



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 2, 2024 – 11:03 AM EDT

PDB ID : 4XPB
Title : X-ray structure of Drosophila dopamine transporter with subsiteB mutations (D121G/S426M) bound to cocaine
Authors : Aravind, P.; Wang, K.; Gouaux, E.
Deposited on : 2015-01-16
Resolution : 3.05 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)	:	1.20.1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.003 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

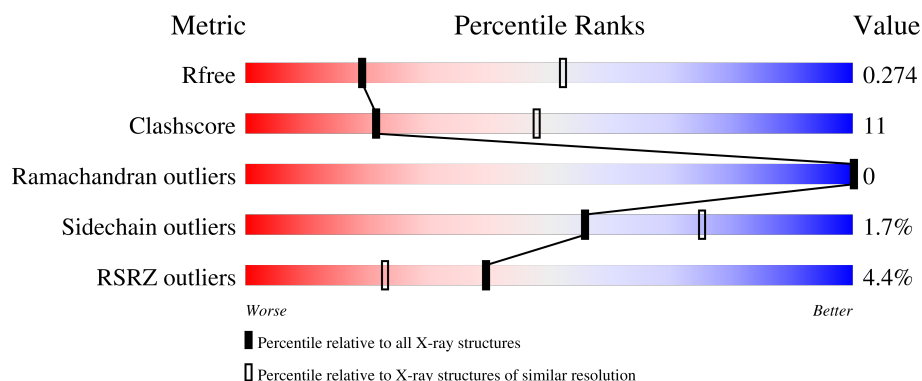
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.05 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	2258 (3.10-3.02)
Clashscore	180529	2399 (3.10-3.02)
Ramachandran outliers	177936	2269 (3.10-3.02)
Sidechain outliers	177891	2268 (3.10-3.02)
RSRZ outliers	164620	2258 (3.10-3.02)

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	543	 3% 84% 13% •
2	L	214	 6% 73% 24% •
3	H	240	 6% 68% 20% • 10%
4	B	2	 100%

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 7471 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 Transporter.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	532	Total	C	N	O	S	0	0	0
			4148	2783	638	708	19			

There are 52 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	20	MET	-	initiating methionine	UNP Q7K4Y6
A	74	ALA	VAL	engineered mutation	UNP Q7K4Y6
A	121	GLY	ASP	engineered mutation	UNP Q7K4Y6
A	?	-	ASN	deletion	UNP Q7K4Y6
A	?	-	ALA	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	ARG	deletion	UNP Q7K4Y6
A	?	-	VAL	deletion	UNP Q7K4Y6
A	?	-	PRO	deletion	UNP Q7K4Y6
A	?	-	VAL	deletion	UNP Q7K4Y6
A	?	-	ILE	deletion	UNP Q7K4Y6
A	?	-	GLY	deletion	UNP Q7K4Y6
A	?	-	ASN	deletion	UNP Q7K4Y6
A	?	-	TYR	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	ASP	deletion	UNP Q7K4Y6
A	?	-	LEU	deletion	UNP Q7K4Y6
A	?	-	TYR	deletion	UNP Q7K4Y6
A	?	-	ALA	deletion	UNP Q7K4Y6
A	?	-	MET	deletion	UNP Q7K4Y6
A	?	-	GLY	deletion	UNP Q7K4Y6
A	?	-	ASN	deletion	UNP Q7K4Y6
A	?	-	GLN	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	LEU	deletion	UNP Q7K4Y6
A	?	-	LEU	deletion	UNP Q7K4Y6
A	?	-	TYR	deletion	UNP Q7K4Y6

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Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	ASN	deletion	UNP Q7K4Y6
A	?	-	GLU	deletion	UNP Q7K4Y6
A	?	-	THR	deletion	UNP Q7K4Y6
A	?	-	TYR	deletion	UNP Q7K4Y6
A	?	-	MET	deletion	UNP Q7K4Y6
A	?	-	ASN	deletion	UNP Q7K4Y6
A	?	-	GLY	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	LEU	deletion	UNP Q7K4Y6
A	?	-	ASP	deletion	UNP Q7K4Y6
A	?	-	THR	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	ALA	deletion	UNP Q7K4Y6
A	?	-	VAL	deletion	UNP Q7K4Y6
A	?	-	GLY	deletion	UNP Q7K4Y6
A	?	-	HIS	deletion	UNP Q7K4Y6
A	?	-	VAL	deletion	UNP Q7K4Y6
A	?	-	GLU	deletion	UNP Q7K4Y6
A	415	ALA	LEU	engineered mutation	UNP Q7K4Y6
A	426	MET	SER	engineered mutation	UNP Q7K4Y6
A	602	LEU	-	expression tag	UNP Q7K4Y6
A	603	VAL	-	expression tag	UNP Q7K4Y6
A	604	PRO	-	expression tag	UNP Q7K4Y6
A	605	ARG	-	expression tag	UNP Q7K4Y6

- Molecule 2 is a protein called Antibody fragment heavy chain-protein, 9D5-heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	L	214	Total	C	N	O	S	0	0	0
			1625	1010	271	336	8			

- Molecule 3 is a protein called Antibody fragment light chain-protein, 9D5-light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	H	215	Total	C	N	O	S	0	0	0
			1592	1005	268	311	8			

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

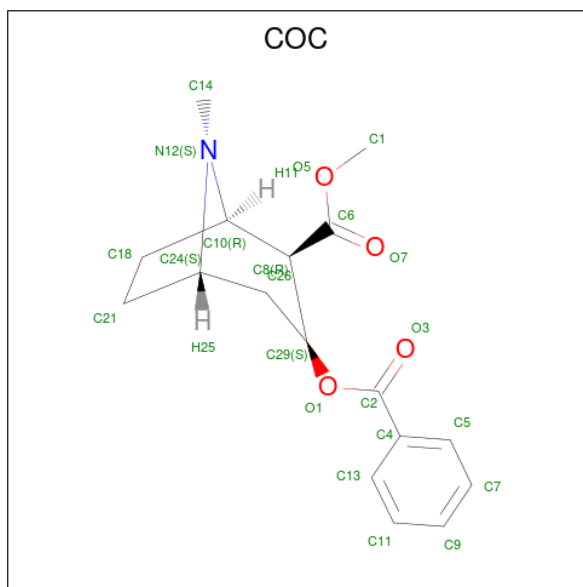


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
4	B	2	Total	C	O	0	0	0
			23	12	11			

- Molecule 5 is SODIUM ION (three-letter code: NA) (formula: Na).

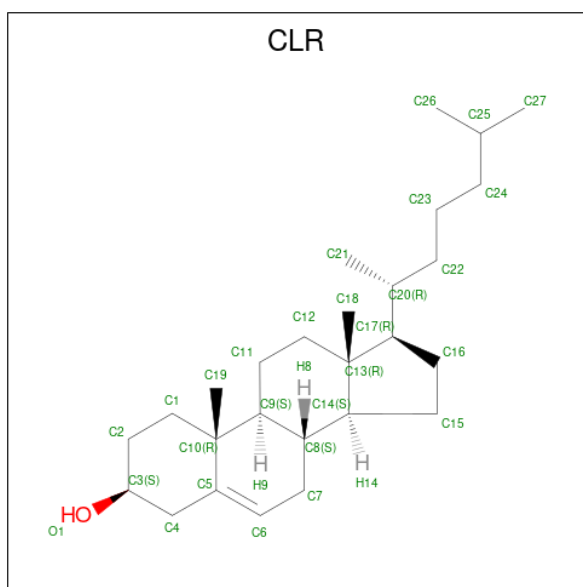
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	2	Total	Na	0	0
			2	2		

- Molecule 6 is COCAINE (three-letter code: COC) (formula: C₁₇H₂₁NO₄).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	A	1	Total	C	N	O	0	0
			22	17	1	4		

- Molecule 7 is CHOLESTEROL (three-letter code: CLR) (formula: C₂₇H₄₆O).



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

- Molecule 8 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	1	Total	Cl	0	0
			1	1		

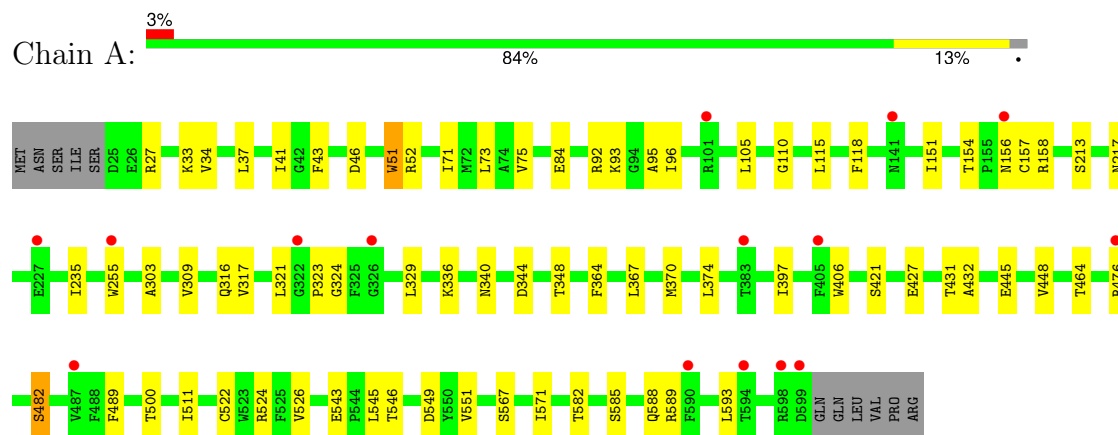
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	2	Total	O	0	0
			2	2		

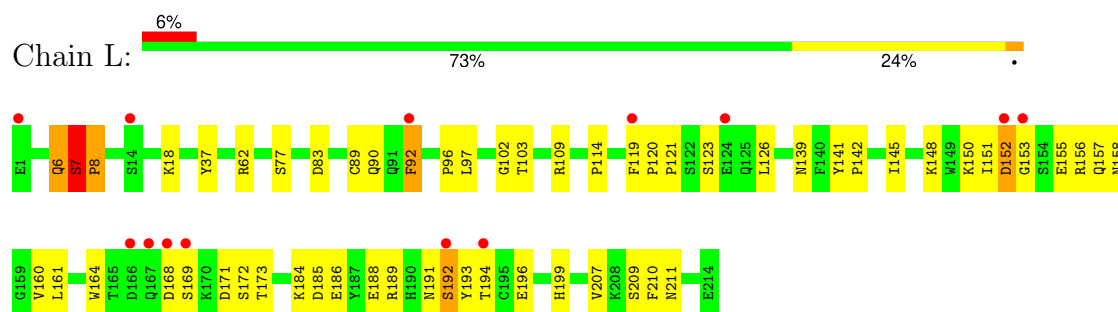
3 Residue-property plots [i](#)

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.

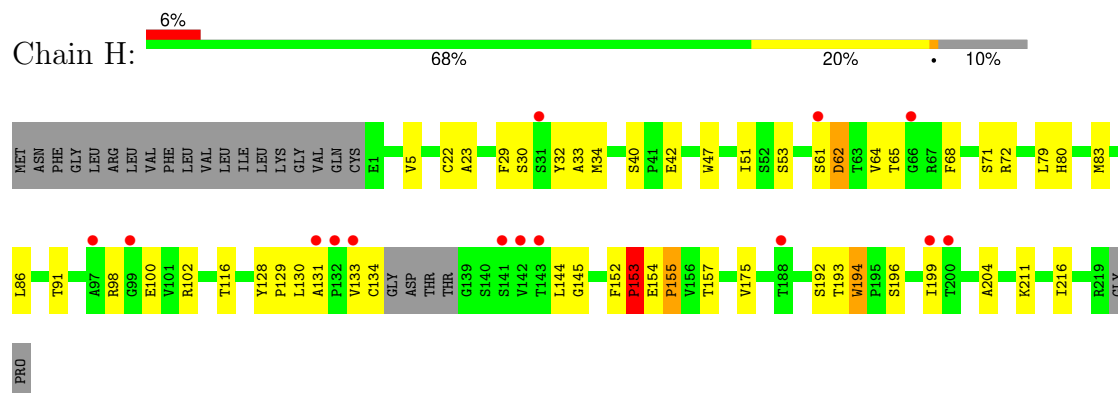
- Molecule 1: Transporter



- 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)-beta-D-glucopyranose

Chain B:

100%

BGC1
GLC2

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	97.50Å 139.96Å 166.96Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.33 – 3.05 48.33 – 3.05	Depositor EDS
% Data completeness (in resolution range)	92.5 (48.33-3.05) 92.5 (48.33-3.05)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.66 (at 3.07Å)	Xtriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.244 , 0.269 0.261 , 0.274	Depositor DCC
R_{free} test set	2040 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å ²)	111.7	Xtriage
Anisotropy	0.143	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 73.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.53$, $\langle L^2 \rangle = 0.37$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	7471	wwPDB-VP
Average B, all atoms (Å ²)	109.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.85% 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: NA, BGC, COC, CL, CLR, GLC

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	0.25	0/4288	0.41	0/5868
2	L	0.40	2/1663 (0.1%)	0.55	2/2261 (0.1%)
3	H	0.39	1/1630 (0.1%)	0.61	3/2223 (0.1%)
All	All	0.32	3/7581 (0.0%)	0.49	5/10352 (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
2	L	0	1
3	H	0	2
All	All	0	3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	H	153	PRO	N-CD	5.37	1.55	1.47
2	L	8	PRO	N-CD	5.25	1.55	1.47
2	L	96	PRO	N-CD	5.22	1.55	1.47

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	H	155	PRO	CA-N-CD	-6.04	103.05	111.50
3	H	131	ALA	C-N-CD	5.68	140.32	128.40
3	H	154	GLU	C-N-CD	5.44	139.82	128.40
2	L	152	ASP	CB-CG-OD2	5.24	123.02	118.30
2	L	7	SER	C-N-CD	5.04	138.99	128.40

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	H	62	ASP	Peptide
3	H	98	ARG	Peptide
2	L	151	ILE	Peptide

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	4148	0	4016	49	0
2	L	1625	0	1534	62	0
3	H	1592	0	1521	52	0
4	B	23	0	21	1	0
5	A	2	0	0	0	0
6	A	22	0	21	1	0
7	A	56	0	92	4	0
8	A	1	0	0	1	0
9	A	2	0	0	0	0
All	All	7471	0	7205	157	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 11.

All (157) 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)
3:H:192:SER:O	3:H:196:SER:OG	1.62	1.17
3:H:194:TRP:HZ2	3:H:216:ILE:HG22	1.19	1.07
3:H:194:TRP:HZ2	3:H:216:ILE:CG2	1.70	1.04
3:H:194:TRP:CZ2	3:H:216:ILE:CG2	2.47	0.97
2:L:37:TYR:CE1	2:L:90:GLN:OE1	2.21	0.93
3:H:194:TRP:CZ2	3:H:216:ILE:HG22	2.02	0.93
2:L:6:GLN:OE1	2:L:89:CYS:SG	2.34	0.85
3:H:194:TRP:CZ2	3:H:216:ILE:HG21	2.12	0.84
2:L:152:ASP:O	2:L:191:ASN:ND2	2.12	0.81

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:L:37:TYR:HE1	2:L:90:GLN:OE1	1.62	0.80
2:L:6:GLN:NE2	2:L:102:GLY:HA2	1.99	0.77
2:L:192:SER:OG	2:L:211:ASN:OD1	2.02	0.76
2:L:92:PHE:CD2	3:H:102:ARG:HA	2.21	0.75
2:L:150:LYS:O	2:L:194:THR:OG1	2.04	0.74
2:L:168:ASP:OD1	2:L:169:SER:N	2.20	0.74
3:H:47:TRP:CE3	3:H:61:SER:HB3	2.23	0.73
2:L:192:SER:OG	2:L:211:ASN:HA	1.89	0.72
3:H:193:THR:O	3:H:196:SER:HB2	1.89	0.71
2:L:6:GLN:NE2	2:L:102:GLY:CA	2.53	0.71
1:A:213:SER:O	1:A:217:ASN:ND2	2.24	0.70
1:A:303:ALA:HB1	1:A:309:VAL:HG21	1.74	0.69
1:A:34:VAL:HG13	7:A:704:CLR:H42	1.75	0.69
2:L:156:ARG:NH1	2:L:158:ASN:O	2.26	0.69
1:A:321:LEU:O	1:A:323:PRO:HD3	1.94	0.67
2:L:37:TYR:CZ	2:L:90:GLN:OE1	2.47	0.67
3:H:32:TYR:O	3:H:72:ARG:NH2	2.29	0.66
1:A:370:MET:HG2	1:A:374:LEU:HD12	1.78	0.66
1:A:476:ARG:HD2	1:A:545:LEU:HD13	1.77	0.65
2:L:193:TYR:O	2:L:194:THR:HG23	1.97	0.65
1:A:445:GLU:HA	1:A:448:VAL:HG22	1.79	0.64
1:A:75:VAL:HB	1:A:526:VAL:HG11	1.78	0.64
1:A:585:SER:N	1:A:588:GLN:OE1	2.30	0.64
2:L:185:ASP:OD1	2:L:186:GLU:N	2.30	0.64
2:L:37:TYR:OH	2:L:90:GLN:OE1	2.13	0.64
3:H:193:THR:O	3:H:196:SER:N	2.31	0.64
3:H:5:VAL:HG22	3:H:23:ALA:HB3	1.81	0.63
3:H:91:THR:HG23	3:H:116:THR:HA	1.82	0.62
2:L:141:TYR:CD2	2:L:142:PRO:HA	2.34	0.62
3:H:22:CYS:HB3	3:H:79:LEU:HB3	1.81	0.62
1:A:445:GLU:N	1:A:445:GLU:OE1	2.31	0.62
2:L:6:GLN:HE22	2:L:102:GLY:HA2	1.63	0.62
2:L:92:PHE:CE2	3:H:102:ARG:HA	2.34	0.61
1:A:255:TRP:CD1	1:A:445:GLU:HB3	2.36	0.61
3:H:194:TRP:CD1	3:H:199:ILE:CG1	2.84	0.60
3:H:194:TRP:CD1	3:H:199:ILE:HG12	2.37	0.60
2:L:6:GLN:HE21	2:L:102:GLY:CA	2.15	0.59
3:H:71:SER:HB3	3:H:80:HIS:HB2	1.83	0.59
1:A:46:ASP:OD1	6:A:702:COC:H15	2.02	0.59
2:L:194:THR:HG22	2:L:209:SER:HB3	1.85	0.59
3:H:144:LEU:HD12	3:H:145:GLY:H	1.68	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:H:83:MET:HB3	3:H:86:LEU:HD21	1.85	0.58
1:A:364:PHE:HA	1:A:367:LEU:HB2	1.86	0.58
3:H:193:THR:O	3:H:196:SER:CB	2.51	0.58
2:L:196:GLU:HB3	2:L:207:VAL:HA	1.86	0.57
1:A:95:ALA:HA	1:A:329:LEU:HD23	1.87	0.57
1:A:582:THR:O	1:A:589:ARG:NH2	2.38	0.56
1:A:27:ARG:NH1	1:A:92:ARG:O	2.39	0.56
3:H:157:THR:OG1	3:H:204:ALA:HB3	2.06	0.55
2:L:194:THR:HG22	2:L:209:SER:CB	2.36	0.55
3:H:29:PHE:O	3:H:72:ARG:NH2	2.39	0.55
1:A:156:ASN:N	1:A:156:ASN:OD1	2.40	0.55
2:L:109:ARG:HD3	2:L:173:THR:HG22	1.89	0.54
1:A:43:PHE:HA	1:A:421:SER:HA	1.90	0.54
2:L:171:ASP:OD1	2:L:172:SER:N	2.40	0.54
1:A:33:LYS:NZ	1:A:344:ASP:OD2	2.32	0.54
2:L:192:SER:OG	2:L:211:ASN:CA	2.56	0.54
2:L:18:LYS:HD2	2:L:77:SER:O	2.08	0.53
2:L:92:PHE:CE1	2:L:97:LEU:HD11	2.43	0.53
3:H:62:ASP:CG	3:H:65:THR:HG23	2.30	0.52
3:H:62:ASP:HA	3:H:64:VAL:H	1.74	0.52
2:L:92:PHE:CE1	2:L:97:LEU:CD1	2.93	0.51
2:L:193:TYR:O	2:L:194:THR:CG2	2.58	0.51
2:L:114:PRO:HD3	2:L:199:HIS:HD2	1.74	0.51
2:L:141:TYR:CG	2:L:142:PRO:HA	2.46	0.51
1:A:340:ASN:HA	1:A:511:ILE:HG22	1.92	0.51
2:L:6:GLN:NE2	2:L:102:GLY:H	2.08	0.51
2:L:150:LYS:HA	2:L:155:GLU:HA	1.92	0.51
3:H:33:ALA:N	3:H:100:GLU:OE1	2.44	0.51
3:H:144:LEU:HD12	3:H:145:GLY:N	2.26	0.50
1:A:105:LEU:HB2	1:A:593:LEU:HB3	1.92	0.50
2:L:8:PRO:O	2:L:103:THR:HG23	2.12	0.50
2:L:141:TYR:CD2	2:L:142:PRO:CA	2.96	0.49
2:L:184:LYS:O	2:L:188:GLU:HG2	2.13	0.49
3:H:51:ILE:HD13	3:H:72:ARG:HB2	1.95	0.49
2:L:171:ASP:OD2	2:L:173:THR:OG1	2.30	0.49
3:H:194:TRP:CA	3:H:196:SER:H	2.26	0.49
2:L:6:GLN:NE2	2:L:102:GLY:N	2.61	0.48
3:H:194:TRP:CD1	3:H:199:ILE:HG13	2.49	0.48
1:A:27:ARG:HH12	1:A:93:LYS:HA	1.79	0.48
3:H:42:GLU:H	3:H:42:GLU:HG2	1.43	0.48
1:A:115:LEU:HD11	1:A:567:SER:HA	1.96	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:157:CYS:O	1:A:158:ARG:NH1	2.41	0.47
3:H:192:SER:O	3:H:196:SER:CB	2.60	0.47
1:A:51:TRP:C	1:A:51:TRP:CD1	2.88	0.47
2:L:121:PRO:HB2	2:L:126:LEU:HD11	1.96	0.47
2:L:123:SER:HA	2:L:126:LEU:HD13	1.97	0.47
1:A:546:THR:HG22	1:A:551:VAL:HA	1.96	0.47
1:A:96:ILE:HA	1:A:110:GLY:HA3	1.97	0.46
3:H:64:VAL:HG13	3:H:68:PHE:HB2	1.97	0.46
3:H:194:TRP:NE1	3:H:199:ILE:HG12	2.31	0.46
1:A:154:THR:HG22	2:L:164:TRP:CZ3	2.50	0.46
2:L:192:SER:OG	2:L:211:ASN:CG	2.54	0.46
1:A:585:SER:OG	1:A:588:GLN:NE2	2.42	0.46
2:L:161:LEU:HD21	3:H:175:VAL:HB	1.98	0.46
1:A:41:ILE:HD13	1:A:348:THR:HG23	1.98	0.46
1:A:115:LEU:HA	1:A:118:PHE:HB3	1.98	0.46
1:A:151:ILE:HD12	2:L:160:VAL:HG11	1.96	0.45
2:L:168:ASP:HB3	2:L:171:ASP:OD1	2.16	0.45
2:L:157:GLN:NE2	4:B:2:GLC:H2	2.32	0.45
1:A:73:LEU:HA	1:A:317:VAL:HG11	1.98	0.45
1:A:84:GLU:OE2	1:A:324:GLY:N	2.41	0.45
3:H:193:THR:C	3:H:196:SER:H	2.20	0.45
3:H:194:TRP:HA	3:H:196:SER:N	2.31	0.45
2:L:119:PHE:HB3	3:H:130:LEU:HB3	1.99	0.45
3:H:211:LYS:N	3:H:211:LYS:HD2	2.31	0.45
1:A:96:ILE:HG13	1:A:432:ALA:HB1	1.99	0.45
1:A:154:THR:HG22	2:L:164:TRP:CH2	2.52	0.45
2:L:92:PHE:CD2	3:H:102:ARG:CA	2.97	0.45
3:H:40:SER:OG	3:H:42:GLU:HG3	2.17	0.44
1:A:397:ILE:HG23	1:A:406:TRP:HB2	1.98	0.44
2:L:120:PRO:HB3	2:L:210:PHE:CE2	2.53	0.44
1:A:71:ILE:O	1:A:75:VAL:HG22	2.17	0.44
2:L:148:LYS:NZ	2:L:196:GLU:OE2	2.51	0.44
1:A:500:THR:OG1	1:A:524:ARG:NH2	2.50	0.43
7:A:705:CLR:H211	7:A:705:CLR:H232	1.67	0.43
2:L:114:PRO:HD3	2:L:199:HIS:CD2	2.53	0.43
3:H:155:PRO:HD2	3:H:155:PRO:O	2.19	0.43
3:H:194:TRP:HA	3:H:196:SER:H	1.83	0.43
1:A:27:ARG:NH1	1:A:93:LYS:HA	2.33	0.43
1:A:316:GLN:NE2	8:A:707:CL:CL	2.89	0.43
7:A:704:CLR:H211	7:A:704:CLR:H232	1.77	0.42
2:L:7:SER:HA	2:L:8:PRO:HA	1.75	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:H:30:SER:O	3:H:53:SER:HB2	2.19	0.42
3:H:144:LEU:HD21	3:H:216:ILE:HG21	2.00	0.42
1:A:235:ILE:HG12	1:A:464:THR:HG22	2.01	0.42
1:A:37:LEU:HD12	7:A:704:CLR:H41	2.01	0.42
2:L:152:ASP:HA	2:L:153:GLY:HA2	1.62	0.42
2:L:62:ARG:NH1	2:L:83:ASP:OD1	2.52	0.42
2:L:196:GLU:N	2:L:196:GLU:OE1	2.52	0.42
2:L:92:PHE:CD1	2:L:97:LEU:HD22	2.54	0.42
1:A:482:SER:HB3	1:A:567:SER:OG	2.20	0.42
1:A:489:PHE:CD2	1:A:571:ILE:HG21	2.55	0.42
3:H:62:ASP:OD1	3:H:64:VAL:HG12	2.19	0.42
1:A:522:CYS:HA	1:A:526:VAL:HB	2.01	0.41
2:L:139:ASN:HA	2:L:173:THR:OG1	2.20	0.41
1:A:41:ILE:HD11	1:A:348:THR:HA	2.02	0.41
1:A:336:LYS:HB3	1:A:336:LYS:HE3	1.68	0.41
3:H:144:LEU:HD21	3:H:216:ILE:HG12	2.02	0.41
3:H:193:THR:O	3:H:196:SER:CA	2.69	0.41
2:L:185:ASP:O	2:L:189:ARG:HG3	2.21	0.41
2:L:62:ARG:O	2:L:77:SER:N	2.36	0.41
2:L:114:PRO:HG3	2:L:145:ILE:HD11	2.03	0.41
3:H:152:PHE:HA	3:H:153:PRO:HA	1.81	0.41
3:H:193:THR:C	3:H:196:SER:HB2	2.41	0.41
1:A:427:GLU:OE2	1:A:431:THR:OG1	2.37	0.40
3:H:128:TYR:HA	3:H:129:PRO:HD3	1.89	0.40
3:H:34:MET:HB3	3:H:79:LEU:HD22	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	A	530/543 (98%)	510 (96%)	20 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	L	212/214 (99%)	203 (96%)	9 (4%)	0	100	100
3	H	211/240 (88%)	206 (98%)	5 (2%)	0	100	100
All	All	953/997 (96%)	919 (96%)	34 (4%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	417/448 (93%)	412 (99%)	5 (1%)	67	82
2	L	183/187 (98%)	179 (98%)	4 (2%)	47	68
3	H	172/205 (84%)	168 (98%)	4 (2%)	45	67
All	All	772/840 (92%)	759 (98%)	13 (2%)	56	75

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	51	TRP
1	A	52	ARG
1	A	482	SER
1	A	543	GLU
1	A	549	ASP
2	L	6	GLN
2	L	7	SER
2	L	92	PHE
2	L	192	SER
3	H	133	VAL
3	H	134	CYS
3	H	153	PRO
3	H	194	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
2	L	6	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

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	BGC	B	1	4	12,12,12	0.47	0	17,17,17	0.95	2 (11%)
4	GLC	B	2	4	11,11,12	0.28	0	15,15,17	0.68	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
4	BGC	B	1	4	-	1/2/22/22	0/1/1/1
4	GLC	B	2	4	-	1/2/19/22	0/1/1/1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	1	BGC	O5-C5-C6	2.28	112.09	106.44

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	1	BGC	C1-O5-C5	2.09	117.69	113.65

There are no chirality outliers.

All (2) torsion outliers are listed below:

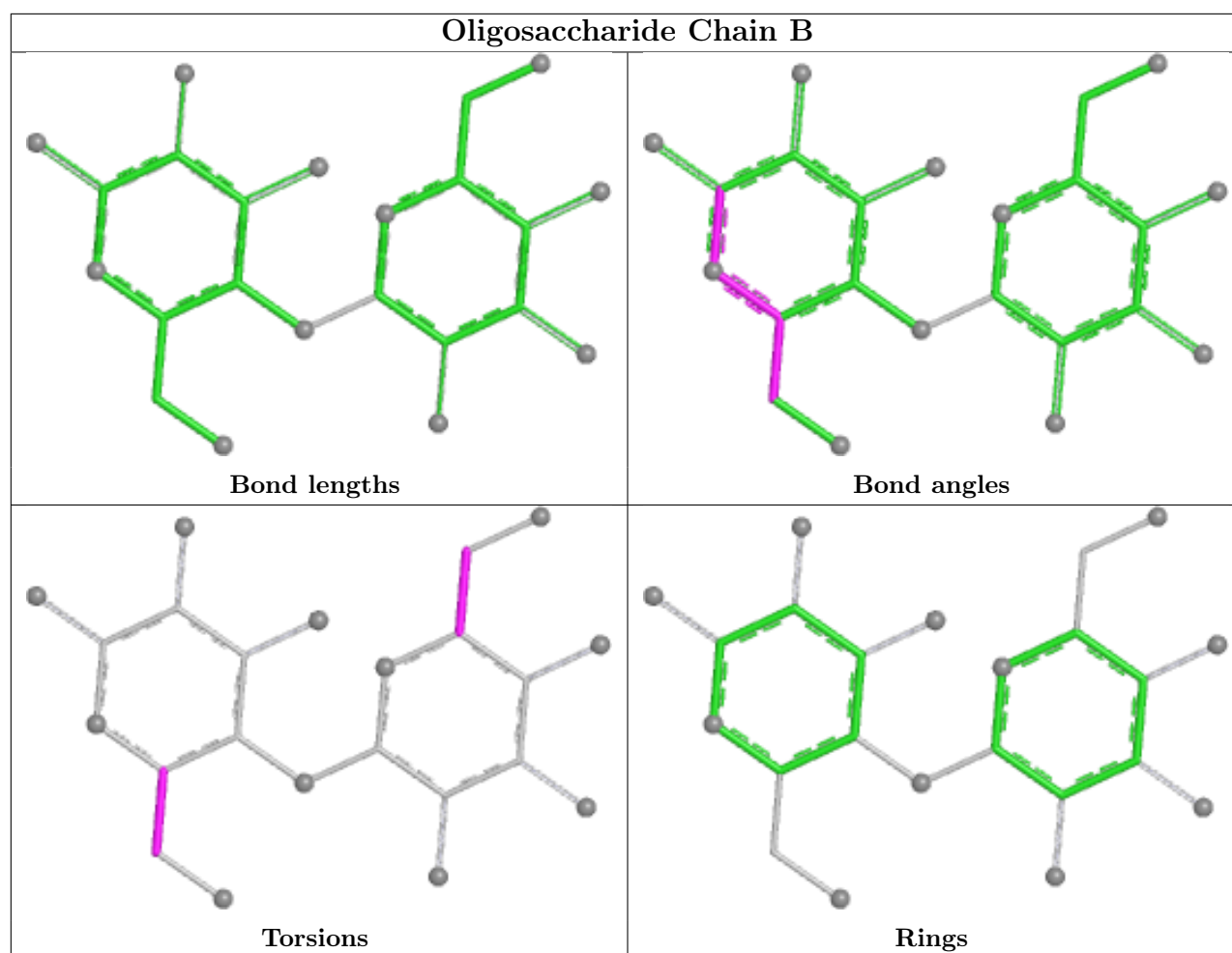
Mol	Chain	Res	Type	Atoms
4	B	2	GLC	O5-C5-C6-O6
4	B	1	BGC	O5-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	2	GLC	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 oligosaccharide.



5.6 Ligand geometry [i](#)

Of 6 ligands modelled in this entry, 3 are monoatomic - leaving 3 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	$\# Z > 2$
7	CLR	A	705	-	31,31,31	0.69	0	48,48,48	1.04	2 (4%)
7	CLR	A	704	-	31,31,31	0.66	0	48,48,48	1.13	3 (6%)
6	COC	A	702	-	24,24,24	4.49	9 (37%)	32,34,34	2.99	9 (28%)

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
7	CLR	A	705	-	-	2/10/68/68	0/4/4/4
7	CLR	A	704	-	-	1/10/68/68	0/4/4/4
6	COC	A	702	-	-	1/14/39/39	0/4/3/3

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	702	COC	O1-C29	-11.12	1.27	1.46
6	A	702	COC	C24-N12	-11.09	1.32	1.48
6	A	702	COC	C10-N12	-8.08	1.31	1.48
6	A	702	COC	O1-C2	6.94	1.48	1.34
6	A	702	COC	C8-C29	5.78	1.69	1.53
6	A	702	COC	C26-C29	5.14	1.61	1.52
6	A	702	COC	O5-C6	4.94	1.45	1.33
6	A	702	COC	C8-C10	-4.87	1.48	1.54
6	A	702	COC	C21-C18	-2.55	1.47	1.54

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	702	COC	C24-N12-C10	12.10	112.01	101.14
6	A	702	COC	O5-C6-C8	6.51	120.30	111.03
6	A	702	COC	O1-C2-C4	4.50	119.13	111.90
6	A	702	COC	C26-C24-N12	4.18	113.25	107.54
7	A	704	CLR	C4-C5-C10	3.48	120.88	116.42
6	A	702	COC	C18-C10-N12	-3.31	101.77	105.18
7	A	705	CLR	C4-C5-C10	2.89	120.12	116.42
6	A	702	COC	C18-C10-C8	-2.88	108.02	112.28
7	A	704	CLR	C8-C7-C6	-2.54	109.24	112.76
7	A	705	CLR	C8-C7-C6	-2.43	109.39	112.76
6	A	702	COC	O5-C6-O7	-2.42	119.13	123.85
6	A	702	COC	O7-C6-C8	-2.40	120.56	125.01
7	A	704	CLR	C4-C5-C6	-2.12	117.69	120.57
6	A	702	COC	C26-C24-C21	-2.03	107.98	113.02

There are no chirality outliers.

All (4) torsion outliers are listed below:

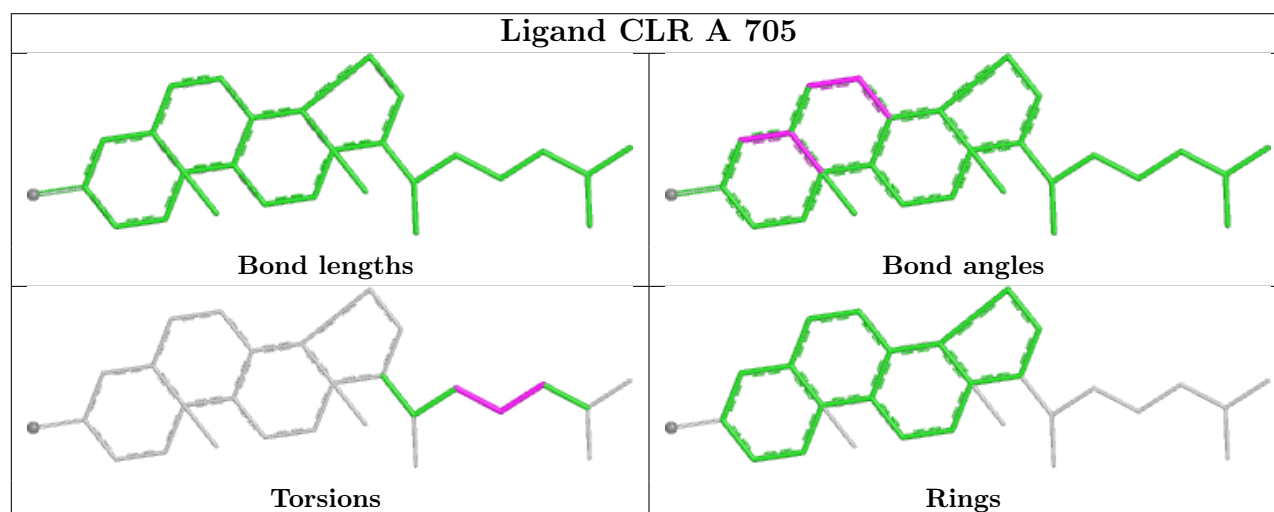
Mol	Chain	Res	Type	Atoms
7	A	705	CLR	C22-C23-C24-C25
7	A	705	CLR	C20-C22-C23-C24
7	A	704	CLR	C21-C20-C22-C23
6	A	702	COC	C8-C29-O1-C2

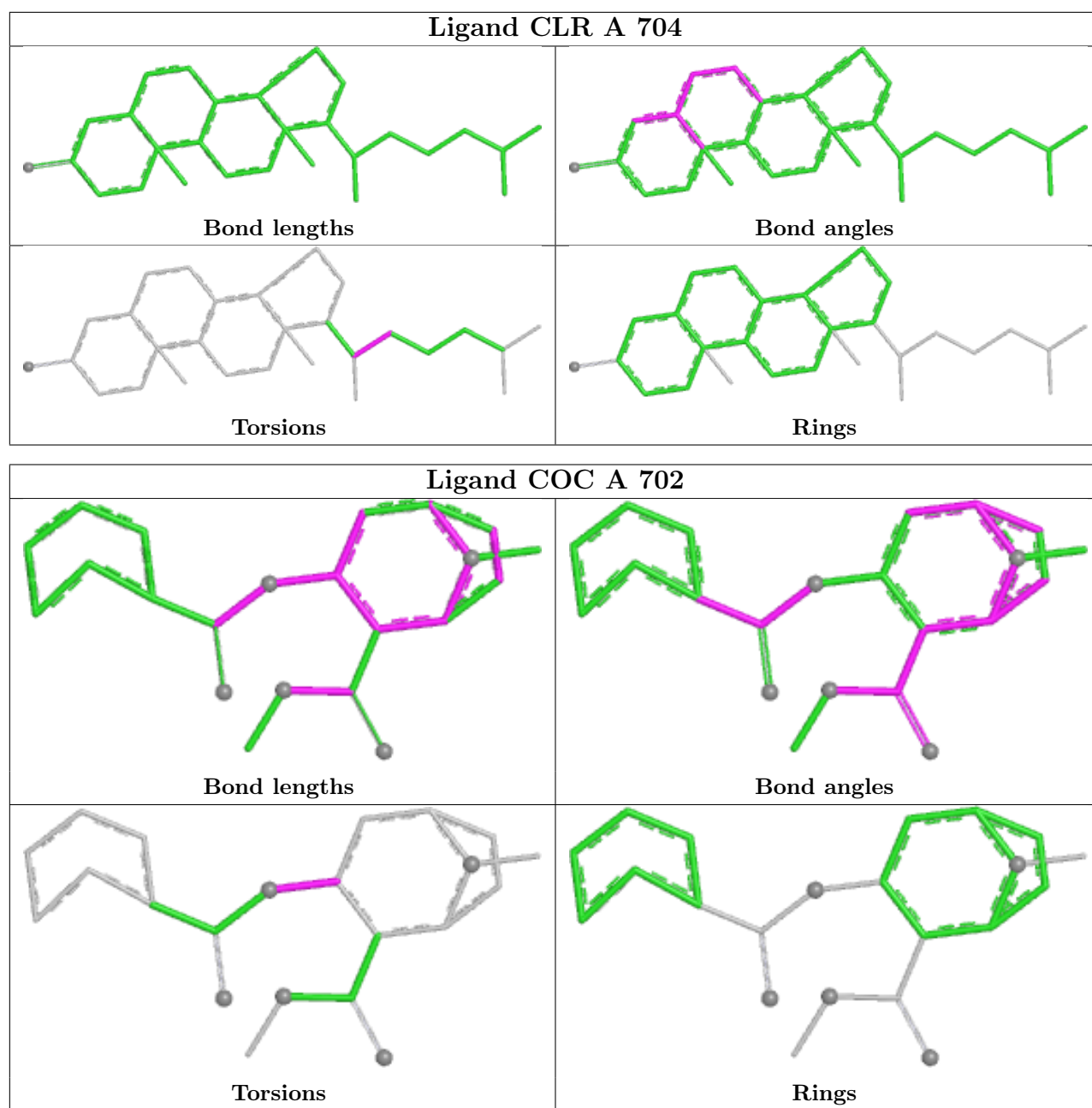
There are no ring outliers.

3 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	A	705	CLR	1	0
7	A	704	CLR	3	0
6	A	702	COC	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	A	532/543 (97%)	0.18	15 (2%)	55 35	88, 107, 130, 155	0
2	L	214/214 (100%)	0.35	13 (6%)	28 16	83, 105, 144, 152	0
3	H	215/240 (89%)	0.42	14 (6%)	26 15	86, 106, 147, 165	0
All	All	961/997 (96%)	0.27	42 (4%)	39 23	83, 107, 143, 165	0

All (42) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	L	152	ASP	5.3
3	H	132	PRO	4.3
2	L	166	ASP	3.9
2	L	153	GLY	3.9
1	A	590	PHE	3.9
3	H	133	VAL	3.9
3	H	61	SER	3.7
3	H	131	ALA	3.6
2	L	92	PHE	3.5
1	A	101	ARG	3.2
3	H	188	THR	3.2
2	L	119	PHE	3.2
3	H	31	SER	3.1
1	A	405	PHE	3.1
1	A	476	ARG	3.1
3	H	141	SER	3.0
1	A	156	ASN	2.9
1	A	326	GLY	2.9
2	L	192	SER	2.9
3	H	66	GLY	2.8
1	A	227	GLU	2.8
1	A	141	ASN	2.7
2	L	169	SER	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	594	THR	2.5
1	A	598	ARG	2.5
2	L	167	GLN	2.5
2	L	1	GLU	2.5
2	L	168	ASP	2.4
2	L	124	GLU	2.4
1	A	487	VAL	2.3
3	H	99	GLY	2.3
2	L	194	THR	2.3
1	A	599	ASP	2.2
3	H	143	THR	2.2
1	A	255	TRP	2.2
2	L	14	SER	2.1
3	H	200	THR	2.1
3	H	97	ALA	2.1
3	H	142	VAL	2.1
1	A	322	GLY	2.0
3	H	199	ILE	2.0
1	A	383	THR	2.0

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](#)

SUGAR-RSR INFOmissingINFO

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.

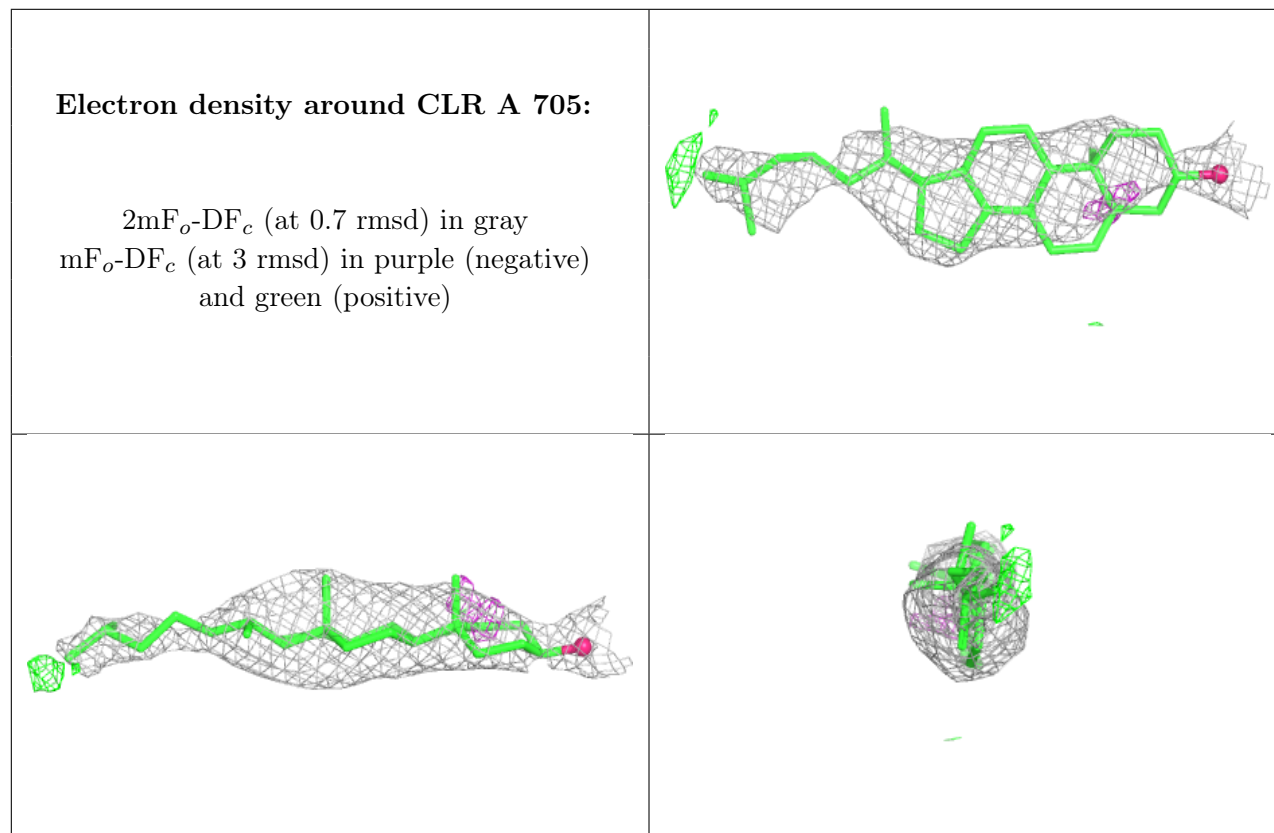
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
7	CLR	A	705	28/28	0.87	0.22	103,125,133,135	0
6	COC	A	702	22/22	0.92	0.11	56,65,70,72	0
7	CLR	A	704	28/28	0.93	0.15	102,110,117,119	0
8	CL	A	707	1/1	0.94	0.39	105,105,105,105	0

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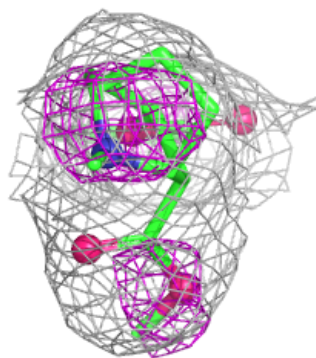
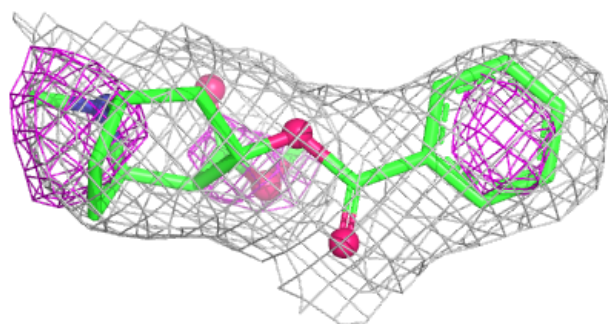
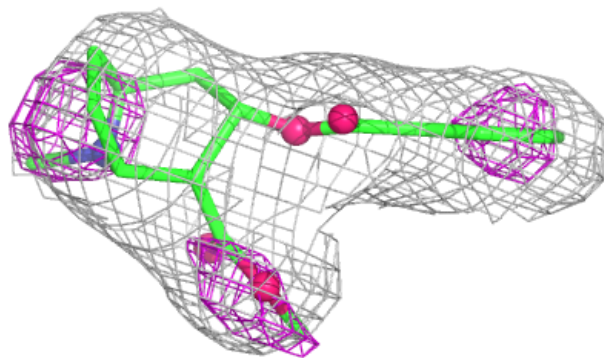
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
5	NA	A	701	1/1	0.97	0.05	89,89,89,89	0
5	NA	A	706	1/1	0.98	0.04	98,98,98,98	0

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.

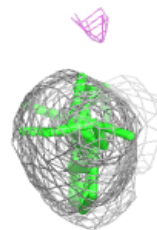
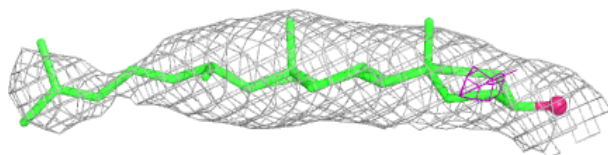
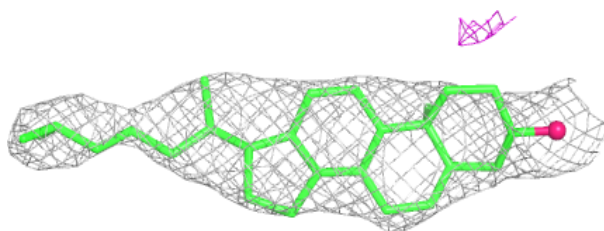


Electron density around COC A 702:

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

**Electron density around CLR A 704:**

$2mF_o-DF_c$ (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.