



# wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 5, 2026 – 07:39 PM UTC

PDB ID : 4XP9 / pdb\_00004xp9  
Title : X-ray structure of Drosophila dopamine transporter bound to psychostimulant  
D-amphetamine  
Authors : Aravind, P.; Wang, K.; Gouaux, E.  
Deposited on : 2015-01-16  
Resolution : 2.80 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](mailto: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>.

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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)  
Xtrriage (Phenix) : 2.0  
EDS : 3.0  
Buster-report : wwPDB partial adaption of 1.1.7 (2018)  
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

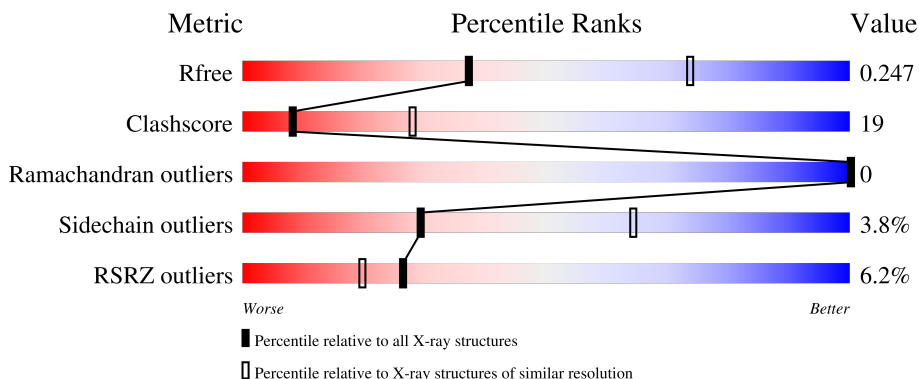
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.80 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	3866 (2.80-2.80)
Clashscore	190562	4276 (2.80-2.80)
Ramachandran outliers	187476	4196 (2.80-2.80)
Sidechain outliers	187428	4198 (2.80-2.80)
RSRZ outliers	180081	3869 (2.80-2.80)

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  $\geq 3$ , 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	541	 5% 67% 30% ..
2	L	213	 7% 67% 29% .
3	H	219	 8% 68% 31% .
4	A	2	 100%

## 2 Entry composition i

There are 13 unique types of molecules in this entry. The entry contains 7701 atoms, of which 36 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 Transporter.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	C	537	4229	2835	655	721	18	0	0	0

There are 48 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	74	ALA	VAL	engineered mutation	UNP A0A0B4KEX2
C	?	-	SER	deletion	UNP A0A0B4KEX2
C	?	-	GLN	deletion	UNP A0A0B4KEX2
C	?	-	ASN	deletion	UNP A0A0B4KEX2
C	?	-	ALA	deletion	UNP A0A0B4KEX2
C	?	-	SER	deletion	UNP A0A0B4KEX2
C	?	-	ARG	deletion	UNP A0A0B4KEX2
C	?	-	VAL	deletion	UNP A0A0B4KEX2
C	?	-	PRO	deletion	UNP A0A0B4KEX2
C	?	-	VAL	deletion	UNP A0A0B4KEX2
C	?	-	ILE	deletion	UNP A0A0B4KEX2
C	?	-	GLY	deletion	UNP A0A0B4KEX2
C	?	-	ASN	deletion	UNP A0A0B4KEX2
C	?	-	TYR	deletion	UNP A0A0B4KEX2
C	?	-	SER	deletion	UNP A0A0B4KEX2
C	?	-	ASP	deletion	UNP A0A0B4KEX2
C	?	-	LEU	deletion	UNP A0A0B4KEX2
C	?	-	TYR	deletion	UNP A0A0B4KEX2
C	?	-	ALA	deletion	UNP A0A0B4KEX2
C	?	-	MET	deletion	UNP A0A0B4KEX2
C	?	-	GLY	deletion	UNP A0A0B4KEX2
C	?	-	ASN	deletion	UNP A0A0B4KEX2
C	?	-	GLN	deletion	UNP A0A0B4KEX2
C	?	-	SER	deletion	UNP A0A0B4KEX2
C	?	-	LEU	deletion	UNP A0A0B4KEX2
C	?	-	LEU	deletion	UNP A0A0B4KEX2
C	?	-	TYR	deletion	UNP A0A0B4KEX2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	?	-	ASN	deletion	UNP A0A0B4KEX2
C	?	-	GLU	deletion	UNP A0A0B4KEX2
C	?	-	THR	deletion	UNP A0A0B4KEX2
C	?	-	TYR	deletion	UNP A0A0B4KEX2
C	?	-	MET	deletion	UNP A0A0B4KEX2
C	?	-	ASN	deletion	UNP A0A0B4KEX2
C	?	-	GLY	deletion	UNP A0A0B4KEX2
C	?	-	SER	deletion	UNP A0A0B4KEX2
C	?	-	SER	deletion	UNP A0A0B4KEX2
C	?	-	LEU	deletion	UNP A0A0B4KEX2
C	?	-	ASP	deletion	UNP A0A0B4KEX2
C	?	-	THR	deletion	UNP A0A0B4KEX2
C	?	-	SER	deletion	UNP A0A0B4KEX2
C	?	-	ALA	deletion	UNP A0A0B4KEX2
C	?	-	VAL	deletion	UNP A0A0B4KEX2
C	415	ALA	LEU	engineered mutation	UNP A0A0B4KEX2
C	602	LEU	-	expression tag	UNP A0A0B4KEX2
C	603	LEU	-	expression tag	UNP A0A0B4KEX2
C	604	VAL	-	expression tag	UNP A0A0B4KEX2
C	605	PRO	-	expression tag	UNP A0A0B4KEX2
C	606	ARG	-	expression tag	UNP A0A0B4KEX2

- Molecule 2 is a protein called ANTIBODY FRAGMENT HEAVY CHAIN-PROTEIN, 9D5-HEAVY CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	L	213	1615	1005	267	335	8	0	0	0

- Molecule 3 is a protein called ANTIBODY FRAGMENT LIGHT CHAIN-PROTEIN, 9D5-LIGHT CHAIN.

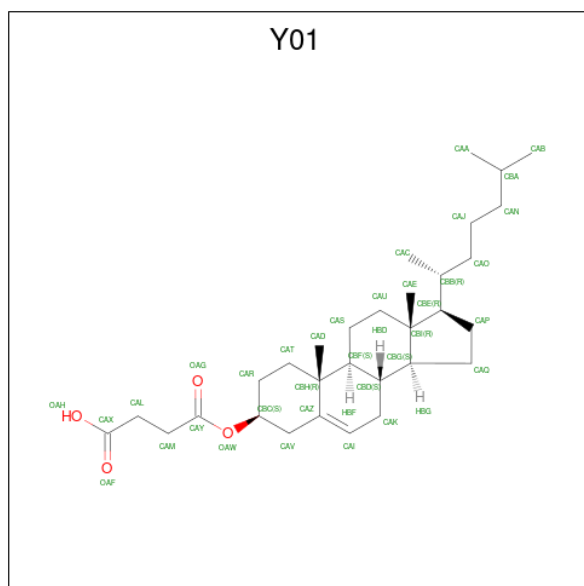
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	H	219	1640	1031	277	324	8	0	0	0

- Molecule 4 is an oligosaccharide called alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose.



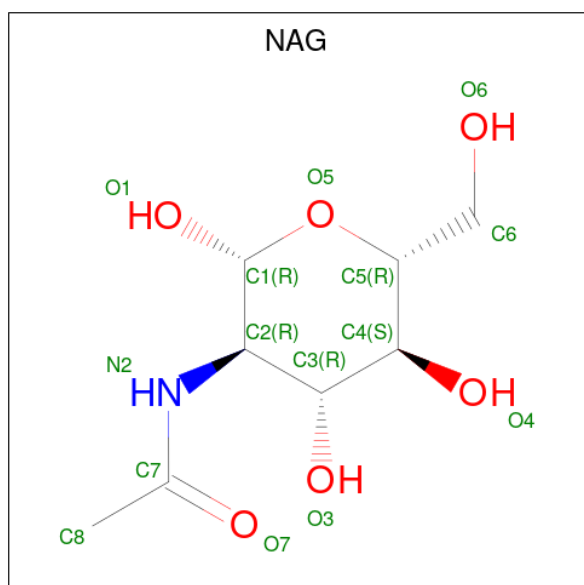
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf	Trace
4	A	2	Total	C O	0	0	0
			23	12 11			

- Molecule 5 is CHOLESTEROL HEMISUCCINATE (CCD ID: Y01) (formula:  $C_{31}H_{50}O_4$ ).



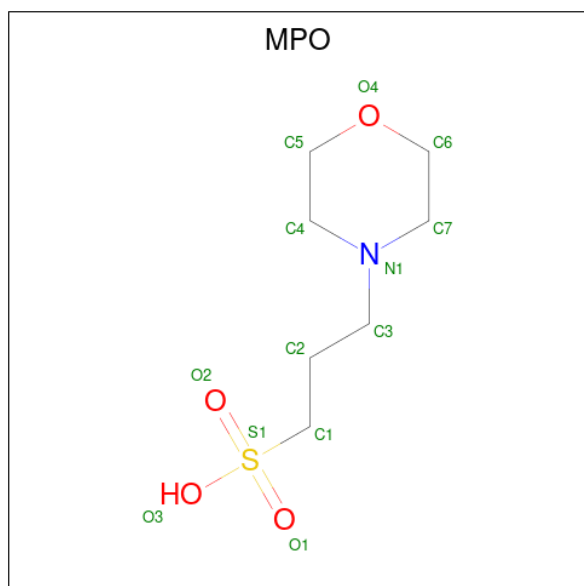
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	C	1	Total	C O	0	0
			35	31 4		

- Molecule 6 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula:  $C_8H_{15}NO_6$ ).



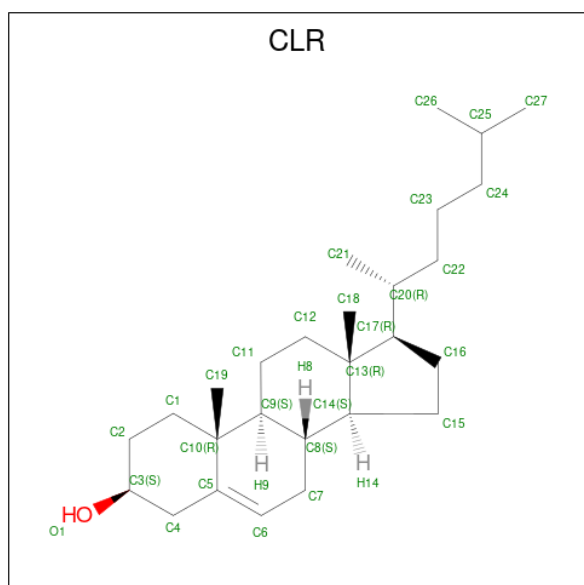
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
6	C	1	14	8	1	5	0	0

- Molecule 7 is 3[N-MORPHOLINO]PROPANE SULFONIC ACID (CCD ID: MPO) (formula:  $C_7H_{15}NO_4S$ ).



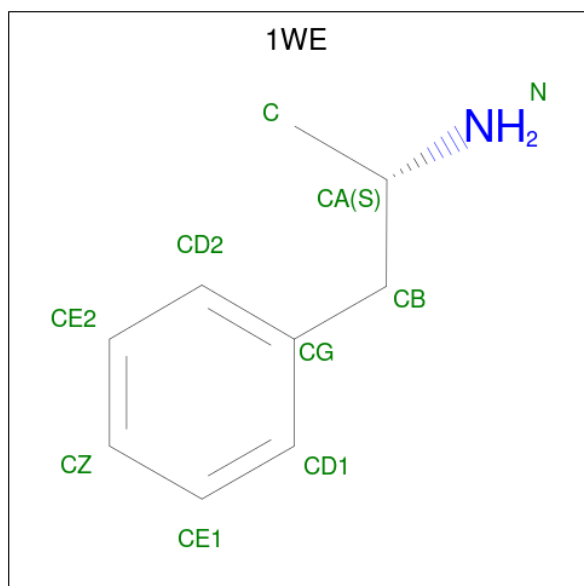
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
7	C	1	13	7	1	4	1	0	0

- Molecule 8 is CHOLESTEROL (CCD ID: CLR) (formula:  $C_{27}H_{46}O$ ).



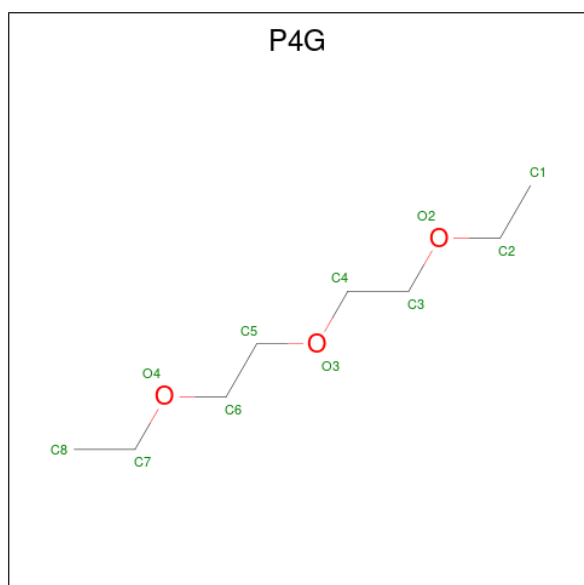
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	C	1	Total	C	O	0	0
			28	27	1		

- Molecule 9 is (2S)-1-phenylpropan-2-amine (CCD ID: 1WE) (formula: C<sub>9</sub>H<sub>13</sub>N).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
9	C	1	Total	C	N	0	0
			10	9	1		

- Molecule 10 is 1-ETHOXY-2-(2-ETHOXYETHOXY)ETHANE (CCD ID: P4G) (formula: C<sub>8</sub>H<sub>18</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
10	C	1	Total	C	H	O	0	0
			29	8	18	3		
10	C	1	Total	C	H	O	0	0
			29	8	18	3		

- Molecule 11 is SODIUM ION (CCD ID: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	C	2	Total	Na	0	0
			2	2		

- Molecule 12 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
12	C	1	Total	Cl	0	0
			1	1		

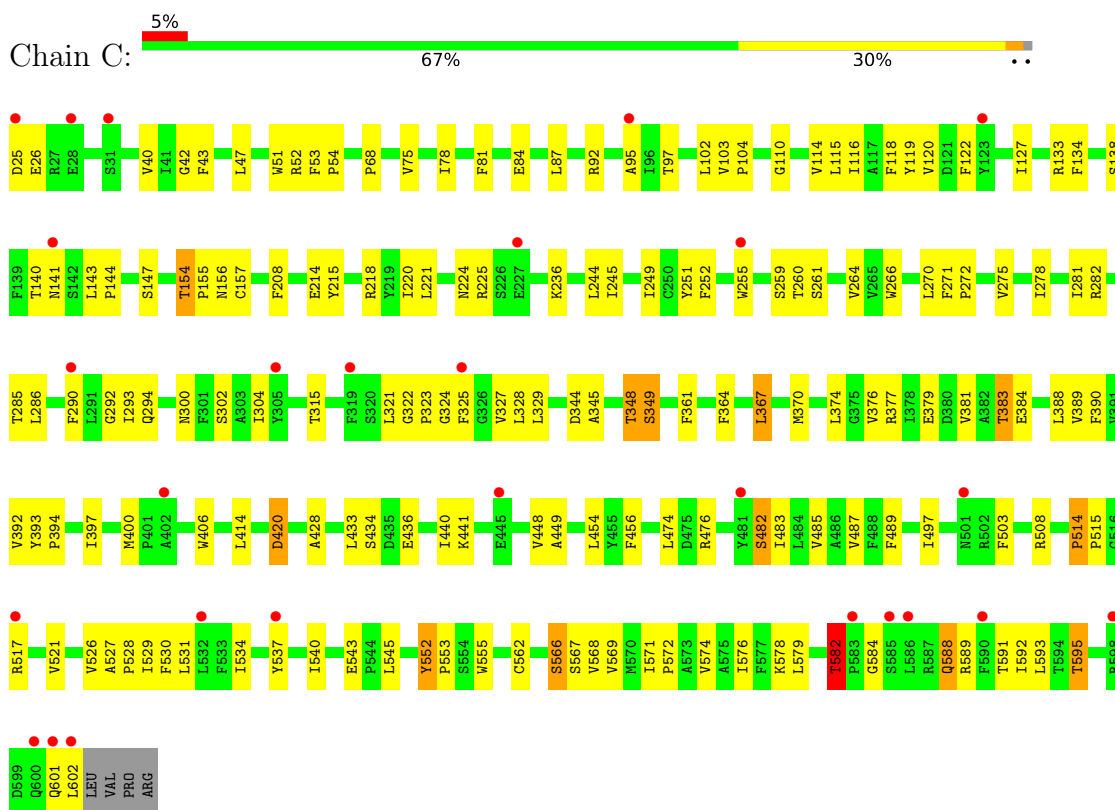
- Molecule 13 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
13	C	16	Total	O	0	0
			16	16		
13	L	9	Total	O	0	0
			9	9		
13	H	8	Total	O	0	0
			8	8		

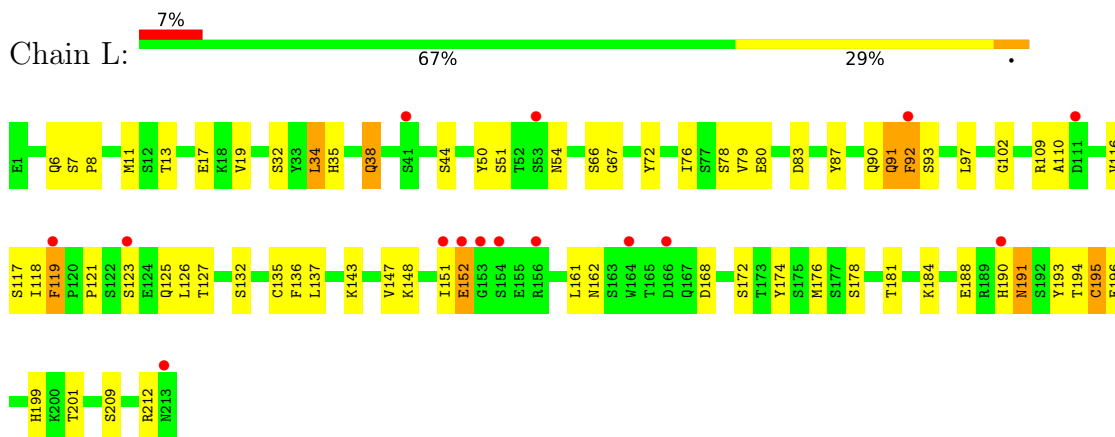
### 3 Residue-property plots

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.

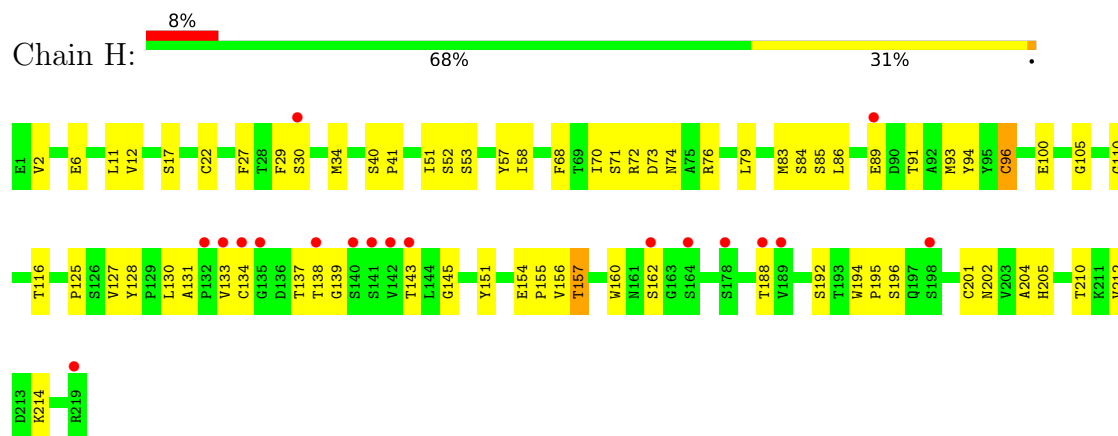
- Molecule 1: Transporter



- Molecule 2: ANTIBODY FRAGMENT HEAVY CHAIN-PROTEIN, 9D5-HEAVY CHAIN



- Molecule 3: ANTIBODY FRAGMENT LIGHT CHAIN-PROTEIN, 9D5-LIGHT CHAIN



- Molecule 4: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	97.35Å 140.75Å 166.76Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.72 – 2.80 46.72 – 2.80	Depositor EDS
% Data completeness (in resolution range)	96.8 (46.72-2.80) 97.0 (46.72-2.80)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.17 (at 2.81Å)	Xtrriage
Refinement program	PHENIX	Depositor
R, $R_{free}$	0.211 , 0.242 0.221 , 0.247	Depositor DCC
$R_{free}$ test set	2703 reflections (4.71%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	86.2	Xtrriage
Anisotropy	0.049	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 54.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	7701	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	85.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.29% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>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.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: Y01, MPO, CLR, CL, GLC, 1WE, P4G, NA, NAG

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	0.49	1/4371 (0.0%)	0.83	9/5977 (0.2%)
2	L	0.47	0/1653	0.86	5/2248 (0.2%)
3	H	0.47	0/1679	0.92	2/2289 (0.1%)
All	All	0.48	1/7703 (0.0%)	0.86	16/10514 (0.2%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	78	ILE	CA-CB	-5.75	1.51	1.54

The worst 5 of 16 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	H	131	ALA	CA-C-N	9.39	129.45	119.78
3	H	131	ALA	C-N-CA	9.39	129.45	119.78
2	L	152	GLU	CB-CA-C	-6.17	109.48	116.63
1	C	552	TYR	CA-C-N	6.09	126.05	119.78
1	C	552	TYR	C-N-CA	6.09	126.05	119.78

There are no chirality outliers.

There are no planarity outliers.

### 5.2 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	C	4229	0	4130	162	0
2	L	1615	0	1523	62	0
3	H	1640	0	1585	72	0
4	A	23	0	21	4	0
5	C	35	0	49	2	0
6	C	14	0	13	1	0
7	C	13	0	14	1	0
8	C	28	0	46	0	0
9	C	10	0	13	2	0
10	C	22	36	36	1	0
11	C	2	0	0	0	0
12	C	1	0	0	0	0
13	C	16	0	0	2	0
13	H	8	0	0	0	0
13	L	9	0	0	0	0
All	All	7665	36	7430	291	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 19.

The worst 5 of 291 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:L:121:PRO:HB2	2:L:126:LEU:HD11	1.37	1.05
2:L:92:PHE:HE2	3:H:105:GLY:HA2	1.23	1.02
3:H:137:THR:HA	3:H:138:THR:HG23	1.48	0.96
3:H:138:THR:HB	3:H:139:GLY:HA3	1.48	0.94
1:C:133:ARG:HH22	4:A:1:GLC:H62	1.33	0.93

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	C	535/541 (99%)	523 (98%)	12 (2%)	0	100	100
2	L	211/213 (99%)	203 (96%)	8 (4%)	0	100	100
3	H	217/219 (99%)	210 (97%)	7 (3%)	0	100	100
All	All	963/973 (99%)	936 (97%)	27 (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	432/446 (97%)	415 (96%)	17 (4%)	28	64
2	L	182/186 (98%)	175 (96%)	7 (4%)	29	64
3	H	181/187 (97%)	175 (97%)	6 (3%)	33	69
All	All	795/819 (97%)	765 (96%)	30 (4%)	29	64

5 of 30 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	566	SER
3	H	157	THR
2	L	34	LEU
3	H	196	SER
3	H	71	SER

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

Mol	Chain	Res	Type
1	C	520	GLN
2	L	39	GLN
2	L	162	ASN
3	H	39	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](#)

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

## 5.5 Carbohydrates [i](#)

2 monosaccharides 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
4	GLC	A	1	4	12,12,12	0.63	0	17,17,17	0.91	0
4	GLC	A	2	4	11,11,12	0.55	0	15,15,17	1.19	1 (6%)

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
4	GLC	A	1	4	-	1/2/22/22	0/1/1/1
4	GLC	A	2	4	-	2/2/19/22	0/1/1/1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	2	GLC	C1-O5-C5	3.63	117.05	112.19

There are no chirality outliers.

All (3) torsion outliers are listed below:

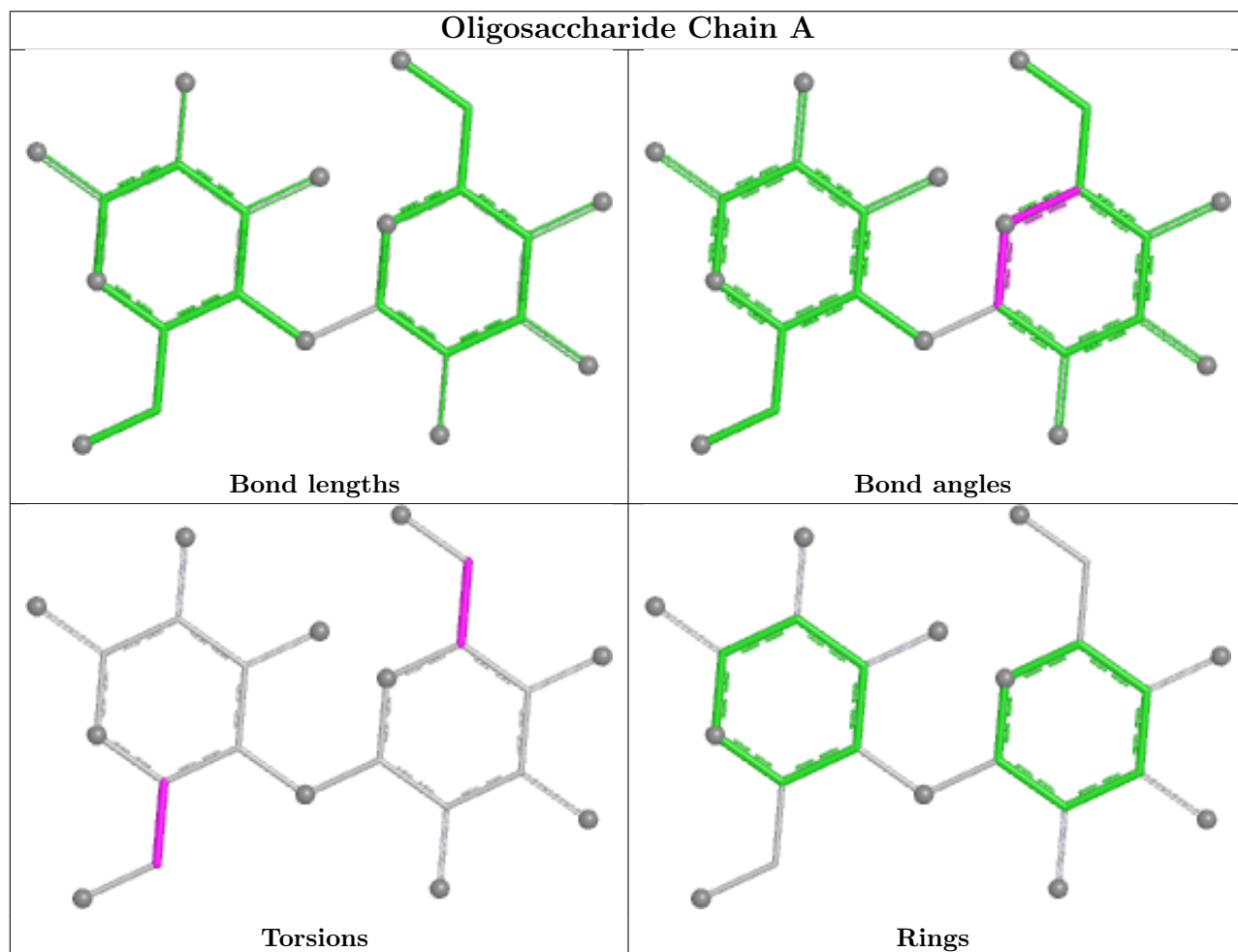
Mol	Chain	Res	Type	Atoms
4	A	2	GLC	C4-C5-C6-O6
4	A	1	GLC	O5-C5-C6-O6
4	A	2	GLC	O5-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	1	GLC	4	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.



## 5.6 Ligand geometry [\(i\)](#)

Of 10 ligands modelled in this entry, 3 are monoatomic - leaving 7 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
8	CLR	C	705	-	31,31,31	0.70	0	48,48,48	1.46	6 (12%)
5	Y01	C	701	-	38,38,38	4.50	14 (36%)	57,57,57	2.05	16 (28%)
9	1WE	C	706	-	10,10,10	0.47	0	12,12,12	0.55	0
6	NAG	C	702	1	14,14,15	0.89	1 (7%)	17,19,21	0.70	0
10	P4G	C	708	-	10,10,10	0.88	0	9,9,9	0.46	0
7	MPO	C	704	-	13,13,13	2.83	2 (15%)	17,17,17	1.39	2 (11%)
10	P4G	C	707	-	10,10,10	0.82	0	9,9,9	0.36	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
8	CLR	C	705	-	-	2/10/68/68	0/4/4/4
5	Y01	C	701	-	-	10/19/77/77	0/4/4/4
9	1WE	C	706	-	-	0/4/4/4	0/1/1/1
6	NAG	C	702	1	-	2/6/23/26	0/1/1/1
10	P4G	C	708	-	-	4/8/8/8	-
7	MPO	C	704	-	-	0/7/15/15	0/1/1/1
10	P4G	C	707	-	-	4/8/8/8	-

The worst 5 of 17 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	701	Y01	CAI-CAZ	18.19	1.70	1.33
5	C	701	Y01	CBB-CBE	-10.23	1.36	1.54
5	C	701	Y01	CBH-CBF	8.55	1.69	1.56
7	C	704	MPO	O2-S1	7.78	1.67	1.45
5	C	701	Y01	CAU-CBI	-7.31	1.41	1.54

The worst 5 of 24 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	C	705	CLR	C4-C5-C10	5.88	123.95	116.42
5	C	701	Y01	CAU-CBI-CBG	5.71	115.78	107.25
5	C	701	Y01	CAU-CBI-CBE	4.41	123.09	116.60
5	C	701	Y01	CAK-CAI-CAZ	-4.29	117.77	125.02
5	C	701	Y01	CBI-CBE-CBB	-4.13	113.12	119.50

There are no chirality outliers.

5 of 22 torsion outliers are listed below:

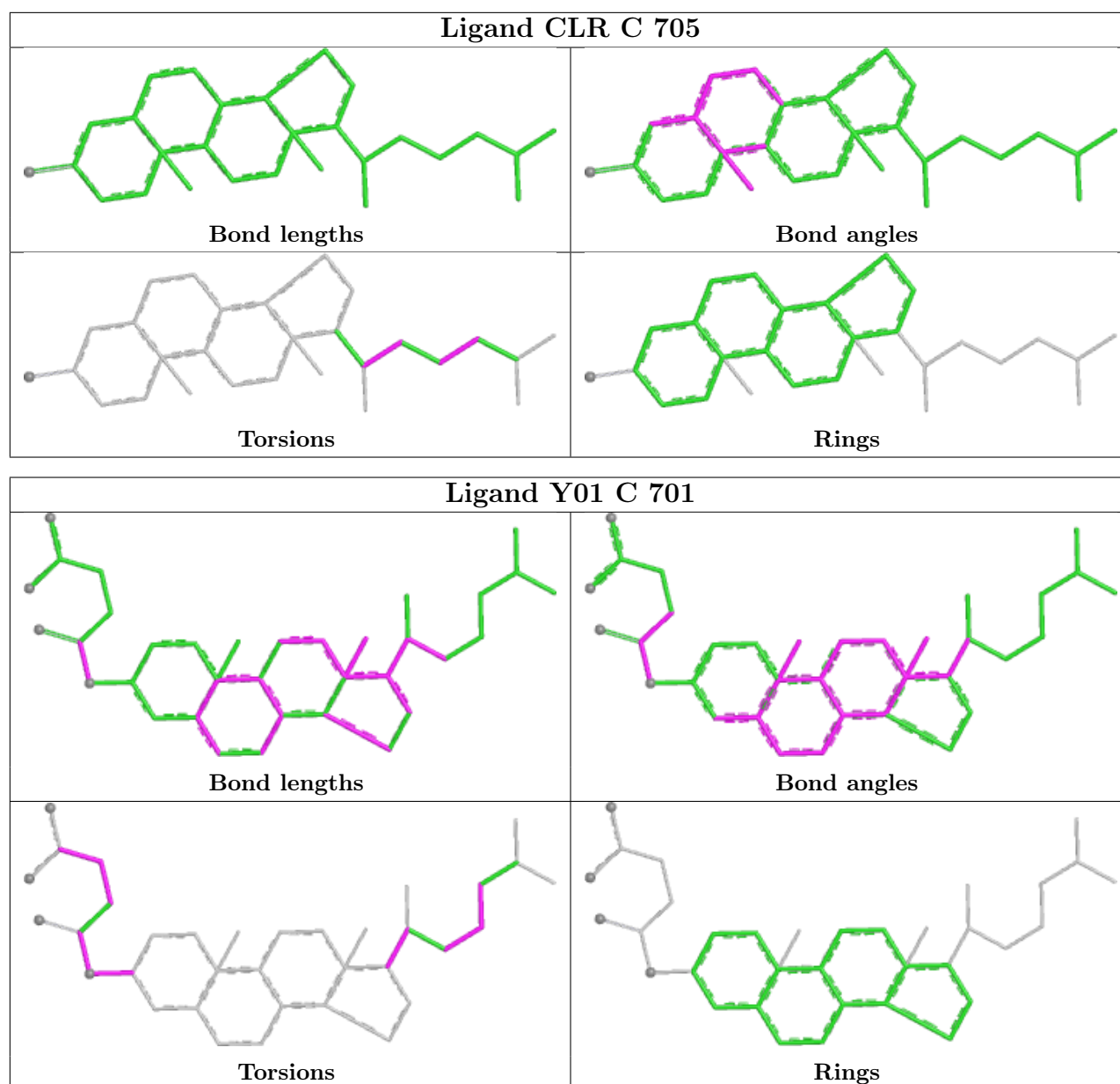
Mol	Chain	Res	Type	Atoms
10	C	708	P4G	O2-C3-C4-O3
5	C	701	Y01	CAM-CAY-OAW-CBC
10	C	707	P4G	C5-C6-O4-C7
6	C	702	NAG	C4-C5-C6-O6
5	C	701	Y01	CAN-CAJ-CAO-CBB

There are no ring outliers.

5 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	C	701	Y01	2	0
9	C	706	1WE	2	0
6	C	702	NAG	1	0
7	C	704	MPO	1	0
10	C	707	P4G	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 [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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	C	537/541 (99%)	0.34	27 (5%) 34 26	65, 82, 109, 145	0
2	L	213/213 (100%)	0.34	15 (7%) 22 16	63, 80, 109, 129	0
3	H	219/219 (100%)	0.39	18 (8%) 17 13	66, 81, 121, 161	0
All	All	969/973 (99%)	0.35	60 (6%) 26 20	63, 82, 111, 161	0

The worst 5 of 60 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	600	GLN	6.2
1	C	602	LEU	4.8
1	C	141	ASN	4.7
1	C	290	PHE	4.7
3	H	135	GLY	4.6

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

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

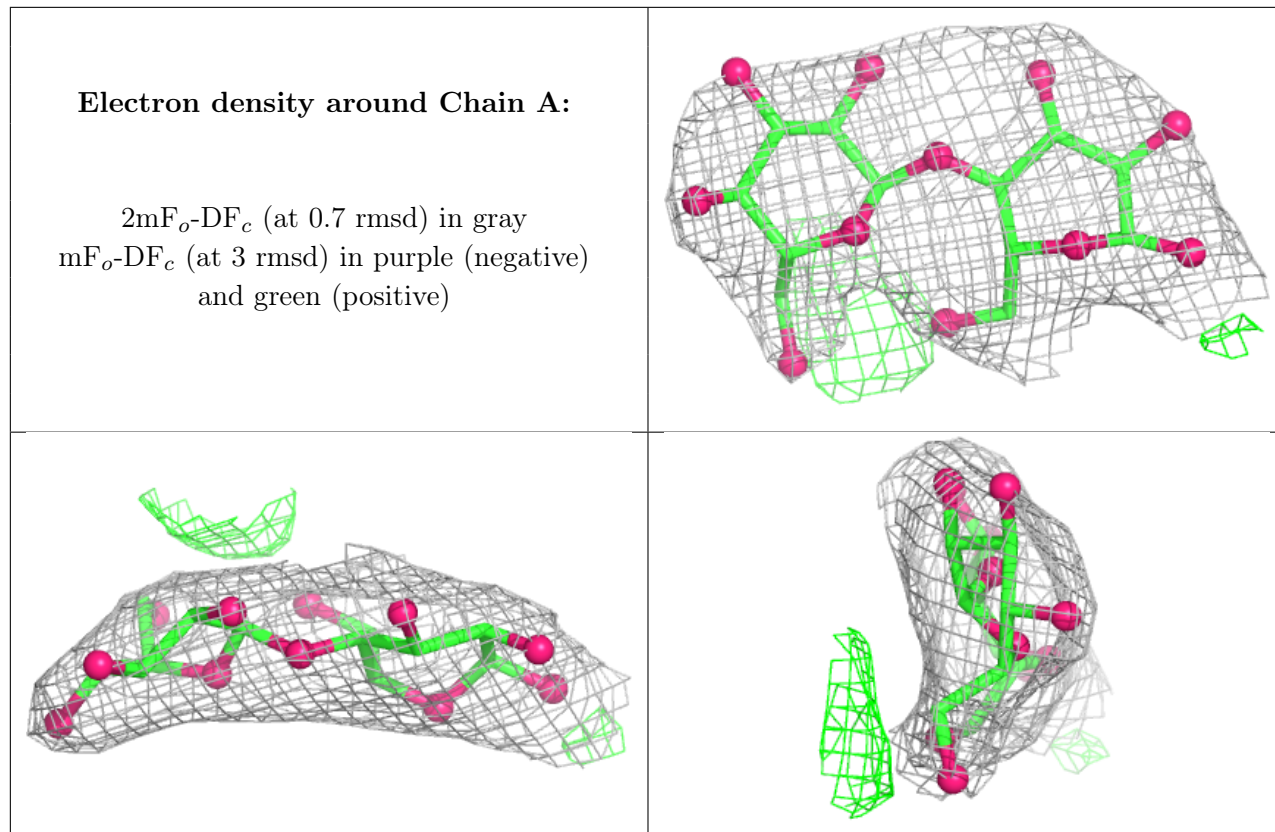
### 6.3 Carbohydrates [i](#)

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
4	GLC	A	1	12/12	-	-	89,96,102,104	0
4	GLC	A	2	11/12	-	-	91,99,103,104	0

The following is a graphical depiction of the model fit to experimental electron density for oligosac-

charide. Each fit is shown from different orientation to approximate a three-dimensional view.



## 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, 95<sup>th</sup> 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.

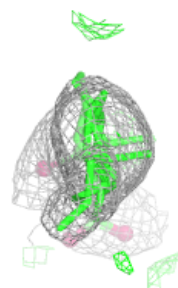
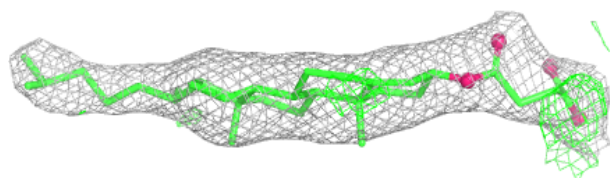
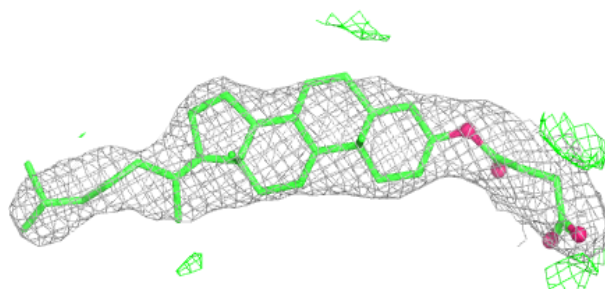
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
6	NAG	C	702	14/15	0.35	0.23	114,118,122,122	0
10	P4G	C	708	11/11	0.63	0.29	109,133,139,140	0
7	MPO	C	704	13/13	0.66	0.26	94,108,136,150	0
10	P4G	C	707	11/11	0.81	0.24	111,133,145,149	0
5	Y01	C	701	35/35	0.91	0.17	75,95,111,117	0
8	CLR	C	705	28/28	0.94	0.14	75,89,94,98	0
9	1WE	C	706	10/10	0.97	0.11	75,79,84,84	0
11	NA	C	709	1/1	0.98	0.04	72,72,72,72	0
12	CL	C	711	1/1	0.98	0.10	77,77,77,77	0
11	NA	C	710	1/1	0.99	0.05	70,70,70,70	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

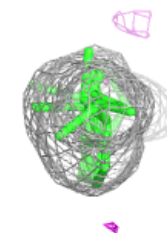
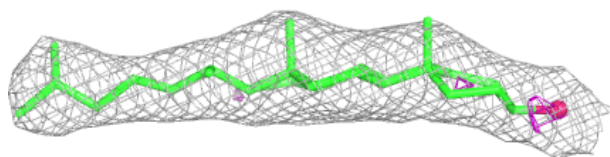
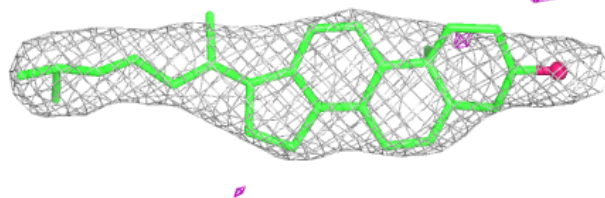
as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

**Electron density around Y01 C 701:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

**Electron density around CLR C 705:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



## 6.5 Other polymers [i](#)

There are no such residues in this entry.