



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 25, 2022 – 12:19 PM JST

PDB ID : 7FE1
Title : Crystal structure of GH92 alpha-1,2-mannosidase from *Enterococcus faecalis* ATCC 10100 in complex with methyl alpha-1,2-C-mannobioside
Authors : Miyazaki, T.; Alonso-Gil, S.
Deposited on : 2021-07-19
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 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 : 2.26
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.26

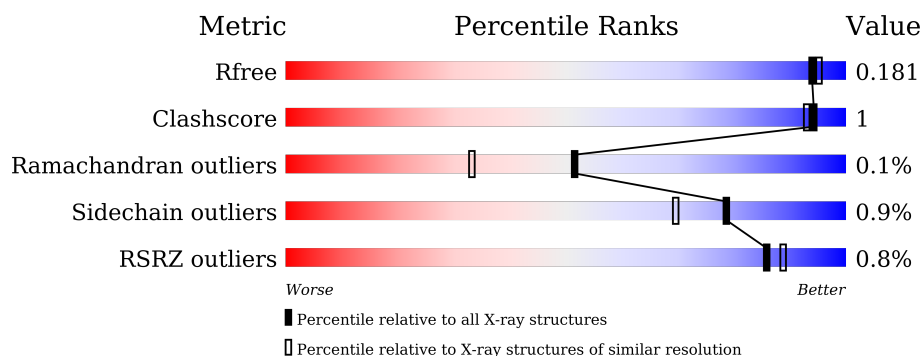
1 Overall quality at a glance

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}	130704	5722 (1.74-1.70)
Clashscore	141614	6152 (1.74-1.70)
Ramachandran outliers	138981	6051 (1.74-1.70)
Sidechain outliers	138945	6051 (1.74-1.70)
RSRZ outliers	127900	5629 (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	A	721	<div> <div></div> <div>94%</div> <div>5%</div> <div>..</div> </div>
1	B	721	<div> <div></div> <div>93%</div> <div>5%</div> <div>.</div> </div>
1	C	721	<div> <div></div> <div>95%</div> <div></div> <div>..</div> </div>
1	D	721	<div> <div></div> <div>95%</div> <div></div> <div>..</div> </div>

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 26067 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 Alpha-1,2-mannosidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	712	Total	C	N	O	S	0	5	0
			5783	3714	945	1103	21			
1	B	712	Total	C	N	O	S	0	2	0
			5774	3708	945	1100	21			
1	C	712	Total	C	N	O	S	0	4	0
			5780	3712	945	1102	21			
1	D	712	Total	C	N	O	S	0	5	0
			5786	3717	945	1103	21			

There are 32 discrepancies between the modelled and reference sequences:

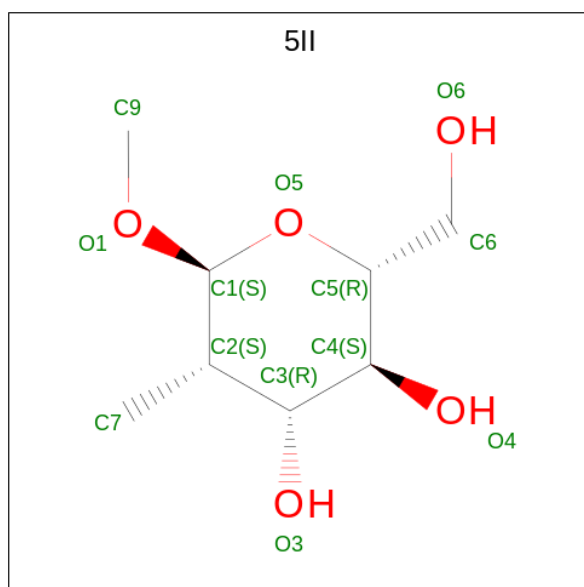
Chain	Residue	Modelled	Actual	Comment	Reference
A	714	LEU	-	expression tag	UNP A0A6N0WQ22
A	715	GLU	-	expression tag	UNP A0A6N0WQ22
A	716	HIS	-	expression tag	UNP A0A6N0WQ22
A	717	HIS	-	expression tag	UNP A0A6N0WQ22
A	718	HIS	-	expression tag	UNP A0A6N0WQ22
A	719	HIS	-	expression tag	UNP A0A6N0WQ22
A	720	HIS	-	expression tag	UNP A0A6N0WQ22
A	721	HIS	-	expression tag	UNP A0A6N0WQ22
B	714	LEU	-	expression tag	UNP A0A6N0WQ22
B	715	GLU	-	expression tag	UNP A0A6N0WQ22
B	716	HIS	-	expression tag	UNP A0A6N0WQ22
B	717	HIS	-	expression tag	UNP A0A6N0WQ22
B	718	HIS	-	expression tag	UNP A0A6N0WQ22
B	719	HIS	-	expression tag	UNP A0A6N0WQ22
B	720	HIS	-	expression tag	UNP A0A6N0WQ22
B	721	HIS	-	expression tag	UNP A0A6N0WQ22
C	714	LEU	-	expression tag	UNP A0A6N0WQ22
C	715	GLU	-	expression tag	UNP A0A6N0WQ22
C	716	HIS	-	expression tag	UNP A0A6N0WQ22
C	717	HIS	-	expression tag	UNP A0A6N0WQ22
C	718	HIS	-	expression tag	UNP A0A6N0WQ22

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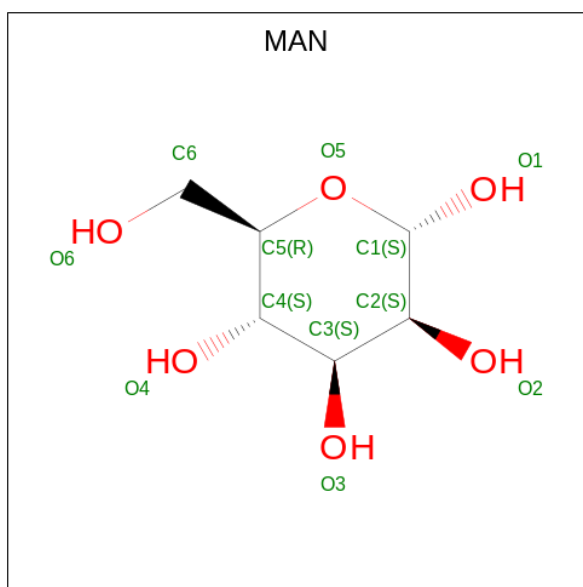
Chain	Residue	Modelled	Actual	Comment	Reference
C	719	HIS	-	expression tag	UNP A0A6N0WQ22
C	720	HIS	-	expression tag	UNP A0A6N0WQ22
C	721	HIS	-	expression tag	UNP A0A6N0WQ22
D	714	LEU	-	expression tag	UNP A0A6N0WQ22
D	715	GLU	-	expression tag	UNP A0A6N0WQ22
D	716	HIS	-	expression tag	UNP A0A6N0WQ22
D	717	HIS	-	expression tag	UNP A0A6N0WQ22
D	718	HIS	-	expression tag	UNP A0A6N0WQ22
D	719	HIS	-	expression tag	UNP A0A6N0WQ22
D	720	HIS	-	expression tag	UNP A0A6N0WQ22
D	721	HIS	-	expression tag	UNP A0A6N0WQ22

- Molecule 2 is methyl 2-deoxy-2-methyl- α -D-mannopyranoside (three-letter code: 5II) (formula: $C_8H_{16}O_5$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			13	8	5		
2	B	1	Total	C	O	0	0
			13	8	5		
2	C	1	Total	C	O	0	0
			13	8	5		
2	D	1	Total	C	O	0	0
			13	8	5		

- Molecule 3 is α -D-mannopyranose (three-letter code: MAN) (formula: $C_6H_{12}O_6$) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Ca	0	0
			1	1		
4	B	1	Total	Ca	0	0
			1	1		
4	C	1	Total	Ca	0	0
			1	1		
4	D	1	Total	Ca	0	0
			1	1		

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

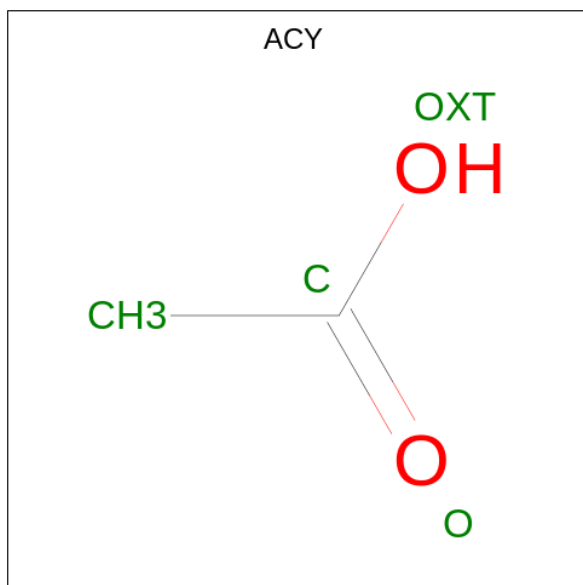
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Na	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	B	1	Total	Na	0	0
			1	1		
5	C	1	Total	Na	0	0
			1	1		
5	D	1	Total	Na	0	0
			1	1		

- Molecule 6 is ACETIC ACID (three-letter code: ACY) (formula: C₂H₄O₂).



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

- Molecule 7 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



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

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

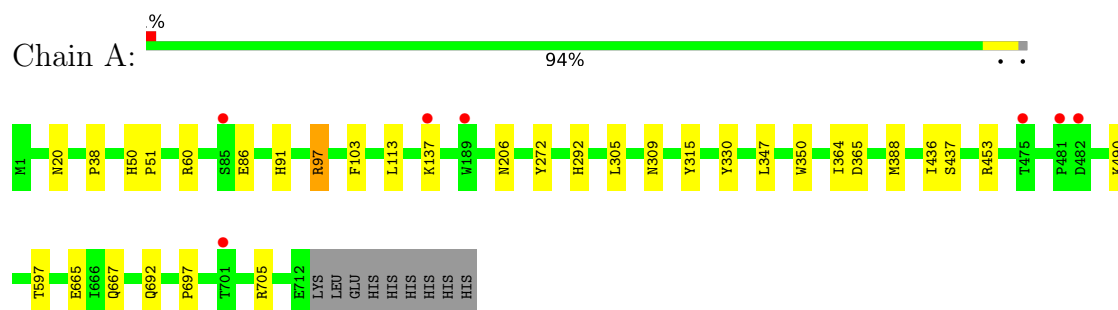
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	721	Total 721	O 721	0	0
8	B	683	Total 683	O 683	0	0
8	C	703	Total 703	O 703	0	0
8	D	653	Total 653	O 653	0	0

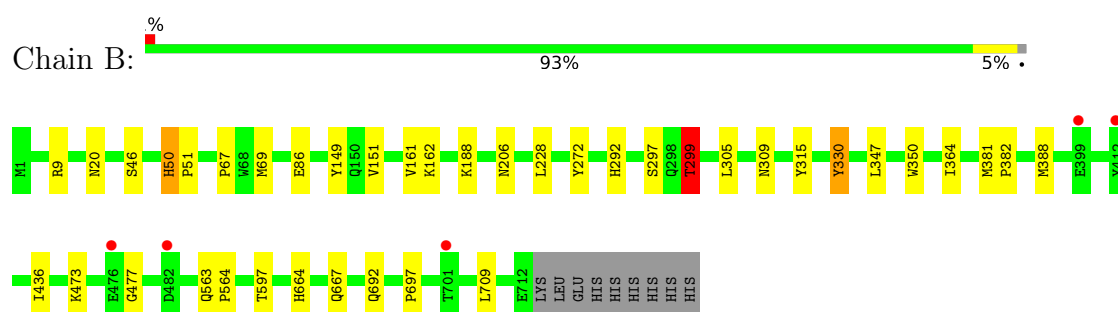
3 Residue-property plots [i](#)

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.

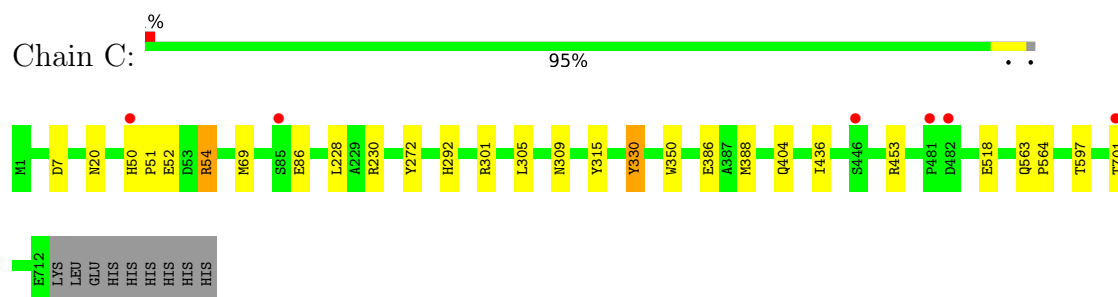
- Molecule 1: Alpha-1,2-mannosidase



- Molecule 1: Alpha-1,2-mannosidase

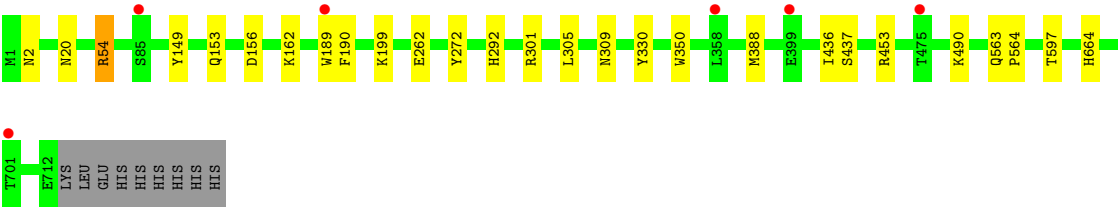


- Molecule 1: Alpha-1,2-mannosidase



- Molecule 1: Alpha-1,2-mannosidase





4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	163.16Å 169.60Å 258.66Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.62 – 1.72 48.57 – 1.72	Depositor EDS
% Data completeness (in resolution range)	100.0 (48.62-1.72) 100.0 (48.57-1.72)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.18 (at 1.72Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.149 , 0.171 0.162 , 0.181	Depositor DCC
R_{free} test set	18587 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å ²)	19.4	Xtriage
Anisotropy	0.029	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 43.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.018 for -k,-h,-l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	26067	wwPDB-VP
Average B, all atoms (Å ²)	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.62% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: MAN, 5II, EDO, NA, CA, ACY

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	0.78	1/5971 (0.0%)	0.87	3/8119 (0.0%)
1	B	0.77	2/5953 (0.0%)	0.86	3/8095 (0.0%)
1	C	0.78	1/5965 (0.0%)	0.89	6/8111 (0.1%)
1	D	0.81	1/5974 (0.0%)	0.88	4/8124 (0.0%)
All	All	0.78	5/23863 (0.0%)	0.87	16/32449 (0.0%)

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	518	GLU	CD-OE2	5.32	1.31	1.25
1	A	137	LYS	C-O	5.18	1.33	1.23
1	B	50[A]	HIS	CE1-NE2	5.16	1.44	1.32
1	B	50[B]	HIS	CE1-NE2	5.16	1.44	1.32
1	D	262	GLU	CD-OE1	-5.04	1.20	1.25

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	301	ARG	NE-CZ-NH2	-6.71	116.95	120.30
1	B	330	TYR	CB-CG-CD1	6.04	124.62	121.00
1	D	54	ARG	CG-CD-NE	-5.91	99.39	111.80
1	D	54	ARG	NE-CZ-NH2	-5.88	117.36	120.30
1	A	97	ARG	NE-CZ-NH2	-5.58	117.51	120.30
1	C	54	ARG	NE-CZ-NH2	-5.53	117.53	120.30
1	C	453	ARG	NE-CZ-NH1	5.45	123.02	120.30
1	C	330	TYR	CB-CG-CD1	5.43	124.26	121.00
1	C	69	MET	CG-SD-CE	-5.40	91.56	100.20
1	B	299	THR	CA-CB-OG1	5.38	120.30	109.00
1	A	705	ARG	NE-CZ-NH2	-5.22	117.69	120.30
1	B	69	MET	CG-SD-CE	-5.21	91.86	100.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	60	ARG	NE-CZ-NH2	-5.21	117.70	120.30
1	C	301	ARG	NE-CZ-NH1	-5.09	117.75	120.30
1	C	230	ARG	NE-CZ-NH2	-5.05	117.78	120.30
1	D	2	ASN	N-CA-CB	5.01	119.62	110.60

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	5783	0	5496	14	0
1	B	5774	0	5481	22	0
1	C	5780	0	5491	11	0
1	D	5786	0	5499	12	0
2	A	13	0	0	0	0
2	B	13	0	0	0	0
2	C	13	0	0	0	0
2	D	13	0	0	0	0
3	A	11	0	8	1	0
3	B	11	0	8	0	0
3	C	11	0	8	0	0
3	D	11	0	9	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
5	C	1	0	0	0	0
5	D	1	0	0	0	0
6	A	4	0	3	1	0
6	B	4	0	3	1	0
7	A	20	0	30	1	0
7	B	24	0	36	1	0
7	C	16	0	24	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	D	12	0	17	0	0
8	A	721	0	0	2	0
8	B	683	0	0	6	0
8	C	703	0	0	5	0
8	D	653	0	0	3	0
All	All	26067	0	22113	60	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 1.

All (60) 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:B:86:GLU:HB3	8:B:1388:HOH:O	1.73	0.87
1:C:86:GLU:HB3	8:C:1295:HOH:O	1.83	0.79
1:D:156:ASP:HB3	1:D:189:TRP:CZ2	2.27	0.69
1:C:228:LEU:HD12	8:C:1354:HOH:O	1.99	0.61
1:B:292:HIS:CD2	1:B:305:LEU:HD22	2.37	0.59
1:B:9:ARG:HB2	7:B:811:EDO:H12	1.86	0.57
1:B:228:LEU:HD12	8:B:1356:HOH:O	2.07	0.55
1:A:697:PRO:HG3	6:A:805:ACY:H3	1.89	0.54
1:B:697:PRO:HG3	6:B:806:ACY:H3	1.91	0.53
1:C:7:ASP:HB3	7:C:808:EDO:H11	1.91	0.53
1:D:437[A]:SER:OG	1:D:453:ARG:HG3	2.10	0.52
1:D:664:HIS:HE1	8:D:1461:HOH:O	1.93	0.52
1:A:388:MET:HB3	1:A:436:ILE:HG12	1.92	0.50
1:C:54:ARG:NH2	8:C:905:HOH:O	2.45	0.50
1:D:54:ARG:NH2	8:D:906:HOH:O	2.44	0.50
1:A:665:GLU:OE1	1:A:667:GLN:NE2	2.43	0.50
1:A:206:ASN:O	1:A:206:ASN:CG	2.51	0.49
1:C:50[A]:HIS:CG	1:C:51:PRO:HD2	2.47	0.49
1:B:667:GLN:NE2	1:B:692:GLN:OE1	2.41	0.49
1:B:206:ASN:HB3	8:B:1401:HOH:O	2.12	0.49
1:B:86:GLU:HG3	8:B:1051:HOH:O	2.13	0.49
1:D:292:HIS:CD2	1:D:305:LEU:HD22	2.48	0.49
1:D:388:MET:HB3	1:D:436:ILE:HG12	1.95	0.49
1:D:20:ASN:HB3	1:D:597:THR:HA	1.95	0.48
1:A:86:GLU:HG2	1:A:91:HIS:ND1	2.29	0.48
1:A:437[A]:SER:OG	1:A:453:ARG:HG3	2.13	0.48
1:C:292:HIS:CD2	1:C:305:LEU:HD22	2.49	0.47
1:A:50[A]:HIS:CG	1:A:51:PRO:HD2	2.49	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:701:THR:HG22	8:C:1460:HOH:O	2.14	0.47
1:A:292:HIS:CD2	1:A:305:LEU:HD22	2.50	0.47
1:A:38:PRO:HG2	1:A:103:PHE:CE2	2.50	0.47
1:A:692:GLN:NE2	8:A:913:HOH:O	2.47	0.46
1:B:50[A]:HIS:CG	1:B:51:PRO:HD2	2.51	0.46
1:D:153:GLN:HB2	1:D:190:PHE:CZ	2.52	0.46
1:B:297:SER:OG	1:B:299:THR:HG23	2.15	0.45
1:B:347:LEU:HB3	1:B:364:ILE:HG21	1.98	0.44
1:A:20:ASN:HB3	1:A:597:THR:HA	2.00	0.44
1:C:20:ASN:HB3	1:C:597:THR:HA	2.00	0.43
1:B:664:HIS:HE1	8:B:1496:HOH:O	2.01	0.43
1:D:20:ASN:CB	1:D:597:THR:HA	2.49	0.43
3:A:802:MAN:C1	8:A:997:HOH:O	2.67	0.43
1:A:347:LEU:HB3	1:A:364:ILE:HG21	2.01	0.43
1:B:20:ASN:HB3	1:B:597:THR:HA	1.99	0.43
1:D:149:TYR:HA	1:D:162:LYS:O	2.19	0.43
1:B:473:LYS:HD3	1:B:477:GLY:HA2	2.01	0.42
1:C:404:GLN:NE2	8:C:919:HOH:O	2.52	0.42
1:B:388:MET:HB3	1:B:436:ILE:HG12	2.02	0.42
1:A:365:ASP:OD2	7:A:810:EDO:H11	2.20	0.42
1:B:151:VAL:HG23	1:B:161:VAL:HG12	2.01	0.42
1:D:199:LYS:HE3	8:D:1435:HOH:O	2.19	0.42
1:D:563:GLN:N	1:D:564:PRO:CD	2.83	0.42
1:C:388:MET:HB3	1:C:436:ILE:HG12	2.02	0.41
1:B:381:MET:N	1:B:382:PRO:CD	2.84	0.41
1:A:97:ARG:HG3	1:A:113:LEU:HD11	2.02	0.41
1:B:709:LEU:HD23	1:B:709:LEU:HA	1.92	0.41
1:C:563:GLN:N	1:C:564:PRO:CD	2.84	0.41
1:B:46:SER:HB3	1:B:67:PRO:HA	2.03	0.41
1:B:149:TYR:HA	1:B:162:LYS:O	2.20	0.41
1:B:563:GLN:N	1:B:564:PRO:CD	2.83	0.40
1:B:188:LYS:NZ	8:B:932:HOH:O	2.53	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	715/721 (99%)	691 (97%)	23 (3%)	1 (0%)	51	33
1	B	712/721 (99%)	693 (97%)	19 (3%)	0	100	100
1	C	714/721 (99%)	691 (97%)	23 (3%)	0	100	100
1	D	715/721 (99%)	692 (97%)	22 (3%)	1 (0%)	51	33
All	All	2856/2884 (99%)	2767 (97%)	87 (3%)	2 (0%)	51	33

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	490	LYS
1	D	490	LYS

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	632/636 (99%)	627 (99%)	5 (1%)	81	73
1	B	629/636 (99%)	623 (99%)	6 (1%)	76	65
1	C	631/636 (99%)	624 (99%)	7 (1%)	73	62
1	D	632/636 (99%)	628 (99%)	4 (1%)	86	80
All	All	2524/2544 (99%)	2502 (99%)	22 (1%)	78	69

All (22) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	272	TYR
1	A	309	ASN
1	A	315	TYR
1	A	330	TYR

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Mol	Chain	Res	Type
1	A	350	TRP
1	B	272	TYR
1	B	299	THR
1	B	309	ASN
1	B	315	TYR
1	B	330	TYR
1	B	350	TRP
1	C	52	GLU
1	C	272	TYR
1	C	309	ASN
1	C	315	TYR
1	C	330	TYR
1	C	350	TRP
1	C	386	GLU
1	D	272	TYR
1	D	309	ASN
1	D	330	TYR
1	D	350	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	420	HIS
1	B	181	HIS
1	B	288	GLN
1	B	383	GLN
1	C	150	GLN
1	C	420	HIS
1	D	590	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 [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 36 ligands modelled in this entry, 8 are monoatomic - leaving 28 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	EDO	B	808	-	3,3,3	0.36	0	2,2,2	0.57	0
7	EDO	A	810	-	3,3,3	1.09	0	2,2,2	0.85	0
7	EDO	A	807	-	3,3,3	0.56	0	2,2,2	1.36	0
7	EDO	C	805	-	3,3,3	0.91	0	2,2,2	0.27	0
2	5II	B	801	-	13,13,13	1.14	2 (15%)	17,18,18	1.19	1 (5%)
7	EDO	B	810	-	3,3,3	0.48	0	2,2,2	0.43	0
7	EDO	C	808	-	3,3,3	0.36	0	2,2,2	0.40	0
7	EDO	D	806	-	3,3,3	0.45	0	2,2,2	0.14	0
3	MAN	A	802	4	11,11,12	1.52	2 (18%)	15,15,17	2.37	5 (33%)
7	EDO	B	805	-	3,3,3	0.60	0	2,2,2	0.25	0
6	ACY	B	806	-	1,3,3	0.72	0	0,3,3	-	-
7	EDO	D	805	-	3,3,3	0.74	0	2,2,2	0.66	0
2	5II	D	801	-	13,13,13	1.18	1 (7%)	17,18,18	1.34	2 (11%)
6	ACY	A	805	-	1,3,3	0.11	0	0,3,3	-	-
7	EDO	D	807	-	3,3,3	0.28	0	2,2,2	0.36	0
7	EDO	A	809	-	3,3,3	0.11	0	2,2,2	0.40	0
3	MAN	C	802	4	11,11,12	1.30	1 (9%)	15,15,17	2.91	6 (40%)
7	EDO	C	807	-	3,3,3	0.86	0	2,2,2	0.29	0
7	EDO	C	806	-	3,3,3	0.50	0	2,2,2	0.27	0
7	EDO	A	806	-	3,3,3	0.25	0	2,2,2	0.35	0
7	EDO	B	807	-	3,3,3	1.12	0	2,2,2	0.38	0
3	MAN	D	802	4	11,11,12	1.56	2 (18%)	15,15,17	2.58	7 (46%)
2	5II	A	801	-	13,13,13	1.23	1 (7%)	17,18,18	1.05	2 (11%)
3	MAN	B	802	4	11,11,12	1.56	3 (27%)	15,15,17	2.64	5 (33%)
7	EDO	A	808	-	3,3,3	0.33	0	2,2,2	0.39	0
7	EDO	B	809	-	3,3,3	0.26	0	2,2,2	0.25	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
7	EDO	B	811	-	3,3,3	0.54	0	2,2,2	0.64	0
2	5II	C	801	-	13,13,13	1.10	0	17,18,18	1.33	1 (5%)

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	EDO	B	808	-	-	0/1/1/1	-
7	EDO	A	810	-	-	0/1/1/1	-
7	EDO	A	807	-	-	0/1/1/1	-
7	EDO	C	805	-	-	0/1/1/1	-
2	5II	B	801	-	-	0/4/24/24	0/1/1/1
7	EDO	B	810	-	-	0/1/1/1	-
7	EDO	C	808	-	-	1/1/1/1	-
7	EDO	D	806	-	-	0/1/1/1	-
3	MAN	A	802	4	-	0/2/19/22	0/1/1/1
7	EDO	B	805	-	-	0/1/1/1	-
7	EDO	D	805	-	-	0/1/1/1	-
2	5II	D	801	-	-	0/4/24/24	0/1/1/1
7	EDO	D	807	-	-	1/1/1/1	-
7	EDO	A	809	-	-	0/1/1/1	-
3	MAN	C	802	4	-	2/2/19/22	0/1/1/1
7	EDO	C	807	-	-	1/1/1/1	-
7	EDO	C	806	-	-	0/1/1/1	-
7	EDO	A	806	-	-	0/1/1/1	-
7	EDO	B	807	-	-	0/1/1/1	-
3	MAN	D	802	4	-	0/2/19/22	0/1/1/1
2	5II	A	801	-	-	0/4/24/24	0/1/1/1
3	MAN	B	802	4	-	0/2/19/22	0/1/1/1
7	EDO	A	808	-	-	1/1/1/1	-
7	EDO	B	809	-	-	0/1/1/1	-
7	EDO	B	811	-	-	1/1/1/1	-
2	5II	C	801	-	-	0/4/24/24	0/1/1/1

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	802	MAN	O2-C2	3.41	1.50	1.43
3	C	802	MAN	O2-C2	2.86	1.49	1.43
3	D	802	MAN	O2-C2	2.86	1.49	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	801	5II	O1-C1	2.79	1.45	1.40
3	D	802	MAN	O5-C1	2.77	1.48	1.43
3	B	802	MAN	O2-C2	2.74	1.49	1.43
2	A	801	5II	O1-C1	2.72	1.44	1.40
2	B	801	5II	O1-C1	2.61	1.44	1.40
3	A	802	MAN	O5-C1	2.34	1.47	1.43
2	B	801	5II	C2-C3	2.26	1.57	1.53
3	B	802	MAN	O5-C1	2.23	1.47	1.43
3	B	802	MAN	C1-C2	2.21	1.57	1.52

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	802	MAN	C1-O5-C5	8.50	123.71	112.19
3	B	802	MAN	C1-O5-C5	6.94	121.59	112.19
3	D	802	MAN	C1-O5-C5	6.64	121.19	112.19
3	A	802	MAN	O5-C1-C2	6.34	120.56	110.77
3	B	802	MAN	O5-C1-C2	4.48	117.69	110.77
3	D	802	MAN	C2-C3-C4	4.30	118.34	110.89
3	C	802	MAN	O2-C2-C1	4.13	117.60	109.15
3	C	802	MAN	O4-C4-C5	-3.63	100.28	109.30
3	B	802	MAN	C2-C3-C4	3.56	117.06	110.89
2	C	801	5II	O5-C1-C2	3.35	117.00	111.54
3	A	802	MAN	O5-C5-C4	-3.19	103.06	110.83
3	D	802	MAN	O5-C1-C2	3.19	115.69	110.77
3	A	802	MAN	C1-C2-C3	3.18	113.58	109.67
3	D	802	MAN	C1-C2-C3	3.04	113.41	109.67
3	A	802	MAN	O3-C3-C4	2.77	116.75	110.35
3	C	802	MAN	C3-C4-C5	2.64	114.96	110.24
3	B	802	MAN	C1-C2-C3	2.40	112.62	109.67
2	D	801	5II	O1-C1-C2	2.36	111.97	108.26
3	A	802	MAN	C3-C4-C5	2.32	114.38	110.24
2	A	801	5II	O5-C1-C2	2.26	115.22	111.54
3	D	802	MAN	O3-C3-C4	2.24	115.54	110.35
3	C	802	MAN	C2-C3-C4	2.23	114.75	110.89
3	C	802	MAN	O6-C6-C5	2.23	118.93	111.29
2	D	801	5II	C7-C2-C3	2.16	115.05	112.15
2	A	801	5II	C7-C2-C3	2.15	115.03	112.15
3	B	802	MAN	O5-C5-C4	-2.11	105.69	110.83
3	D	802	MAN	O2-C2-C1	2.10	113.45	109.15
3	D	802	MAN	O5-C5-C4	-2.06	105.81	110.83
2	B	801	5II	O1-C1-C2	2.01	111.42	108.26

There are no chirality outliers.

All (7) torsion outliers are listed below:

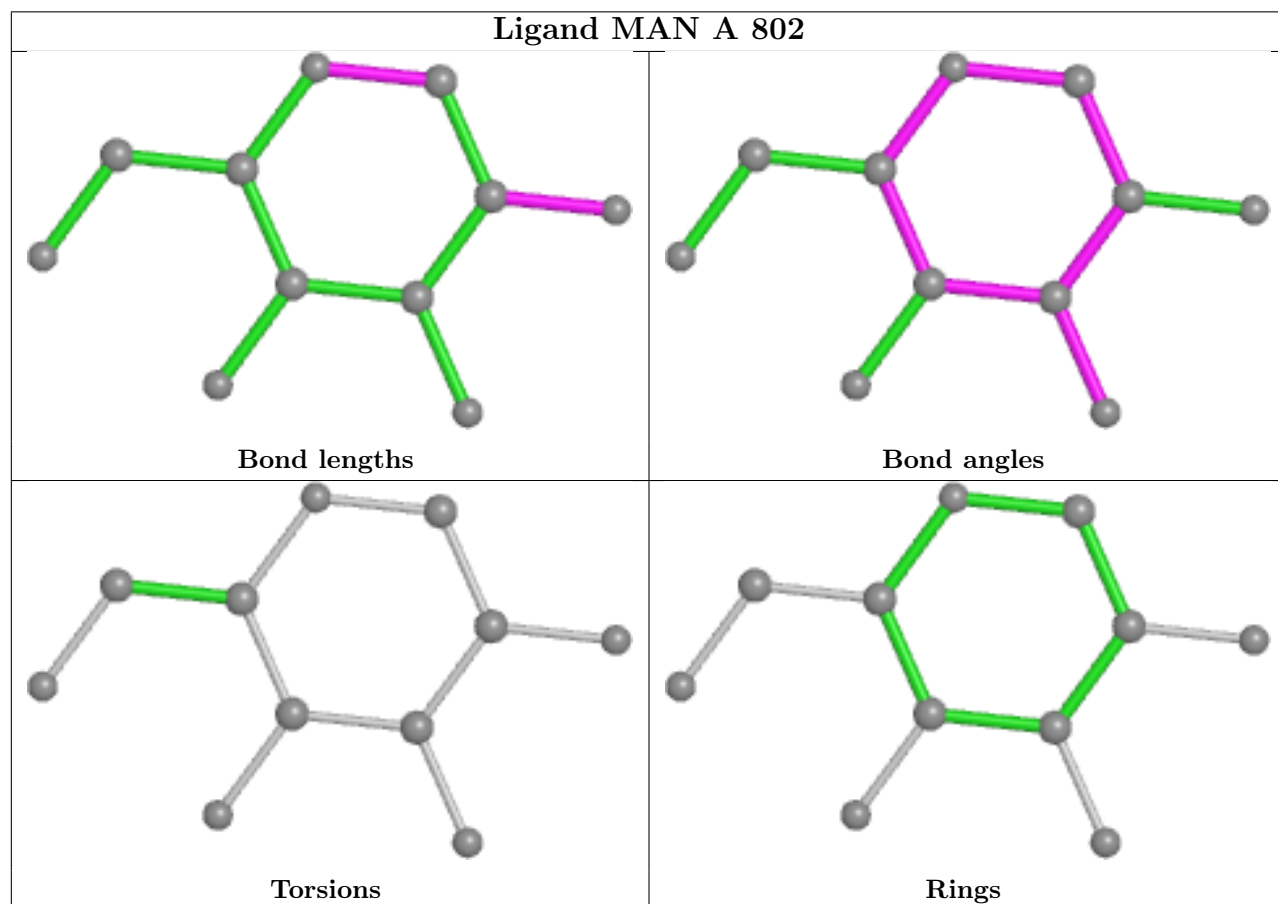
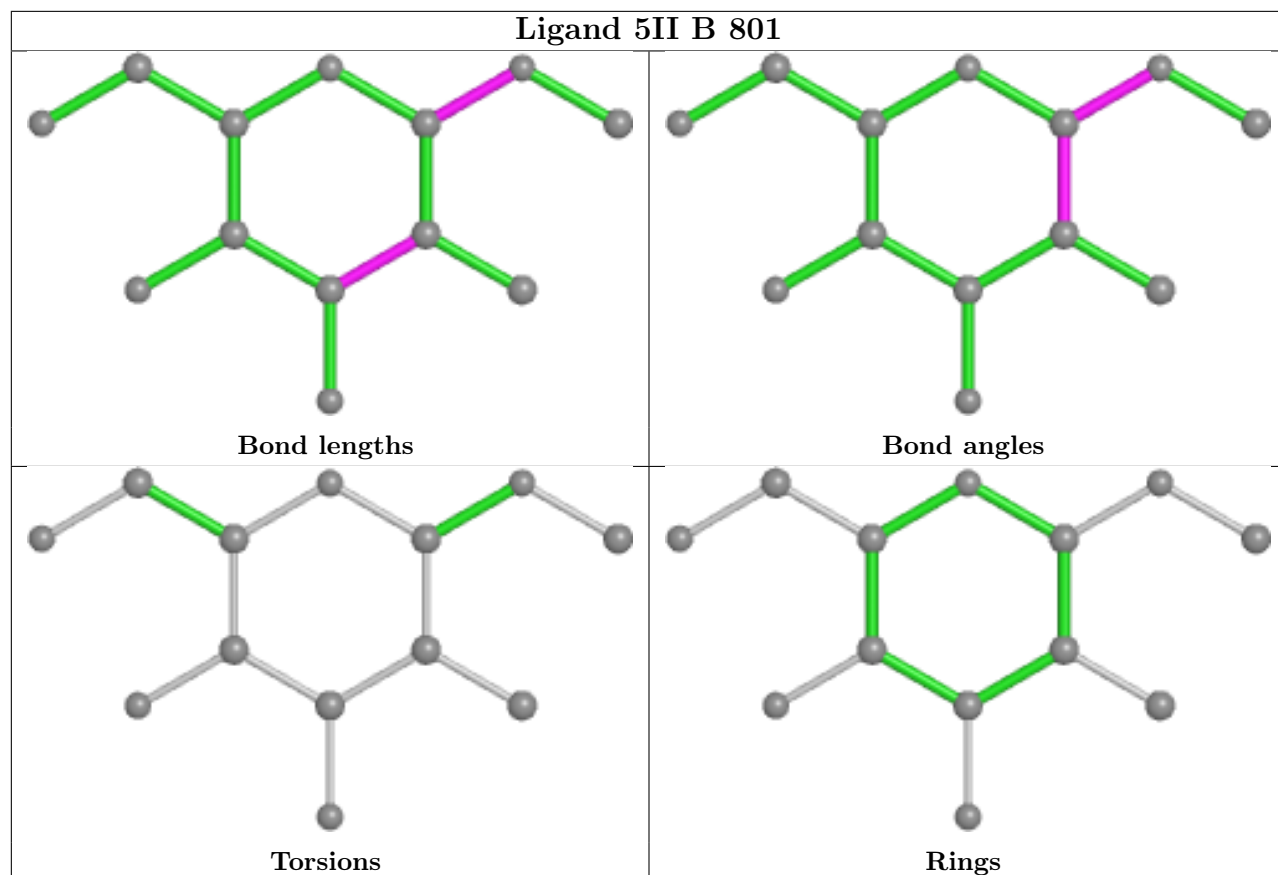
Mol	Chain	Res	Type	Atoms
3	C	802	MAN	C4-C5-C6-O6
7	A	808	EDO	O1-C1-C2-O2
3	C	802	MAN	O5-C5-C6-O6
7	B	811	EDO	O1-C1-C2-O2
7	C	807	EDO	O1-C1-C2-O2
7	C	808	EDO	O1-C1-C2-O2
7	D	807	EDO	O1-C1-C2-O2

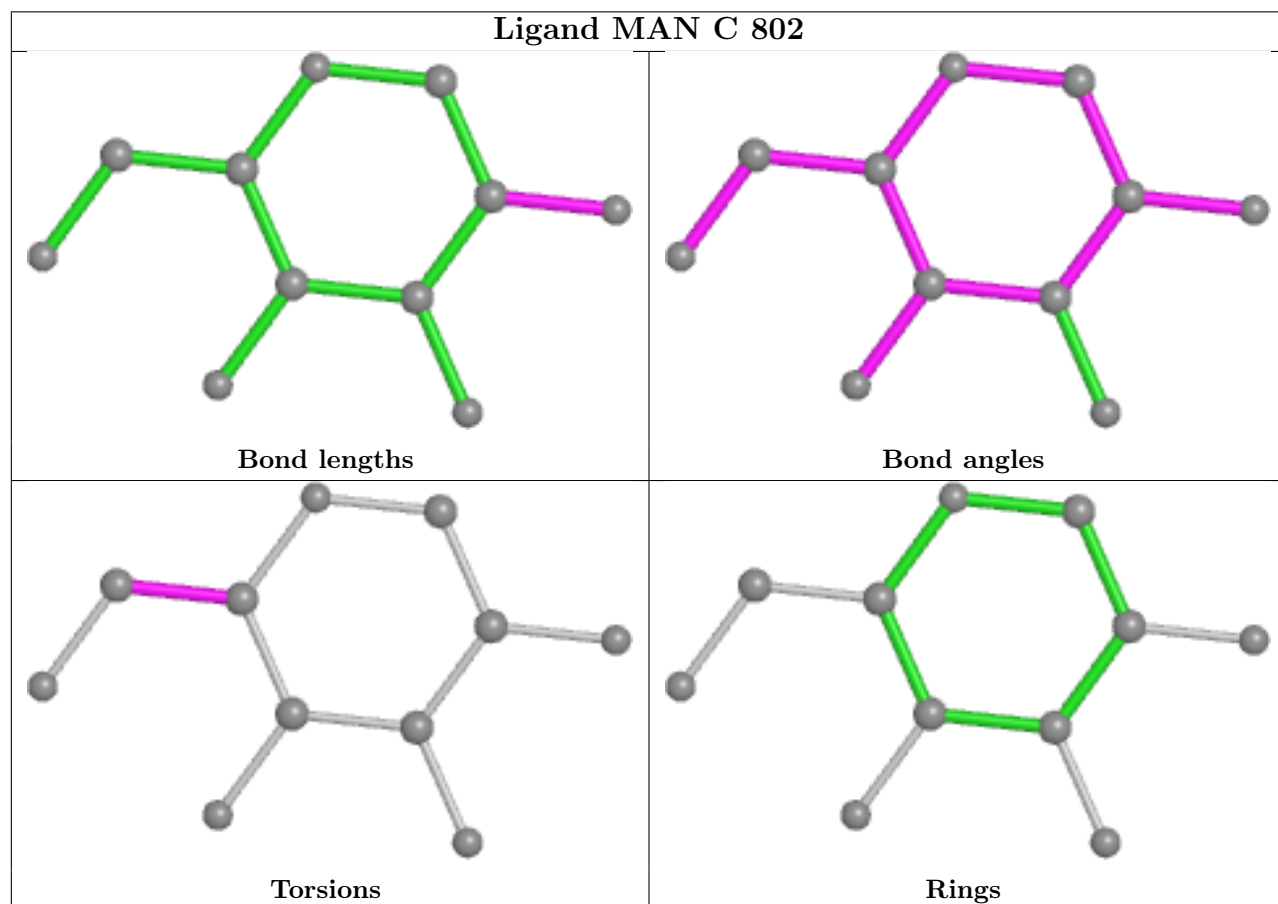
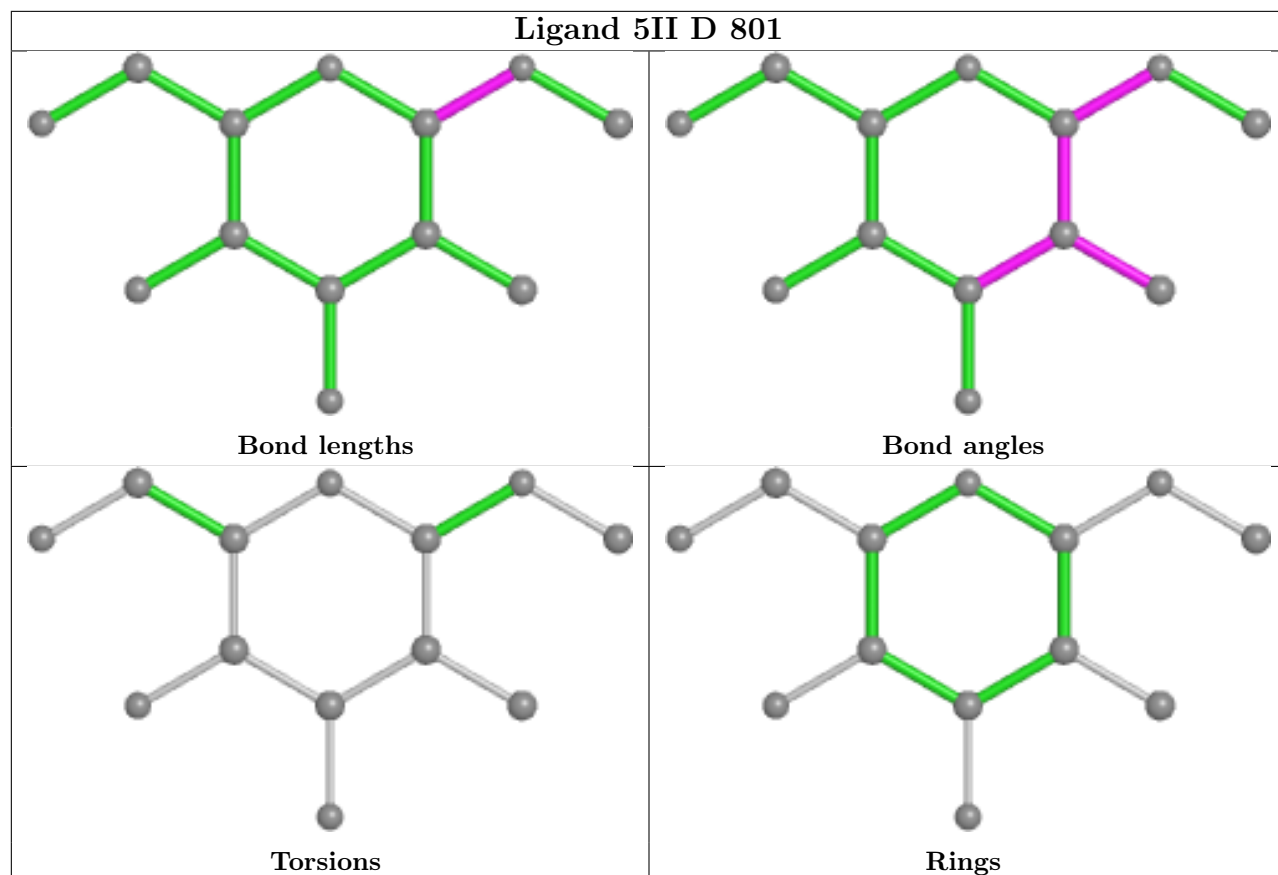
There are no ring outliers.

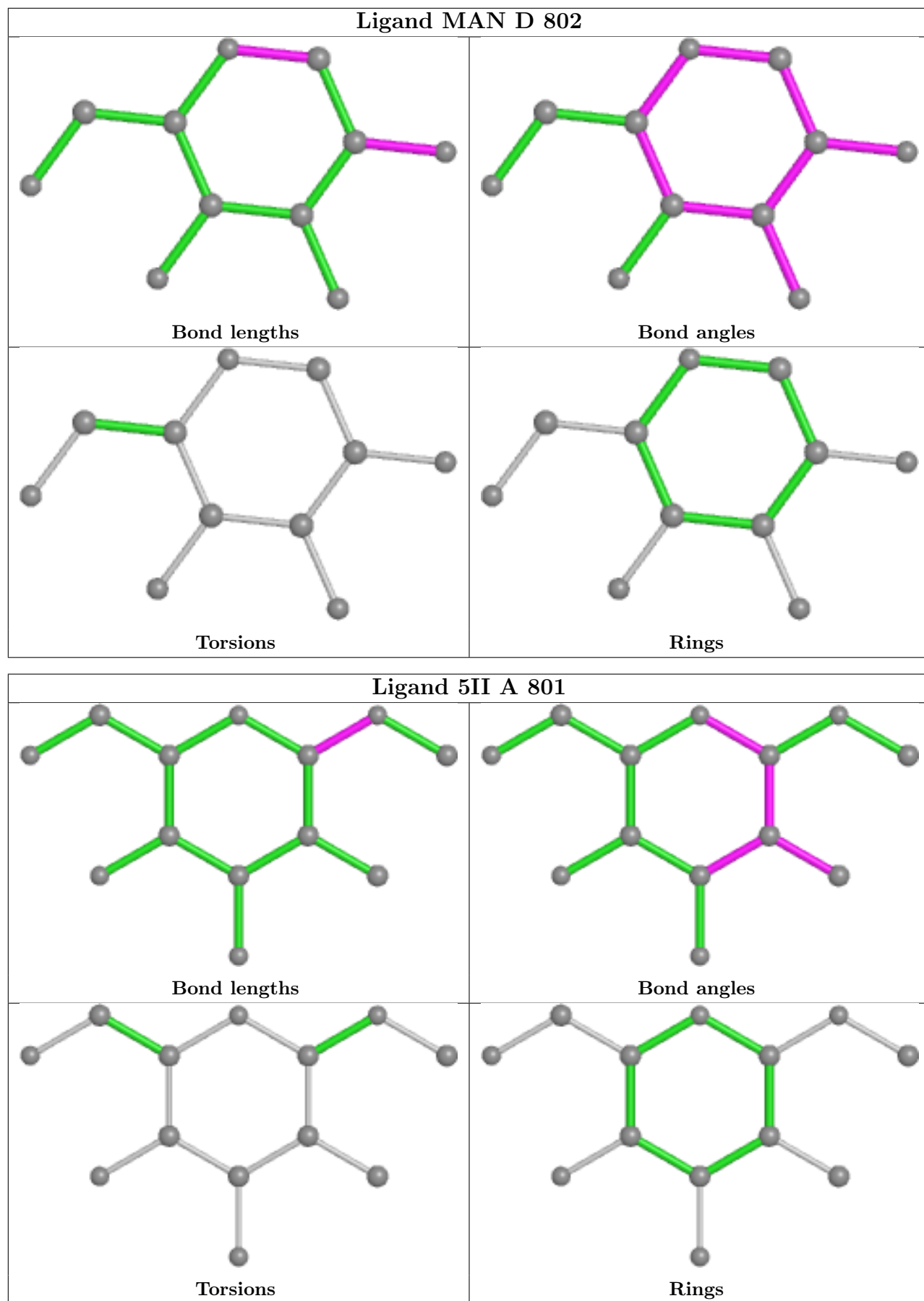
6 monomers are involved in 6 short contacts:

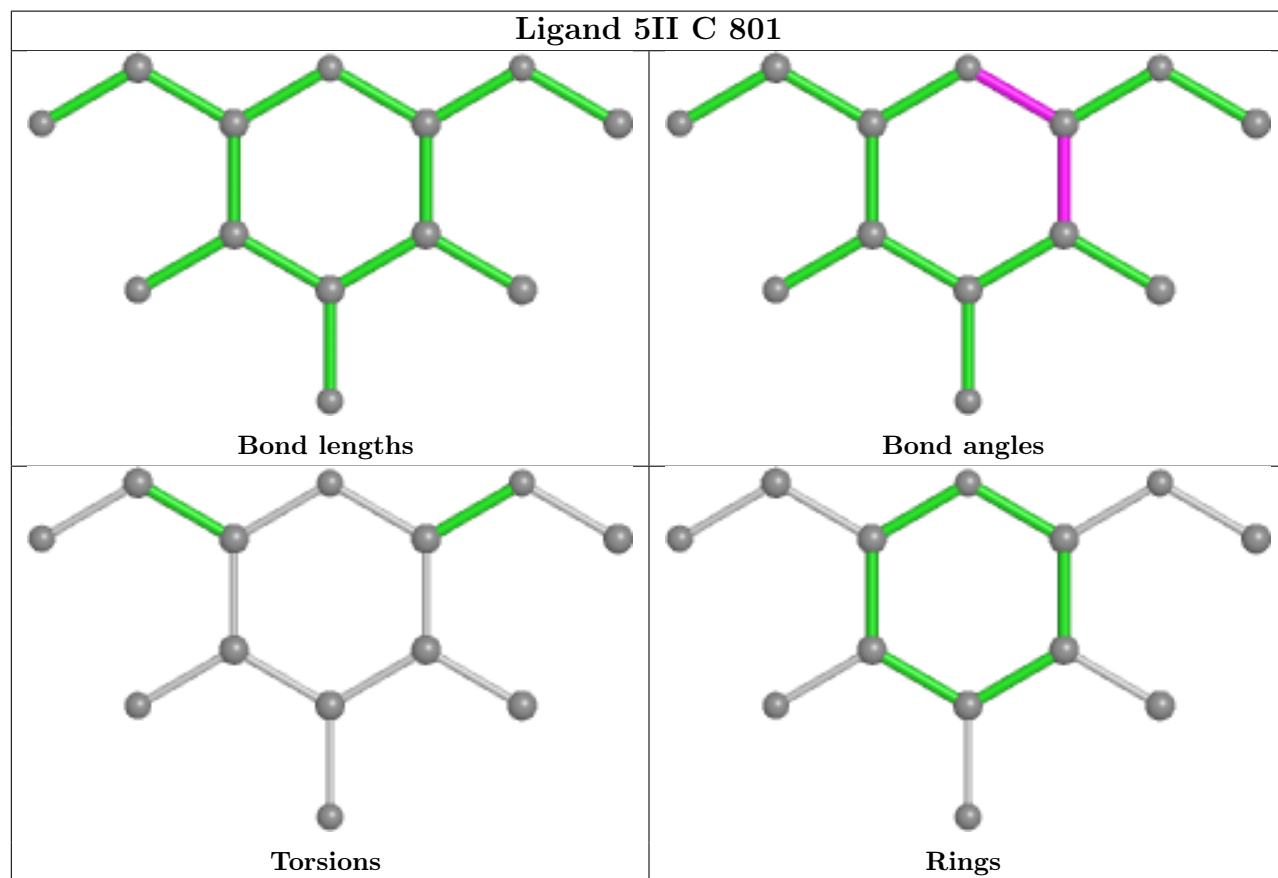
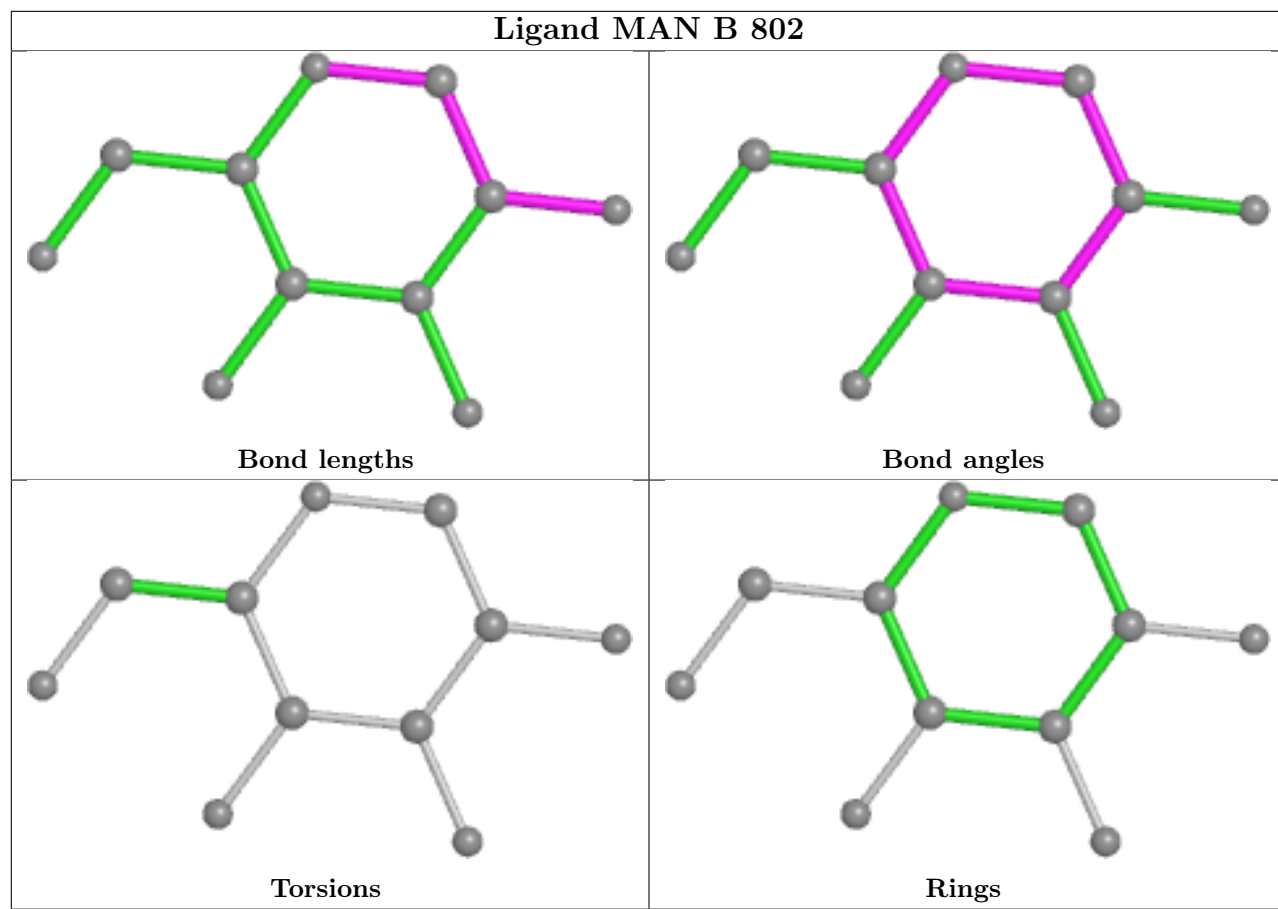
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	A	810	EDO	1	0
7	C	808	EDO	1	0
3	A	802	MAN	1	0
6	B	806	ACY	1	0
6	A	805	ACY	1	0
7	B	811	EDO	1	0

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	712/721 (98%)	-0.23	7 (0%) 82 85	14, 21, 38, 60	0
1	B	712/721 (98%)	-0.34	5 (0%) 87 90	15, 22, 40, 73	0
1	C	712/721 (98%)	-0.24	6 (0%) 86 89	15, 22, 39, 58	0
1	D	712/721 (98%)	-0.28	6 (0%) 86 89	16, 23, 40, 59	0
All	All	2848/2884 (98%)	-0.27	24 (0%) 86 89	14, 22, 39, 73	0

All (24) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	85	SER	4.5
1	A	85	SER	3.9
1	D	358	LEU	3.8
1	C	701	THR	3.7
1	B	412	TYR	3.1
1	D	85	SER	3.1
1	D	701	THR	3.0
1	B	701	THR	2.9
1	A	701	THR	2.9
1	B	476	GLU	2.5
1	A	189	TRP	2.5
1	A	137	LYS	2.4
1	D	399	GLU	2.4
1	A	482	ASP	2.3
1	C	482	ASP	2.3
1	A	475	THR	2.3
1	C	481	PRO	2.2
1	C	446	SER	2.1
1	B	399	GLU	2.1
1	C	50[A]	HIS	2.1
1	B	482	ASP	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	481	PRO	2.0
1	D	475	THR	2.0
1	D	189	TRP	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](#)

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
7	EDO	B	807	4/4	0.69	0.23	29,30,33,34	0
7	EDO	C	805	4/4	0.78	0.21	30,34,35,38	0
7	EDO	C	807	4/4	0.82	0.22	31,33,33,35	0
7	EDO	A	807	4/4	0.86	0.12	32,35,35,39	0
7	EDO	D	805	4/4	0.87	0.16	34,35,35,42	0
7	EDO	B	805	4/4	0.91	0.13	24,26,26,29	0
7	EDO	A	810	4/4	0.91	0.12	25,27,29,32	0
7	EDO	B	810	4/4	0.91	0.19	28,28,30,35	0
3	MAN	D	802	11/12	0.92	0.11	24,33,36,41	0
3	MAN	A	802	11/12	0.92	0.12	19,26,34,35	0
3	MAN	B	802	11/12	0.92	0.10	20,26,33,35	0
7	EDO	A	809	4/4	0.93	0.16	33,34,34,36	0
6	ACY	B	806	4/4	0.93	0.11	30,32,37,38	0
7	EDO	B	808	4/4	0.93	0.16	32,37,38,39	0
7	EDO	B	809	4/4	0.93	0.11	27,31,33,36	0
7	EDO	A	806	4/4	0.94	0.15	26,27,27,29	0
2	5II	D	801	13/13	0.94	0.07	22,25,33,35	0
3	MAN	C	802	11/12	0.94	0.09	21,24,27,33	0
7	EDO	D	806	4/4	0.94	0.14	29,30,31,32	0
7	EDO	D	807	4/4	0.94	0.17	36,36,36,38	0

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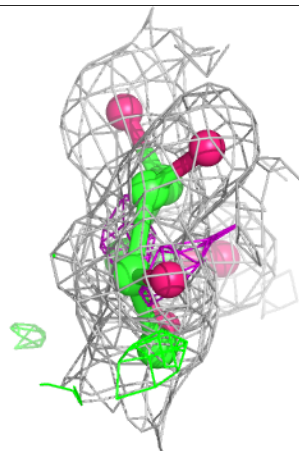
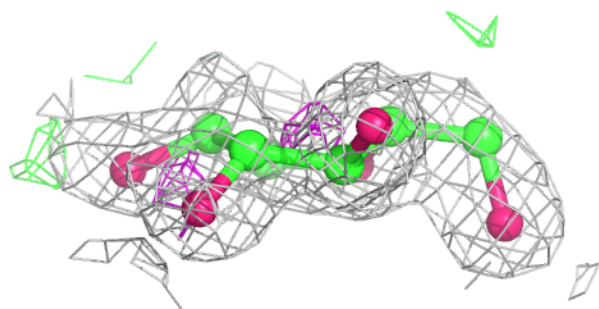
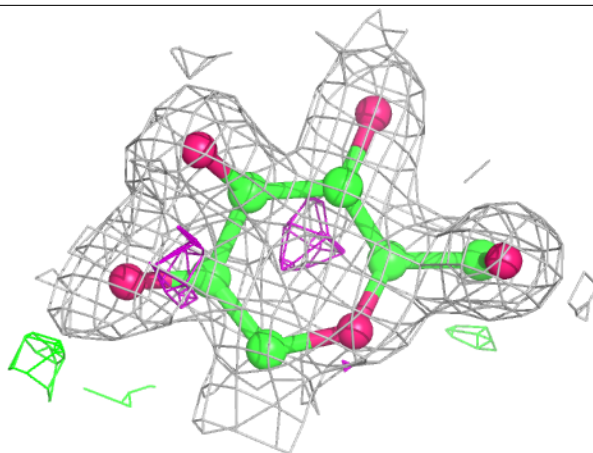
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
6	ACY	A	805	4/4	0.95	0.11	28,30,32,34	0
7	EDO	B	811	4/4	0.95	0.20	26,28,30,31	0
2	5II	C	801	13/13	0.95	0.07	19,20,25,27	0
7	EDO	C	806	4/4	0.95	0.10	28,28,30,30	0
7	EDO	C	808	4/4	0.96	0.23	27,29,31,32	0
7	EDO	A	808	4/4	0.96	0.10	28,31,34,34	0
2	5II	B	801	13/13	0.97	0.06	18,21,26,28	0
2	5II	A	801	13/13	0.98	0.11	15,20,24,27	0
5	NA	B	804	1/1	0.99	0.09	24,24,24,24	0
4	CA	C	803	1/1	0.99	0.06	21,21,21,21	0
4	CA	D	803	1/1	0.99	0.05	21,21,21,21	0
4	CA	B	803	1/1	1.00	0.04	20,20,20,20	0
5	NA	A	804	1/1	1.00	0.04	25,25,25,25	0
4	CA	A	803	1/1	1.00	0.04	21,21,21,21	0
5	NA	C	804	1/1	1.00	0.04	23,23,23,23	0
5	NA	D	804	1/1	1.00	0.04	28,28,28,28	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.

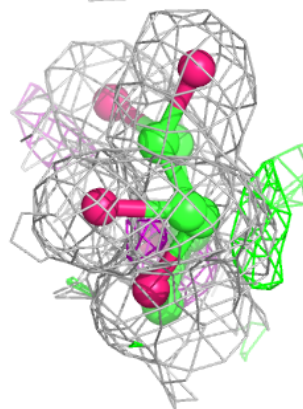
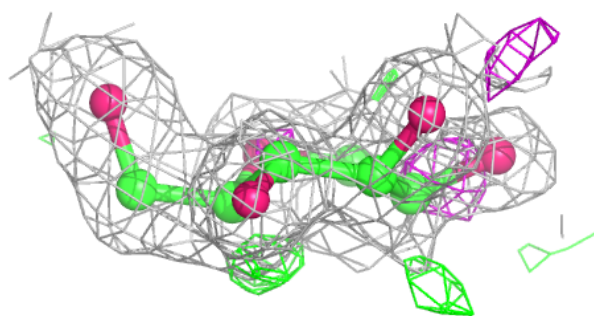
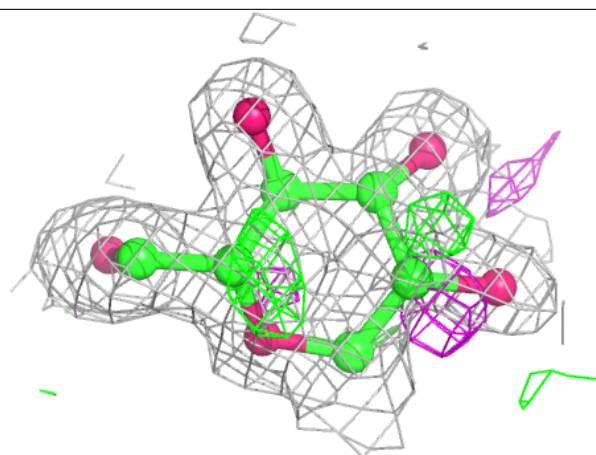
Electron density around MAN D 802:

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



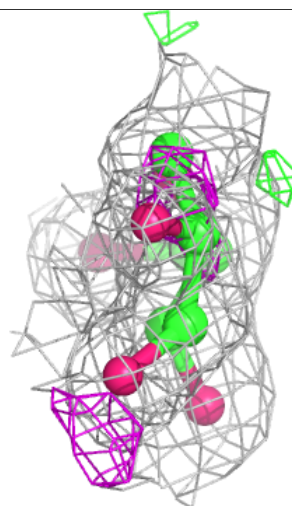
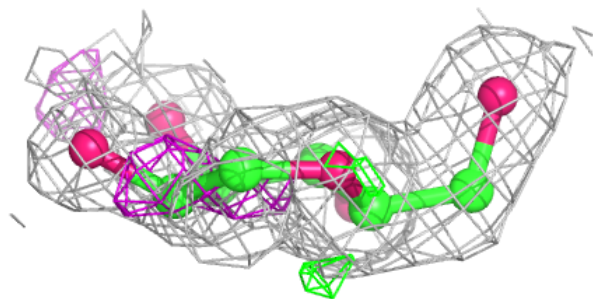
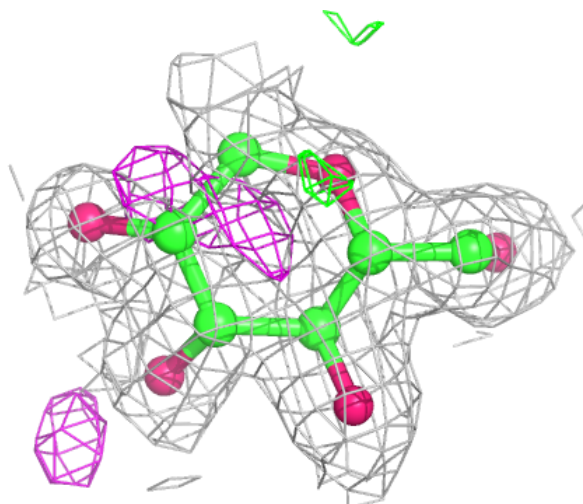
Electron density around MAN A 802:

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



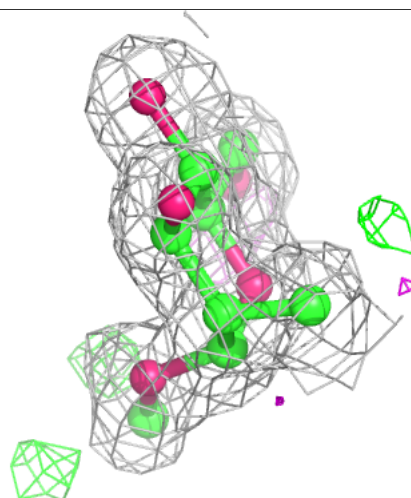
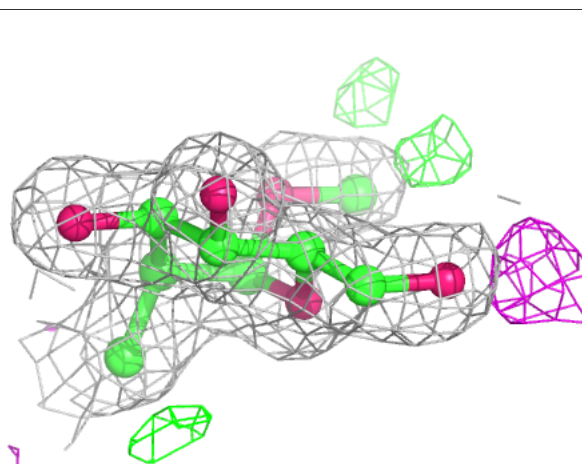
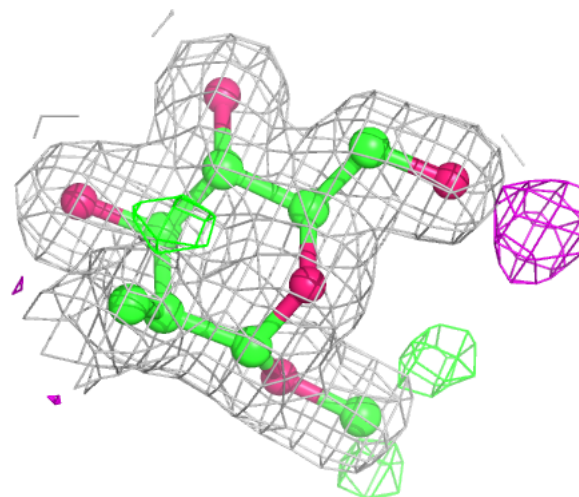
Electron density around MAN B 802:

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



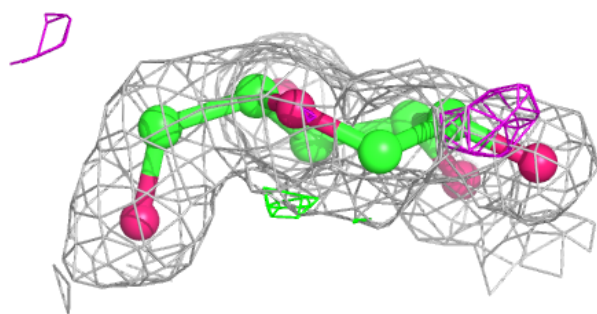
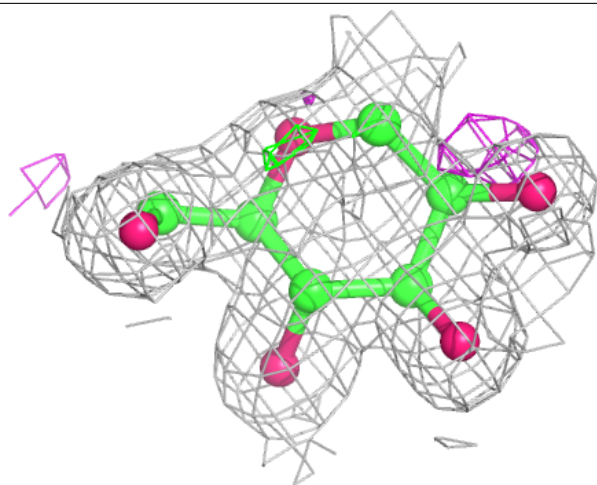
Electron density around 5II D 801:

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



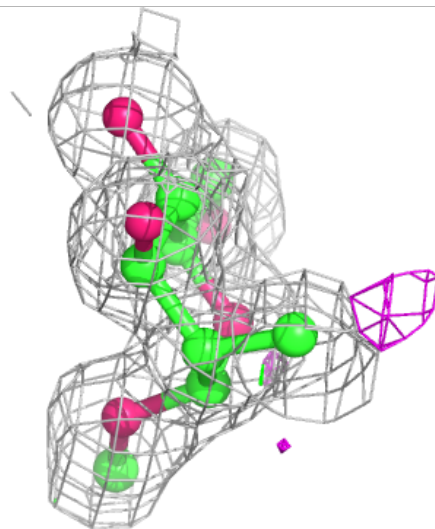
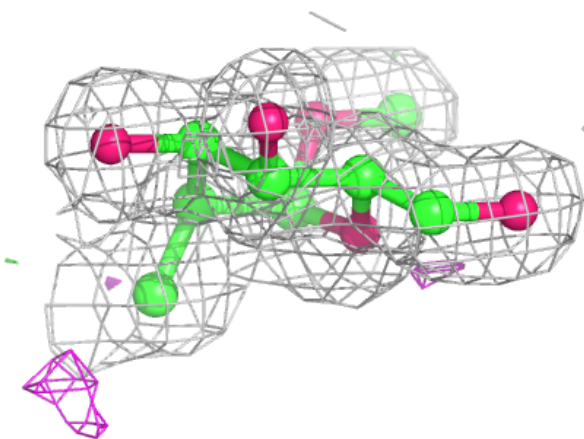
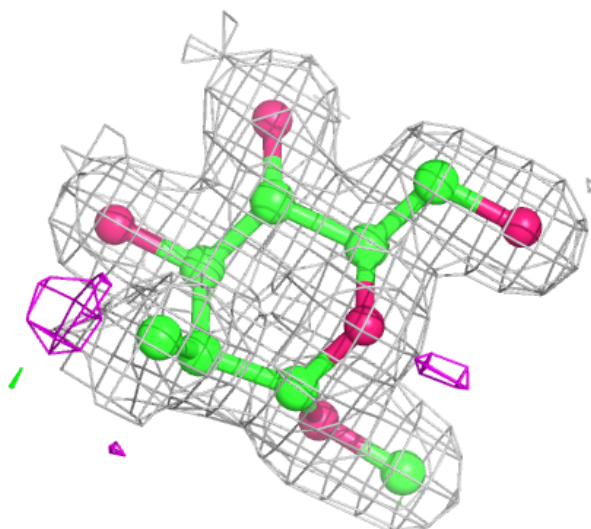
Electron density around MAN C 802:

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



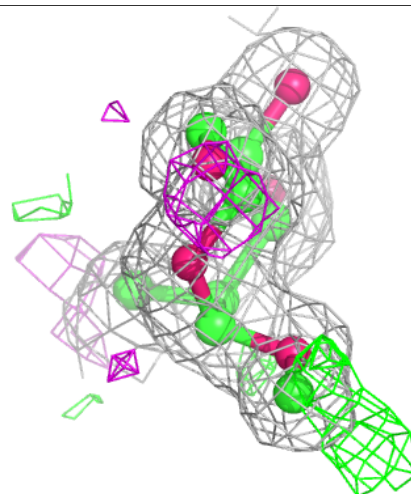
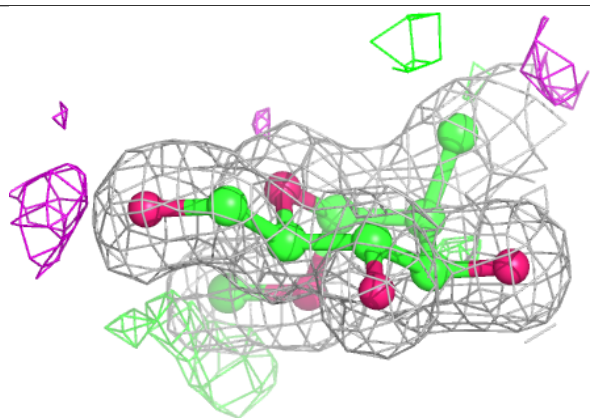
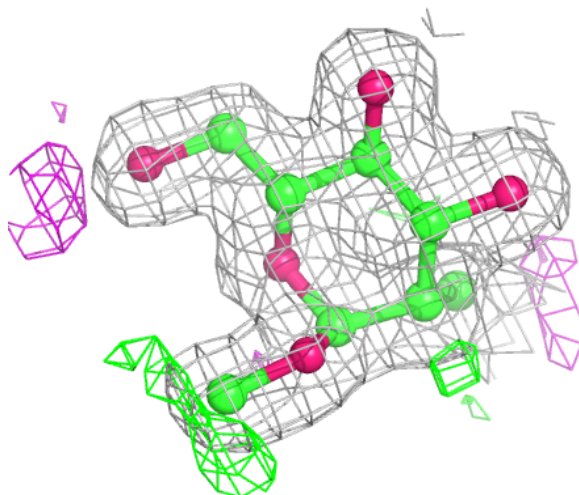
Electron density around 5II C 801:

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



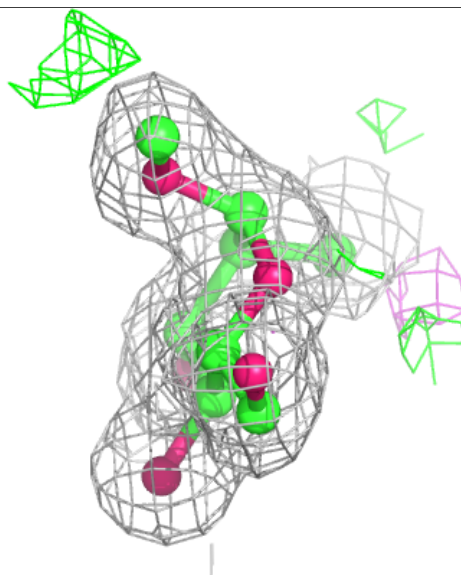
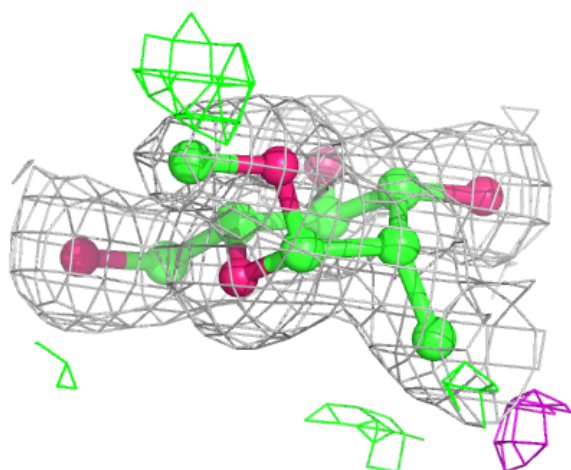
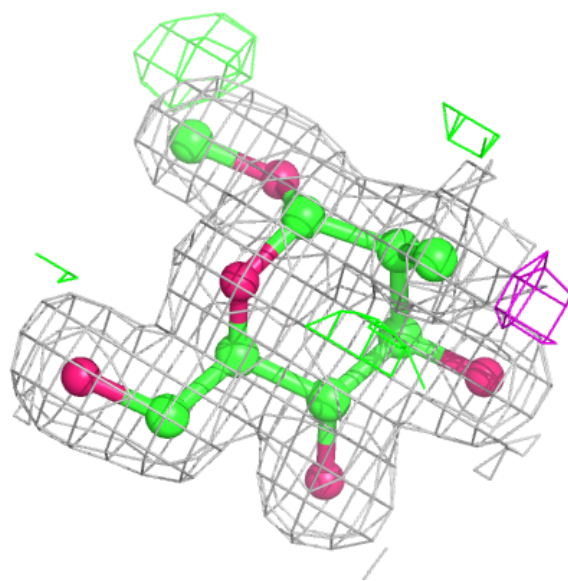
Electron density around 5II B 801:

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



Electron density around 5II A 801:

$2mF_o-DF_c$ (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.