2	2.57	0.40
2:A:550:ARG:HE	2:A:554:GLN:HE21	1.67	0.40
2:A:699:ILE:HD12	2:A:730:THR:HG21	2.03	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	C	6/19 (32%)	6 (100%)	0	0	100	100
2	A	274/286 (96%)	265 (97%)	9 (3%)	0	100	100
All	All	280/305 (92%)	271 (97%)	9 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	C	4/14 (29%)	4 (100%)	0	100	100
2	A	256/268 (96%)	250 (98%)	6 (2%)	45	27
All	All	260/282 (92%)	254 (98%)	6 (2%)	45	27

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	A	508	CYS
2	A	548	LYS
2	A	598	LYS
2	A	606	LEU
2	A	779	VAL
2	A	781	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
2	A	554	GLN
2	A	564	HIS
2	A	627	HIS
2	A	733	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](#)

1 non-standard protein/DNA/RNA residue is 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	ALY	A	604	2	10,11,12	0.33	0	7,12,14	0.30	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	ALY	A	604	2	-	1/9/10/12	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	604	ALY	CG-CD-CE-NZ

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 3 ligands modelled in this entry, 1 is monoatomic - leaving 2 for Mogul analysis.

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	CMC	C	101	1	47,53,54	0.81	2 (4%)	59,78,80	0.79	2 (3%)
5	GOL	A	802	-	5,5,5	0.14	0	5,5,5	0.56	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
3	CMC	C	101	1	-	12/46/67/68	0/3/3/3
5	GOL	A	802	-	-	2/4/4/4	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	101	CMC	P3B-O8A	-2.35	1.46	1.54
3	C	101	CMC	P1A-O2A	-2.12	1.45	1.55

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	101	CMC	C2P-C3P-N4P	2.44	117.50	112.41
3	C	101	CMC	C5A-C6A-N6A	2.37	123.92	120.31

There are no chirality outliers.

All (14) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	101	CMC	C5B-O5B-P1A-O1A

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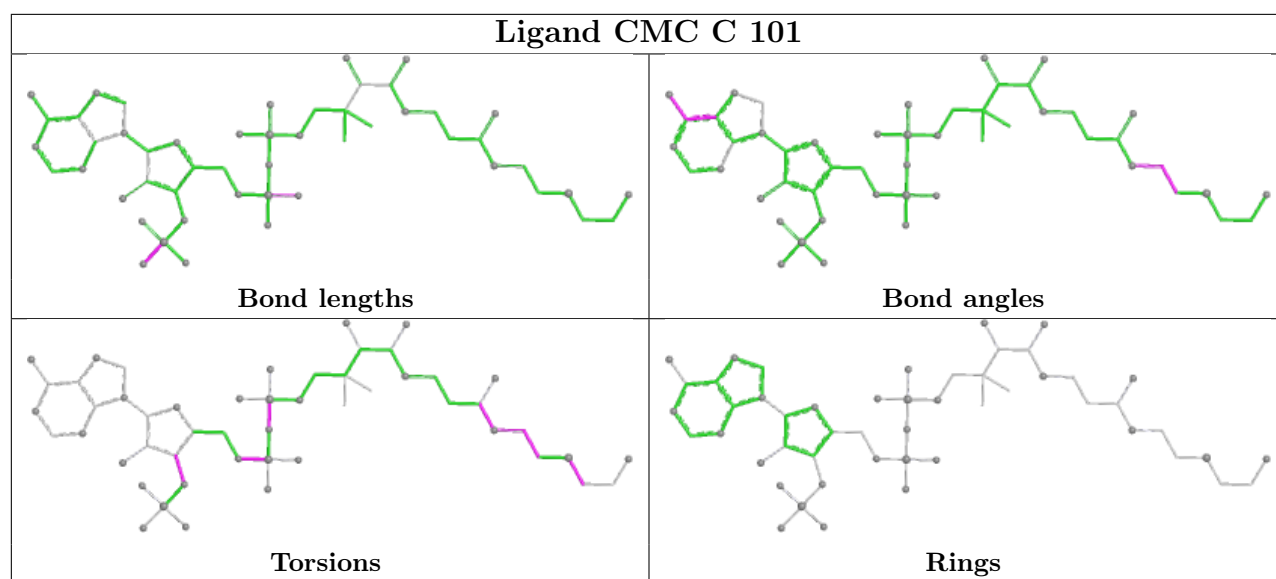
Mol	Chain	Res	Type	Atoms
3	C	101	CMC	C5B-O5B-P1A-O3A
3	C	101	CMC	C6P-C5P-N4P-C3P
3	C	101	CMC	O5P-C5P-N4P-C3P
3	C	101	CMC	C2P-C3P-N4P-C5P
3	C	101	CMC	S1P-C2P-C3P-N4P
5	A	802	GOL	C1-C2-C3-O3
3	C	101	CMC	C2B-C3B-O3B-P3B
5	A	802	GOL	O2-C2-C3-O3
3	C	101	CMC	C4B-C3B-O3B-P3B
3	C	101	CMC	C2-C1-S1P-C2P
3	C	101	CMC	C5B-O5B-P1A-O2A
3	C	101	CMC	P1A-O3A-P2A-O5A
3	C	101	CMC	P1A-O3A-P2A-O4A

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	101	CMC	2	0
5	A	802	GOL	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



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, 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	C	8/19 (42%)	2.34	4 (50%) 0 0	32, 44, 56, 56	0
2	A	275/286 (96%)	0.89	50 (18%) 4 4	13, 28, 51, 71	1 (0%)
All	All	283/305 (92%)	0.93	54 (19%) 4 4	13, 28, 52, 71	1 (0%)

All (54) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	A	607	TYR	5.4
2	A	710	GLN	5.2
2	A	762	LEU	4.6
2	A	780	ILE	4.6
2	A	742	ASP	4.6
2	A	711	ILE	4.5
1	C	17	ARG	4.5
2	A	535	PRO	4.5
2	A	766	PRO	4.4
1	C	10	SER	4.4
2	A	608	TYR	4.3
2	A	528	PRO	4.2
2	A	741	SER	4.2
2	A	534	LEU	4.1
2	A	531	TYR	4.1
2	A	707	ASN	4.0
2	A	708	ASP	3.9
2	A	508	CYS	3.7
2	A	763	ASN	3.6
2	A	536	LYS	3.6
2	A	706	GLN	3.4
2	A	532	SER	3.3
2	A	530	GLU	3.2
2	A	779	VAL	3.2

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Mol	Chain	Res	Type	RSRZ
1	C	11	THR	3.1
2	A	533	ARG	3.1
2	A	704	TYR	3.0
2	A	709	LYS	3.0
2	A	522	TRP	2.8
2	A	764	LEU	2.7
2	A	509	PRO	2.7
2	A	778	PRO	2.7
2	A	781	VAL	2.6
2	A	718	LYS	2.6
2	A	752	LEU	2.6
2	A	639	GLN	2.6
2	A	753	ILE	2.5
2	A	672	ARG	2.4
2	A	675	GLN	2.4
2	A	674	GLY	2.3
2	A	743	GLN	2.3
2	A	744	PHE	2.2
1	C	15	ALA	2.2
2	A	527	TYR	2.2
2	A	538	TYR	2.2
2	A	673	GLU	2.2
2	A	549	SER	2.2
2	A	507	ARG	2.2
2	A	725	GLN	2.1
2	A	511	VAL	2.1
2	A	759	LYS	2.1
2	A	548	LYS	2.1
2	A	777	THR	2.0
2	A	782	SER	2.0

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
2	ALY	A	604	12/13	0.95	0.07	23,26,31,31	0

6.3 Carbohydrates [i](#)

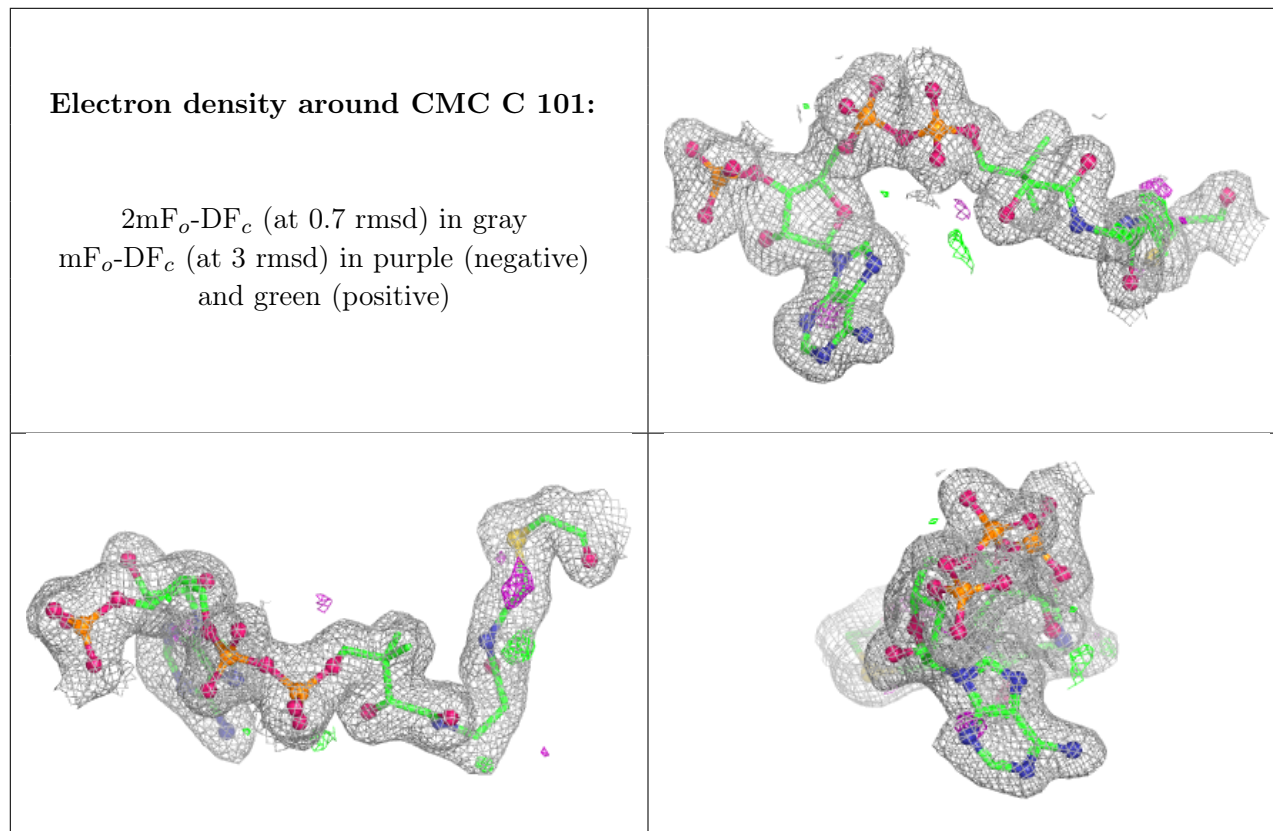
There are no monosaccharides in this entry.

6.4 Ligands [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
5	GOL	A	802	6/6	0.91	0.10	28,31,33,35	0
3	CMC	C	101	51/52	0.96	0.07	20,25,31,33	0
4	ZN	A	801	1/1	0.99	0.03	27,27,27,27	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



6.5 Other polymers [i](#)

There are no such residues in this entry.