



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 23, 2023 – 12:29 AM EDT

PDB ID : 3CAP
Title : Crystal Structure of Native Opsin: the G Protein-Coupled Receptor Rhodopsin in its Ligand-free State
Authors : Park, J.H.; Scheerer, P.; Hofmann, K.P.; Choe, H.-W.; Ernst, O.P.
Deposited on : 2008-02-20
Resolution : 2.90 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 : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
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) : 2.36

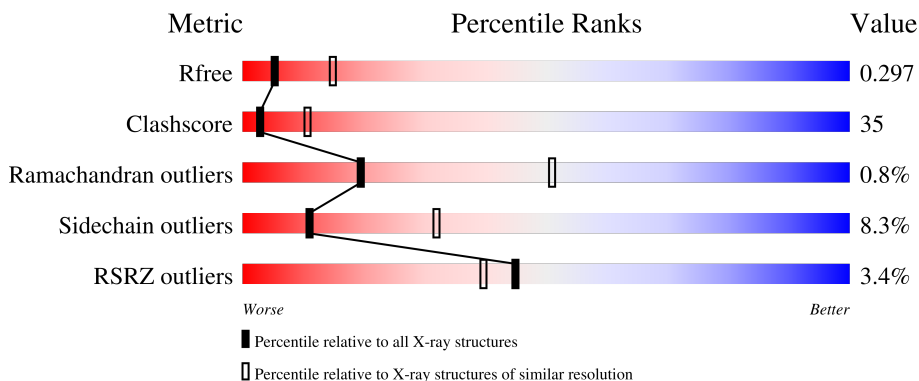
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 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	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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	348	 2% 50% 39% 5% 6%
1	B	348	 4% 54% 34% 6% 6%
2	C	4	 25% 50% 25%
2	E	4	 25% 75%
3	D	2	 100%

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Mol	Chain	Length	Quality of chain
3	F	2	 100%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	NAG	D	1	-	-	X	-
3	NAG	F	1	-	-	X	-
4	BGL	A	804	-	-	-	X
4	BGL	B	805	-	-	-	X
4	BGL	B	806	X	-	-	-
5	PLM	B	902	-	-	-	X

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 5504 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 Rhodopsin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	326	2592	1725	400	441	26	0	0	0
1	B	326	2592	1725	400	441	26	0	0	0

- Molecule 2 is an oligosaccharide called beta-D-mannopyranose-(1-3)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



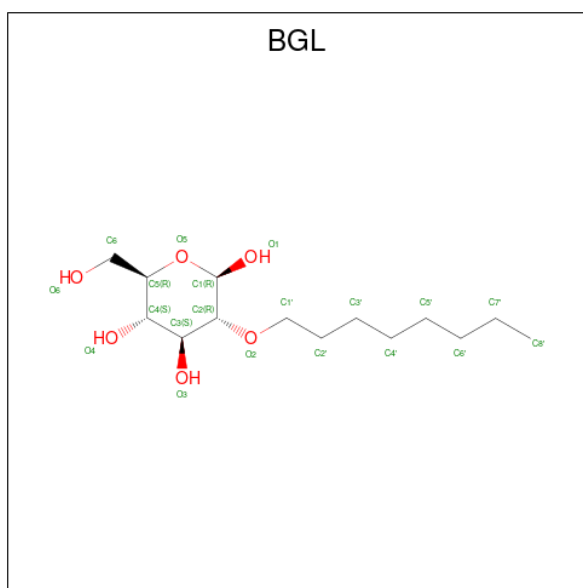
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	C	4	50	28	2	20	0	0	0
2	E	4	50	28	2	20	0	0	0

- Molecule 3 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



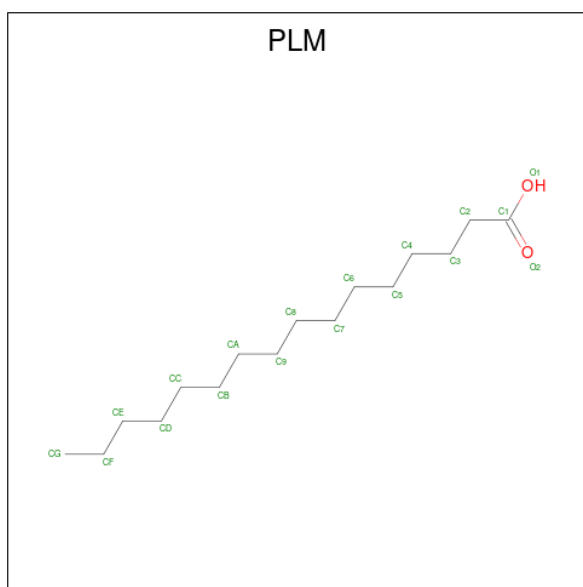
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	D	2	28	16	2	10	0	0	0
3	F	2	28	16	2	10	0	0	0

- Molecule 4 is 2-O-octyl-beta-D-glucopyranose (three-letter code: BGL) (formula: $C_{14}H_{28}O_6$).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	C O	0	0
			20	14 6		
4	A	1	Total	C O	0	0
			20	14 6		
4	A	1	Total	C O	0	0
			20	14 6		
4	A	1	Total	C O	0	0
			20	14 6		
4	B	1	Total	C O	0	0
			20	14 6		
4	B	1	Total	C O	0	0
			20	14 6		

- Molecule 5 is PALMITIC ACID (three-letter code: PLM) (formula: $C_{16}H_{32}O_2$).



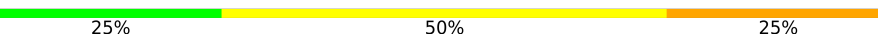
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 17 16 1	0	0
5	B	1	Total C O 17 16 1	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	5	Total O 5 5	0	0
6	B	5	Total O 5 5	0	0

ALA

- Molecule 2: beta-D-mannopyranose-(1-3)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain C:  25% 50% 25%



MAG1
MAG2
BM13
BM14

- Molecule 2: beta-D-mannopyranose-(1-3)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain E:  25% 75%



MAG1
MAG2
BM13
BM14

- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain D:  100%



MAG1
MAG2

- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain F:  100%



MAG1
MAG2

4 Data and refinement statistics

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, α , β , γ	242.92Å 242.92Å 110.42Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	50.00 – 2.90 47.48 – 2.91	Depositor EDS
% Data completeness (in resolution range)	99.1 (50.00-2.90) 99.1 (47.48-2.91)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.79 (at 2.91Å)	Xtrriage
Refinement program	CNS, REFMAC 5.2.0019	Depositor
R, R_{free}	0.229 , 0.266 0.260 , 0.297	Depositor DCC
R_{free} test set	2691 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å ²)	68.2	Xtrriage
Anisotropy	0.113	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 21.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.54$, $\langle L^2 \rangle = 0.38$	Xtrriage
Estimated twinning fraction	0.477 for h,-h-k,-l	Xtrriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	5504	wwPDB-VP
Average B, all atoms (Å ²)	53.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.80% 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: BMA, BGL, NAG, PLM

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	0.45	0/2674	0.59	0/3643
1	B	0.45	0/2674	0.60	0/3643
All	All	0.45	0/5348	0.60	0/7286

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2592	0	2568	188	0
1	B	2592	0	2568	171	0
2	C	50	0	43	4	0
2	E	50	0	43	8	0
3	D	28	0	25	8	0
3	F	28	0	25	7	0
4	A	80	0	112	14	0
4	B	40	0	56	5	0
5	A	17	0	31	6	0
5	B	17	0	31	3	0
6	A	5	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	5	0	0	0	0
All	All	5504	0	5502	384	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 35.

All (384) 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:39:MET:HA	1:B:39:MET:CE	1.67	1.23
1:B:155:MET:HA	1:B:155:MET:CE	1.69	1.23
1:A:2:ASN:CB	1:A:282:ASP:HB3	1.69	1.21
1:A:78:ASN:HD21	1:A:160:THR:HG21	1.14	1.12
1:B:155:MET:HA	1:B:155:MET:HE2	1.25	1.10
1:A:311:LYS:HD3	1:A:311:LYS:H	1.20	1.06
1:B:311:LYS:H	1:B:311:LYS:HD3	0.93	1.04
1:B:39:MET:HA	1:B:39:MET:HE2	1.06	1.04
1:A:305:ILE:HA	1:A:309:MET:CE	1.88	1.04
1:A:78:ASN:ND2	1:A:160:THR:HG21	1.72	1.03
1:B:311:LYS:H	1:B:311:LYS:CD	1.70	1.03
1:B:2:ASN:CG	1:B:282:ASP:HB3	1.79	1.02
3:D:1:NAG:O3	3:D:1:NAG:H83	1.59	1.01
1:B:311:LYS:HD3	1:B:311:LYS:N	1.74	1.01
1:A:223:TYR:CZ	1:A:257:MET:HE1	1.96	1.00
1:A:4:THR:HG22	1:A:13:PHE:O	1.61	1.00
1:A:305:ILE:HA	1:A:309:MET:HE2	1.37	1.00
1:A:44:MET:O	1:A:48:ILE:HG13	1.61	1.00
1:B:4:THR:HG22	1:B:13:PHE:O	1.61	0.98
1:A:2:ASN:CG	1:A:282:ASP:HB3	1.83	0.98
1:B:1:MET:HA	3:F:1:NAG:HN2	1.25	0.97
1:B:2:ASN:CB	1:B:282:ASP:HB3	1.95	0.95
1:B:44:MET:CE	1:B:91:PHE:HA	1.96	0.95
1:A:252:ARG:NH1	1:A:252:ARG:HB2	1.82	0.93
1:B:44:MET:O	1:B:48:ILE:HG13	1.68	0.93
1:A:4:THR:HG21	1:A:20:VAL:HG21	1.50	0.93
1:A:123:ILE:HG23	1:A:160:THR:HG23	1.48	0.92
1:B:149:GLY:H	1:B:152:HIS:HD2	1.11	0.91
1:B:39:MET:CE	1:B:39:MET:CA	2.46	0.91
1:A:311:LYS:HD3	1:A:311:LYS:N	1.86	0.90
1:B:325:LYS:O	1:B:326:ASN:HB2	1.69	0.90
1:B:86:MET:HE2	1:B:299:ALA:HB2	1.51	0.90

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:252:ARG:HB2	1:A:252:ARG:HH11	1.35	0.89
1:B:155:MET:CE	1:B:155:MET:CA	2.48	0.89
1:B:293:PHE:O	1:B:297:THR:HG22	1.73	0.89
1:A:28:GLN:O	1:A:31:LEU:HD23	1.74	0.88
1:A:324:GLY:O	1:A:325:LYS:HG3	1.73	0.88
3:F:1:NAG:H61	3:F:2:NAG:C2	2.04	0.87
1:B:39:MET:HE2	1:B:39:MET:CA	1.99	0.87
1:A:28:GLN:HB3	1:A:31:LEU:HD22	1.56	0.87
1:A:301:TYR:HB3	5:B:902:PLM:HB2	1.56	0.86
1:A:293:PHE:O	1:A:297:THR:HG22	1.75	0.86
1:A:28:GLN:O	1:A:31:LEU:CD2	2.24	0.85
1:A:223:TYR:CZ	1:A:257:MET:CE	2.59	0.85
1:A:2:ASN:CB	1:A:282:ASP:CB	2.52	0.85
1:B:275:ILE:HG12	1:B:283:PHE:CE1	2.12	0.85
1:A:114:GLY:O	1:A:118:THR:HG23	1.76	0.84
1:B:324:GLY:O	1:B:325:LYS:HG3	1.77	0.84
1:B:310:ASN:HD21	1:B:313:PHE:H	1.23	0.84
1:B:155:MET:HA	1:B:155:MET:HE3	1.57	0.84
1:B:4:THR:CG2	1:B:13:PHE:O	2.26	0.83
1:A:2:ASN:HB3	1:A:282:ASP:HB3	1.60	0.83
1:B:4:THR:HG21	1:B:20:VAL:HG21	1.61	0.82
1:B:86:MET:CE	1:B:299:ALA:HB2	2.09	0.81
1:A:70:THR:HG22	1:A:71:PRO:HD2	1.63	0.81
1:B:15:ASN:OD1	1:B:18:GLY:HA2	1.79	0.81
1:A:70:THR:CG2	1:A:71:PRO:HD2	2.11	0.81
4:B:806:BGL:O1	4:B:806:BGL:H1'1	1.76	0.80
1:A:125:LEU:CD1	1:A:261:PHE:HE1	1.95	0.79
1:B:310:ASN:HD21	1:B:313:PHE:N	1.80	0.79
1:A:4:THR:CG2	1:A:13:PHE:O	2.31	0.78
1:B:125:LEU:HD23	1:B:126:TRP:N	1.99	0.78
1:A:66:LYS:CA	1:A:69:ARG:HH11	1.97	0.78
1:A:2:ASN:HB2	1:A:282:ASP:HB3	1.66	0.78
1:A:78:ASN:HD21	1:A:160:THR:CG2	1.97	0.77
1:A:86:MET:HE2	1:A:299:ALA:HB2	1.64	0.77
1:A:322:CYS:HA	5:A:901:PLM:H21	1.67	0.77
1:B:44:MET:HE1	1:B:91:PHE:HA	1.64	0.77
1:B:31:LEU:C	1:B:31:LEU:HD12	2.05	0.77
1:A:252:ARG:HH11	1:A:252:ARG:CB	1.97	0.77
1:B:281:SER:O	1:B:283:PHE:CD2	2.37	0.77
1:A:325:LYS:O	1:A:326:ASN:HB2	1.84	0.76
1:A:52:PHE:HB3	1:A:53:PRO:HD3	1.67	0.76

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:155:MET:CA	1:B:155:MET:HE3	2.14	0.76
5:A:901:PLM:CB	1:B:301:TYR:HB3	2.15	0.76
1:A:281:SER:O	1:A:283:PHE:CD1	2.39	0.76
1:B:1:MET:HA	3:F:1:NAG:N2	2.00	0.75
1:B:293:PHE:HD1	1:B:294:PHE:N	1.85	0.75
1:A:311:LYS:H	1:A:311:LYS:CD	1.98	0.75
1:A:28:GLN:HB3	1:A:31:LEU:CD2	2.17	0.75
3:D:1:NAG:H83	3:D:1:NAG:HO3	1.48	0.75
1:B:281:SER:O	1:B:283:PHE:CE2	2.39	0.75
1:A:123:ILE:HG23	1:A:160:THR:CG2	2.17	0.74
1:B:97:THR:CG2	1:B:185:CYS:HB3	2.17	0.74
1:B:325:LYS:O	1:B:326:ASN:CB	2.36	0.74
1:A:86:MET:CE	1:A:299:ALA:HB2	2.19	0.73
1:B:149:GLY:H	1:B:152:HIS:CD2	2.00	0.73
1:B:310:ASN:ND2	1:B:313:PHE:HB3	2.03	0.73
1:B:149:GLY:N	1:B:152:HIS:HD2	1.87	0.73
3:D:1:NAG:O3	3:D:1:NAG:C8	2.35	0.73
3:F:1:NAG:H61	3:F:2:NAG:N2	2.02	0.73
1:A:325:LYS:O	1:A:326:ASN:CB	2.35	0.73
2:C:3:BMA:C2	2:C:4:BMA:O2	2.37	0.73
3:F:1:NAG:H61	3:F:2:NAG:H2	1.69	0.72
1:A:163:MET:HA	1:A:163:MET:CE	2.19	0.72
1:B:293:PHE:C	1:B:293:PHE:CD1	2.63	0.72
1:A:264:CYS:HB2	1:A:301:TYR:OH	1.90	0.72
1:B:310:ASN:ND2	1:B:310:ASN:O	2.23	0.71
2:E:3:BMA:H3	2:E:4:BMA:O2	1.90	0.71
1:A:2:ASN:OD1	3:D:1:NAG:H2	1.90	0.70
1:A:163:MET:HA	1:A:163:MET:HE2	1.72	0.70
1:A:150:GLU:O	1:A:154:ILE:HG12	1.92	0.70
1:B:302:ASN:HB2	1:B:303:PRO:HD3	1.72	0.70
1:B:107:PRO:O	1:B:110:CYS:HB3	1.90	0.70
1:B:194:PRO:O	1:B:196:GLU:HG2	1.92	0.70
1:B:310:ASN:OD1	1:B:312:GLN:HB3	1.92	0.69
1:A:113:GLU:C	1:A:113:GLU:OE1	2.30	0.69
2:E:3:BMA:H2	2:E:4:BMA:O2	1.93	0.68
1:B:44:MET:HE2	1:B:91:PHE:HA	1.76	0.68
5:A:901:PLM:HB1	1:B:301:TYR:HB3	1.74	0.67
1:A:221:PHE:O	1:A:225:GLN:HG2	1.94	0.67
1:A:266:LEU:HB3	1:A:267:PRO:HD3	1.77	0.67
1:B:6:GLY:HA3	1:B:9:PHE:CZ	2.29	0.67
2:C:3:BMA:H2	2:C:4:BMA:O2	1.94	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:802:BGL:H8'2	4:A:802:BGL:H4'1	1.76	0.67
1:A:189:ILE:HD13	1:A:203:PHE:HE2	1.60	0.66
1:A:2:ASN:OD1	1:A:282:ASP:N	2.27	0.66
1:A:171:PRO:HA	1:A:175:TRP:O	1.94	0.66
1:A:57:LEU:HD11	1:A:321:LEU:HD21	1.77	0.66
1:A:66:LYS:HA	1:A:69:ARG:HH11	1.61	0.65
1:B:128:LEU:HD22	1:B:306:TYR:CZ	2.32	0.65
1:B:286:ILE:HG12	1:B:287:PHE:H	1.62	0.65
1:A:70:THR:HG22	1:A:71:PRO:CD	2.27	0.65
1:A:6:GLY:HA3	1:A:9:PHE:CZ	2.32	0.65
2:E:3:BMA:C3	2:E:4:BMA:O2	2.44	0.64
1:A:290:ILE:H	1:A:291:PRO:HD2	1.61	0.64
1:B:286:ILE:HD13	1:B:286:ILE:H	1.61	0.64
1:A:66:LYS:HA	1:A:69:ARG:HE	1.61	0.64
5:A:901:PLM:HB2	1:B:301:TYR:HB3	1.78	0.64
1:A:27:PRO:HB3	1:A:29:TYR:CE2	2.33	0.64
1:A:301:TYR:CB	5:B:902:PLM:HB2	2.27	0.64
1:A:281:SER:O	1:A:283:PHE:CE1	2.51	0.64
1:B:2:ASN:OD1	3:F:1:NAG:C2	2.44	0.64
1:A:128:LEU:HD22	1:A:306:TYR:CZ	2.33	0.63
1:A:2:ASN:HB2	1:A:282:ASP:CB	2.26	0.63
1:B:31:LEU:C	1:B:31:LEU:CD1	2.67	0.63
1:B:15:ASN:OD1	1:B:18:GLY:CA	2.46	0.63
1:B:290:ILE:N	1:B:291:PRO:HD2	2.14	0.63
1:A:133:ILE:HD11	1:A:218:VAL:HG11	1.81	0.63
1:B:266:LEU:HB3	1:B:267:PRO:HD3	1.81	0.63
1:A:290:ILE:N	1:A:291:PRO:HD2	2.14	0.62
1:B:169:ALA:HB3	1:B:170:PRO:HD3	1.81	0.62
4:B:806:BGL:O1	4:B:806:BGL:C1'	2.47	0.62
1:A:293:PHE:HD2	1:A:294:PHE:N	1.97	0.62
1:A:223:TYR:OH	1:A:257:MET:HE1	1.98	0.62
4:A:804:BGL:O1	4:A:804:BGL:H1'2	2.00	0.62
1:B:287:PHE:C	1:B:287:PHE:CD2	2.73	0.62
1:A:310:ASN:OD1	1:A:312:GLN:HB3	2.00	0.61
2:E:3:BMA:C2	2:E:4:BMA:O2	2.48	0.61
1:A:293:PHE:C	1:A:293:PHE:CD2	2.74	0.61
1:B:44:MET:CE	1:B:91:PHE:CA	2.77	0.61
1:A:2:ASN:HB3	1:A:282:ASP:CB	2.26	0.61
1:B:43:TYR:OH	1:B:297:THR:HB	2.01	0.61
1:B:2:ASN:CB	1:B:282:ASP:CB	2.77	0.61
1:A:220:PHE:CE2	4:A:803:BGL:H8'1	2.36	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:59:LEU:HD23	1:A:77:LEU:HD12	1.82	0.60
4:A:801:BGL:H6'1	4:A:801:BGL:O1	2.00	0.60
1:B:97:THR:HG21	1:B:185:CYS:O	2.02	0.60
4:B:806:BGL:O1	4:B:806:BGL:H3'1	2.01	0.60
1:A:223:TYR:CE1	1:A:257:MET:CE	2.85	0.60
1:A:275:ILE:HG12	1:A:283:PHE:CE2	2.37	0.59
1:B:133:ILE:HD11	1:B:218:VAL:HG11	1.84	0.59
1:A:65:HIS:CD2	1:A:316:CYS:HB3	2.37	0.59
1:A:311:LYS:HA	1:A:314:ARG:NH2	2.16	0.59
1:B:97:THR:HG23	1:B:185:CYS:HB3	1.85	0.59
1:B:193:THR:C	1:B:195:HIS:H	2.07	0.59
1:A:293:PHE:CD2	1:A:294:PHE:N	2.71	0.58
1:A:279:GLN:HA	1:A:279:GLN:OE1	2.03	0.58
1:B:66:LYS:HA	1:B:69:ARG:NH2	2.17	0.58
1:B:171:PRO:HA	1:B:175:TRP:O	2.03	0.58
1:A:313:PHE:C	1:A:313:PHE:CD2	2.76	0.58
1:B:273:PHE:C	1:B:273:PHE:CD2	2.77	0.58
1:A:15:ASN:OD1	1:A:18:GLY:HA2	2.02	0.58
1:A:216:LEU:HD23	1:A:216:LEU:C	2.24	0.58
1:A:231:LYS:NZ	4:A:803:BGL:H3	2.18	0.58
1:A:66:LYS:CB	1:A:69:ARG:HH11	2.17	0.57
1:A:319:THR:HG23	1:A:324:GLY:O	2.03	0.57
1:B:293:PHE:CD1	1:B:294:PHE:N	2.69	0.57
1:A:2:ASN:OD1	1:A:282:ASP:HB3	2.03	0.57
1:B:52:PHE:HB3	1:B:53:PRO:HD3	1.86	0.57
1:A:100:HIS:CE1	4:A:804:BGL:H2'1	2.39	0.57
1:B:154:ILE:O	1:B:155:MET:C	2.42	0.57
1:B:310:ASN:HD21	1:B:313:PHE:HB3	1.70	0.57
1:B:178:TYR:O	1:B:179:ILE:CG2	2.53	0.57
1:B:189:ILE:HD13	1:B:203:PHE:HE2	1.70	0.57
1:B:2:ASN:OD1	3:F:1:NAG:H2	2.05	0.57
2:C:3:BMA:C2	2:C:4:BMA:HO2	2.17	0.57
1:B:311:LYS:CD	1:B:311:LYS:N	2.50	0.57
1:A:298:SER:HA	1:A:301:TYR:CE2	2.40	0.56
4:A:802:BGL:C1'	4:A:802:BGL:O1	2.52	0.56
1:B:170:PRO:HB2	1:B:171:PRO:HD3	1.86	0.56
1:B:286:ILE:H	1:B:286:ILE:CD1	2.18	0.56
1:A:220:PHE:CD2	4:A:803:BGL:H8'1	2.41	0.56
1:A:275:ILE:HG12	1:A:283:PHE:CZ	2.41	0.56
1:B:71:PRO:HA	1:B:74:TYR:CE1	2.40	0.56
1:A:288:MET:HA	1:A:288:MET:CE	2.36	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:284:GLY:HA3	1:B:286:ILE:HD13	1.88	0.56
1:B:31:LEU:HD12	1:B:32:ALA:N	2.22	0.55
1:B:313:PHE:C	1:B:313:PHE:CD2	2.79	0.55
1:A:47:LEU:HB3	1:A:91:PHE:CD2	2.41	0.55
1:A:163:MET:CE	1:A:163:MET:CA	2.84	0.55
1:A:2:ASN:OD1	3:D:1:NAG:C2	2.50	0.55
1:A:35:TRP:CD1	4:B:805:BGL:H4'1	2.41	0.55
1:B:196:GLU:C	1:B:198:THR:H	2.09	0.54
1:B:97:THR:CG2	1:B:98:SER:N	2.70	0.54
1:A:125:LEU:HD13	1:A:261:PHE:HE1	1.72	0.54
1:B:287:PHE:HD2	1:B:288:MET:N	2.06	0.54
1:A:134:GLU:O	1:A:138:VAL:HG13	2.07	0.54
1:A:302:ASN:HB2	1:A:303:PRO:HD3	1.89	0.54
1:A:71:PRO:HA	1:A:74:TYR:CE1	2.43	0.54
1:B:107:PRO:O	1:B:110:CYS:CB	2.56	0.54
1:A:119:LEU:O	1:A:123:ILE:HG13	2.08	0.54
1:A:239:GLU:OE2	1:A:239:GLU:N	2.35	0.54
1:A:28:GLN:CB	1:A:31:LEU:CD2	2.84	0.54
1:A:223:TYR:OH	1:A:257:MET:CE	2.54	0.54
1:B:15:ASN:HD22	2:E:1:NAG:H83	1.72	0.54
1:B:302:ASN:CB	1:B:303:PRO:HD3	2.38	0.53
1:B:283:PHE:CD2	1:B:283:PHE:N	2.76	0.53
1:A:1:MET:HA	3:D:1:NAG:HN2	1.74	0.53
1:A:298:SER:HA	1:A:301:TYR:CZ	2.43	0.53
1:A:223:TYR:HB3	1:A:254:VAL:CG1	2.39	0.53
1:A:314:ARG:O	1:A:318:VAL:HG23	2.09	0.53
1:B:264:CYS:HB2	1:B:301:TYR:OH	2.08	0.53
1:A:40:LEU:HB2	1:A:183:MET:HE2	1.92	0.52
1:A:71:PRO:HA	1:A:74:TYR:CD1	2.44	0.52
1:B:71:PRO:HA	1:B:74:TYR:CD1	2.44	0.52
1:A:283:PHE:HD2	1:A:287:PHE:CE2	2.27	0.52
1:B:97:THR:HG22	1:B:98:SER:N	2.24	0.52
1:A:193:THR:O	1:A:195:HIS:N	2.39	0.52
1:A:286:ILE:HD13	1:A:286:ILE:H	1.72	0.52
1:A:125:LEU:HD11	1:A:261:PHE:HE1	1.70	0.52
1:A:276:PHE:C	1:A:276:PHE:CD2	2.83	0.52
1:A:275:ILE:HD11	1:A:288:MET:HE1	1.91	0.52
1:B:279:GLN:OE1	1:B:279:GLN:HA	2.08	0.52
1:B:27:PRO:HB3	1:B:29:TYR:CE2	2.45	0.51
1:B:214:ILE:HB	1:B:215:PRO:HD3	1.92	0.51
1:B:310:ASN:HD21	1:B:313:PHE:CB	2.23	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:231:LYS:HE2	4:A:803:BGL:H1	1.92	0.51
1:B:194:PRO:O	1:B:196:GLU:CG	2.59	0.51
1:A:196:GLU:C	1:A:198:THR:H	2.14	0.51
2:E:3:BMA:O2	2:E:4:BMA:O5	2.27	0.51
1:B:273:PHE:CD2	1:B:273:PHE:O	2.63	0.51
1:B:290:ILE:H	1:B:291:PRO:HD2	1.75	0.51
1:B:39:MET:N	1:B:39:MET:HE3	2.26	0.50
1:B:193:THR:O	1:B:195:HIS:N	2.44	0.50
1:A:284:GLY:HA3	1:A:286:ILE:HD13	1.94	0.50
1:B:2:ASN:HB2	1:B:282:ASP:HB3	1.86	0.50
1:B:284:GLY:HA3	1:B:286:ILE:CD1	2.42	0.50
4:B:806:BGL:O1	4:B:806:BGL:C3'	2.59	0.50
1:A:66:LYS:CB	1:A:69:ARG:NH1	2.75	0.49
1:A:273:PHE:C	1:A:273:PHE:CD2	2.86	0.49
1:A:76:LEU:HD21	1:A:131:LEU:HD22	1.95	0.49
1:B:286:ILE:HG12	1:B:287:PHE:N	2.27	0.49
1:A:125:LEU:CD1	1:A:261:PHE:CE1	2.85	0.48
1:B:2:ASN:OD1	1:B:282:ASP:HB3	2.12	0.48
1:A:301:TYR:HB3	5:B:902:PLM:CB	2.37	0.48
1:A:216:LEU:HD23	1:A:216:LEU:O	2.14	0.48
1:B:275:ILE:HG12	1:B:283:PHE:CZ	2.49	0.48
1:B:70:THR:HB	1:B:71:PRO:HD2	1.95	0.48
1:A:70:THR:HG23	1:A:71:PRO:HD2	1.93	0.48
1:A:119:LEU:HD12	1:A:164:ALA:HB1	1.96	0.48
1:A:125:LEU:HD11	1:A:261:PHE:CE1	2.48	0.48
3:D:1:NAG:H62	3:D:2:NAG:HN2	1.77	0.47
1:A:286:ILE:H	1:A:286:ILE:CD1	2.27	0.47
1:B:125:LEU:HD23	1:B:125:LEU:C	2.34	0.47
1:B:26:ALA:HB1	1:B:27:PRO:HD2	1.95	0.47
1:B:239:GLU:H	1:B:239:GLU:HG3	1.23	0.47
1:A:59:LEU:CD2	1:A:77:LEU:HD12	2.45	0.47
1:A:154:ILE:O	1:A:155:MET:C	2.53	0.47
1:A:312:GLN:O	1:A:315:ASN:N	2.48	0.47
1:B:196:GLU:C	1:B:198:THR:N	2.68	0.47
4:A:804:BGL:H3'1	1:B:35:TRP:CD1	2.50	0.47
1:B:65:HIS:CD2	1:B:316:CYS:HB3	2.49	0.47
1:B:155:MET:HE3	1:B:155:MET:N	2.29	0.47
1:A:223:TYR:HB3	1:A:254:VAL:HG13	1.97	0.47
1:B:66:LYS:HA	1:B:69:ARG:CZ	2.45	0.47
1:A:231:LYS:HZ1	4:A:803:BGL:H3	1.79	0.46
1:B:238:GLN:HA	1:B:244:GLN:NE2	2.30	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:304:VAL:HA	1:B:308:MET:CG	2.46	0.46
1:B:274:TYR:O	1:B:278:HIS:N	2.46	0.46
1:A:57:LEU:HD21	1:A:321:LEU:HD11	1.96	0.46
1:A:283:PHE:O	1:A:284:GLY:C	2.53	0.46
1:A:66:LYS:HA	1:A:69:ARG:NH1	2.28	0.46
1:A:284:GLY:HA3	1:A:286:ILE:CD1	2.46	0.46
1:B:39:MET:CA	1:B:39:MET:HE3	2.41	0.45
1:B:154:ILE:O	1:B:157:VAL:N	2.49	0.45
1:B:293:PHE:HD1	1:B:294:PHE:CA	2.30	0.45
1:A:133:ILE:HD11	1:A:218:VAL:CG1	2.46	0.45
1:B:178:TYR:C	1:B:179:ILE:HG23	2.37	0.45
1:A:214:ILE:HB	1:A:215:PRO:HD3	1.97	0.45
1:B:32:ALA:HB3	1:B:37:PHE:CE2	2.52	0.44
1:A:173:VAL:HG23	1:A:173:VAL:O	2.17	0.44
2:E:1:NAG:H82	2:E:1:NAG:H2	1.71	0.44
1:A:1:MET:HA	3:D:1:NAG:N2	2.31	0.44
1:A:254:VAL:CG1	4:A:803:BGL:H6'2	2.48	0.44
1:B:86:MET:HE1	1:B:299:ALA:HB2	1.96	0.44
1:B:259:ILE:O	1:B:263:ILE:HG13	2.18	0.44
1:B:310:ASN:ND2	1:B:313:PHE:H	2.03	0.44
1:B:178:TYR:O	1:B:179:ILE:HG23	2.18	0.44
1:B:193:THR:C	1:B:195:HIS:N	2.71	0.44
1:A:284:GLY:CA	1:A:286:ILE:HD13	2.48	0.44
1:B:231:LYS:NZ	1:B:251:THR:HG21	2.33	0.44
1:A:28:GLN:O	1:A:31:LEU:HD22	2.13	0.43
1:A:288:MET:HA	1:A:288:MET:HE3	2.00	0.43
1:B:124:ALA:O	1:B:127:SER:HB2	2.17	0.43
1:A:312:GLN:O	1:A:313:PHE:C	2.57	0.43
1:B:200:ASN:O	1:B:204:VAL:HG23	2.18	0.43
1:A:15:ASN:OD1	1:A:18:GLY:CA	2.65	0.43
1:A:193:THR:C	1:A:195:HIS:H	2.18	0.43
1:A:287:PHE:CD2	1:A:287:PHE:C	2.91	0.43
1:A:324:GLY:C	1:A:325:LYS:HG3	2.35	0.43
5:A:901:PLM:HB2	1:B:301:TYR:CB	2.47	0.43
1:A:66:LYS:HB2	1:A:66:LYS:HE2	1.68	0.43
1:A:83:ASP:O	1:A:87:VAL:HG23	2.18	0.43
1:A:200:ASN:O	1:A:204:VAL:HG23	2.19	0.43
1:A:304:VAL:HA	1:A:308:MET:CG	2.48	0.43
1:B:178:TYR:O	1:B:179:ILE:HG22	2.18	0.43
1:A:302:ASN:CB	1:A:303:PRO:HD3	2.49	0.43
1:B:50:LEU:O	1:B:54:ILE:HD13	2.19	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:39:MET:CE	1:B:39:MET:N	2.80	0.43
1:B:170:PRO:CB	1:B:171:PRO:HD3	2.49	0.43
1:A:66:LYS:HA	1:A:69:ARG:NE	2.30	0.43
1:B:37:PHE:HE1	1:B:185:CYS:SG	2.42	0.43
1:B:57:LEU:HD12	1:B:57:LEU:HA	1.89	0.43
1:B:128:LEU:HA	1:B:128:LEU:HD23	1.67	0.43
1:B:216:LEU:HA	1:B:216:LEU:HD12	1.80	0.43
1:A:196:GLU:C	1:A:198:THR:N	2.72	0.43
1:A:276:PHE:CD2	1:A:276:PHE:O	2.72	0.43
1:B:191:TYR:O	1:B:191:TYR:CD1	2.72	0.43
1:A:25:GLU:HA	1:A:25:GLU:OE2	2.19	0.43
1:B:309:MET:O	1:B:314:ARG:NH1	2.52	0.43
1:A:169:ALA:N	1:A:170:PRO:CD	2.82	0.42
1:B:54:ILE:HG21	1:B:303:PRO:HB2	2.00	0.42
1:A:50:LEU:O	1:A:53:PRO:HD2	2.18	0.42
1:A:91:PHE:N	1:A:91:PHE:CD1	2.87	0.42
1:A:124:ALA:O	1:A:127:SER:HB2	2.18	0.42
1:A:290:ILE:N	1:A:291:PRO:CD	2.81	0.42
5:A:901:PLM:CB	1:B:301:TYR:CB	2.93	0.42
1:A:214:ILE:O	1:A:215:PRO:C	2.58	0.42
1:B:287:PHE:C	1:B:287:PHE:HD2	2.16	0.42
2:C:3:BMA:H3	2:C:4:BMA:H2	1.77	0.42
1:B:91:PHE:CD1	1:B:91:PHE:N	2.85	0.42
1:B:21:ARG:HH22	2:E:2:NAG:H81	1.83	0.42
1:B:47:LEU:HD12	1:B:47:LEU:HA	1.78	0.42
1:A:125:LEU:HD13	1:A:261:PHE:CE1	2.52	0.42
4:A:802:BGL:O1	4:A:802:BGL:H1'1	2.19	0.42
1:B:2:ASN:HB2	1:B:282:ASP:CB	2.49	0.42
1:B:208:PHE:O	1:B:212:PHE:HB3	2.20	0.42
1:A:165:LEU:C	1:A:167:CYS:H	2.22	0.42
1:B:312:GLN:O	1:B:313:PHE:C	2.58	0.42
1:A:28:GLN:CB	1:A:31:LEU:HD21	2.49	0.41
1:A:177:ARG:NH1	1:A:190:ASP:OD1	2.53	0.41
1:A:43:TYR:OH	1:A:297:THR:HB	2.19	0.41
1:A:115:PHE:CD1	1:A:172:LEU:HD11	2.55	0.41
1:A:274:TYR:O	1:A:278:HIS:N	2.53	0.41
1:A:152:HIS:HA	1:A:155:MET:HE2	2.03	0.41
1:A:55:ASN:OD1	1:A:83:ASP:HB3	2.20	0.41
1:B:89:GLY:O	1:B:113:GLU:HG2	2.21	0.41
1:B:221:PHE:O	1:B:225:GLN:HG2	2.21	0.41
1:B:289:THR:O	1:B:289:THR:CG2	2.68	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:28:GLN:NE2	1:A:30:TYR:OH	2.53	0.41
1:A:39:MET:O	1:A:40:LEU:C	2.58	0.41
1:A:55:ASN:HD21	1:A:303:PRO:HG3	1.85	0.41
1:A:100:HIS:CG	1:A:104:VAL:HG11	2.56	0.41
1:A:128:LEU:HA	1:A:128:LEU:HD23	1.80	0.41
1:A:171:PRO:HB2	1:A:178:TYR:CE2	2.55	0.41
1:B:45:PHE:O	1:B:49:MET:HG2	2.20	0.41
1:A:112:LEU:HD23	1:A:112:LEU:HA	1.94	0.41
1:B:87:VAL:HA	1:B:91:PHE:CD2	2.55	0.41
1:B:181:GLU:O	1:B:184:GLN:N	2.45	0.41
1:B:283:PHE:H	1:B:283:PHE:HD2	1.69	0.41
1:A:65:HIS:CG	1:A:316:CYS:HB3	2.55	0.41
1:B:57:LEU:HD21	1:B:321:LEU:HD11	2.03	0.41
1:B:286:ILE:CG1	1:B:287:PHE:H	2.31	0.41
1:A:99:LEU:HD13	1:B:35:TRP:HB2	2.03	0.41
1:A:161:TRP:O	1:A:165:LEU:HD22	2.21	0.41
1:B:324:GLY:C	1:B:325:LYS:HG3	2.38	0.41
1:B:288:MET:O	1:B:291:PRO:HG2	2.21	0.40
1:A:154:ILE:O	1:A:157:VAL:N	2.52	0.40
1:B:103:PHE:HD1	1:B:185:CYS:O	2.04	0.40
1:A:231:LYS:HZ3	4:A:803:BGL:H3	1.85	0.40
1:B:170:PRO:N	1:B:171:PRO:CD	2.84	0.40
1:A:113:GLU:OE1	1:A:113:GLU:O	2.39	0.40
1:B:40:LEU:HD22	1:B:183:MET:HE3	2.03	0.40

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	A	324/348 (93%)	284 (88%)	38 (12%)	2 (1%)	25 58

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	324/348 (93%)	277 (86%)	44 (14%)	3 (1%)	17	48
All	All	648/696 (93%)	561 (87%)	82 (13%)	5 (1%)	19	51

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	284	GLY
1	A	279	GLN
1	B	194	PRO
1	A	182	GLY
1	B	107	PRO

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	A	278/296 (94%)	255 (92%)	23 (8%)	11	32
1	B	278/296 (94%)	255 (92%)	23 (8%)	11	32
All	All	556/592 (94%)	510 (92%)	46 (8%)	11	32

All (46) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	ASN
1	A	4	THR
1	A	17	THR
1	A	47	LEU
1	A	66	LYS
1	A	77	LEU
1	A	113	GLU
1	A	118	THR
1	A	138	VAL
1	A	160	THR
1	A	163	MET

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Mol	Chain	Res	Type
1	A	165	LEU
1	A	177	ARG
1	A	236	GLN
1	A	242	THR
1	A	268	TYR
1	A	276	PHE
1	A	286	ILE
1	A	287	PHE
1	A	288	MET
1	A	289	THR
1	A	293	PHE
1	A	311	LYS
1	B	2	ASN
1	B	4	THR
1	B	21	ARG
1	B	31	LEU
1	B	39	MET
1	B	46	LEU
1	B	47	LEU
1	B	93	THR
1	B	97	THR
1	B	125	LEU
1	B	138	VAL
1	B	155	MET
1	B	165	LEU
1	B	239	GLU
1	B	268	TYR
1	B	283	PHE
1	B	286	ILE
1	B	287	PHE
1	B	293	PHE
1	B	309	MET
1	B	310	ASN
1	B	311	LYS
1	B	322	CYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	28	GLN
1	A	55	ASN
1	A	64	GLN

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Mol	Chain	Res	Type
1	A	78	ASN
1	A	184	GLN
1	A	236	GLN
1	A	315	ASN
1	B	28	GLN
1	B	64	GLN
1	B	73	ASN
1	B	152	HIS
1	B	237	GLN
1	B	310	ASN
1	B	315	ASN

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](#)

12 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
2	NAG	C	1	2,1	14,14,15	0.60	0	17,19,21	1.02	0
2	NAG	C	2	2	14,14,15	0.46	0	17,19,21	1.06	2 (11%)
2	BMA	C	3	2	11,11,12	0.39	0	15,15,17	1.88	5 (33%)
2	BMA	C	4	2	11,11,12	0.31	0	15,15,17	0.92	0
3	NAG	D	1	3,1	14,14,15	0.53	0	17,19,21	1.59	4 (23%)
3	NAG	D	2	3	14,14,15	0.56	0	17,19,21	0.97	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	NAG	E	1	2,1	14,14,15	0.57	0	17,19,21	1.99	4 (23%)
2	NAG	E	2	2	14,14,15	0.47	0	17,19,21	1.61	4 (23%)
2	BMA	E	3	2	11,11,12	0.72	0	15,15,17	1.78	4 (26%)
2	BMA	E	4	2	11,11,12	0.36	0	15,15,17	0.83	0
3	NAG	F	1	3,1	14,14,15	0.64	0	17,19,21	0.97	1 (5%)
3	NAG	F	2	3	14,14,15	0.64	0	17,19,21	1.33	2 (11%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	C	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	C	2	2	-	0/6/23/26	0/1/1/1
2	BMA	C	3	2	-	0/2/19/22	0/1/1/1
2	BMA	C	4	2	-	0/2/19/22	0/1/1/1
3	NAG	D	1	3,1	-	3/6/23/26	0/1/1/1
3	NAG	D	2	3	-	4/6/23/26	0/1/1/1
2	NAG	E	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	E	2	2	-	1/6/23/26	0/1/1/1
2	BMA	E	3	2	-	0/2/19/22	0/1/1/1
2	BMA	E	4	2	-	2/2/19/22	0/1/1/1
3	NAG	F	1	3,1	-	4/6/23/26	0/1/1/1
3	NAG	F	2	3	-	6/6/23/26	0/1/1/1

There are no bond length outliers.

All (27) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	1	NAG	C2-N2-C7	-5.12	115.61	122.90
2	E	2	NAG	C2-N2-C7	-4.05	117.13	122.90
2	E	3	BMA	O5-C1-C2	-4.02	104.57	110.77
3	D	1	NAG	C1-O5-C5	3.90	117.48	112.19
2	E	1	NAG	C1-O5-C5	3.71	117.22	112.19
2	C	3	BMA	O5-C1-C2	-3.32	105.65	110.77
3	D	1	NAG	C3-C4-C5	3.26	116.05	110.24
2	E	3	BMA	C3-C4-C5	3.22	115.99	110.24
3	F	2	NAG	O5-C5-C6	3.20	112.22	107.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	3	BMA	C1-C2-C3	3.09	113.47	109.67
3	F	2	NAG	C4-C3-C2	3.01	115.43	111.02
2	E	3	BMA	O5-C5-C6	2.86	111.69	107.20
2	C	3	BMA	C3-C4-C5	2.83	115.29	110.24
2	E	2	NAG	O5-C5-C6	2.81	111.61	107.20
2	C	3	BMA	C2-C3-C4	2.69	115.55	110.89
2	E	1	NAG	O7-C7-C8	-2.41	117.59	122.06
2	C	2	NAG	C6-C5-C4	-2.39	107.41	113.00
2	E	1	NAG	C1-C2-N2	2.35	114.50	110.49
3	F	1	NAG	C3-C4-C5	-2.30	106.13	110.24
2	C	3	BMA	O2-C2-C3	-2.28	105.57	110.14
2	E	2	NAG	C1-O5-C5	2.19	115.16	112.19
3	D	1	NAG	O5-C5-C4	2.15	116.05	110.83
2	C	2	NAG	O5-C5-C6	2.14	110.56	107.20
2	E	2	NAG	O5-C1-C2	-2.11	107.96	111.29
3	D	1	NAG	C6-C5-C4	-2.08	108.14	113.00
3	D	2	NAG	C3-C4-C5	2.04	113.88	110.24
2	E	3	BMA	C2-C3-C4	2.01	114.37	110.89

There are no chirality outliers.

All (22) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	E	1	NAG	C8-C7-N2-C2
2	E	1	NAG	O7-C7-N2-C2
3	D	1	NAG	C8-C7-N2-C2
3	D	1	NAG	O7-C7-N2-C2
3	D	2	NAG	C8-C7-N2-C2
3	D	2	NAG	O7-C7-N2-C2
3	F	1	NAG	C8-C7-N2-C2
3	F	1	NAG	O7-C7-N2-C2
3	F	2	NAG	C3-C2-N2-C7
3	D	2	NAG	O5-C5-C6-O6
2	E	4	BMA	C4-C5-C6-O6
3	F	1	NAG	O5-C5-C6-O6
3	F	2	NAG	O5-C5-C6-O6
3	F	2	NAG	C1-C2-N2-C7
3	F	1	NAG	C4-C5-C6-O6
3	F	2	NAG	C4-C5-C6-O6
3	D	2	NAG	C4-C5-C6-O6
3	F	2	NAG	C8-C7-N2-C2
2	E	4	BMA	O5-C5-C6-O6

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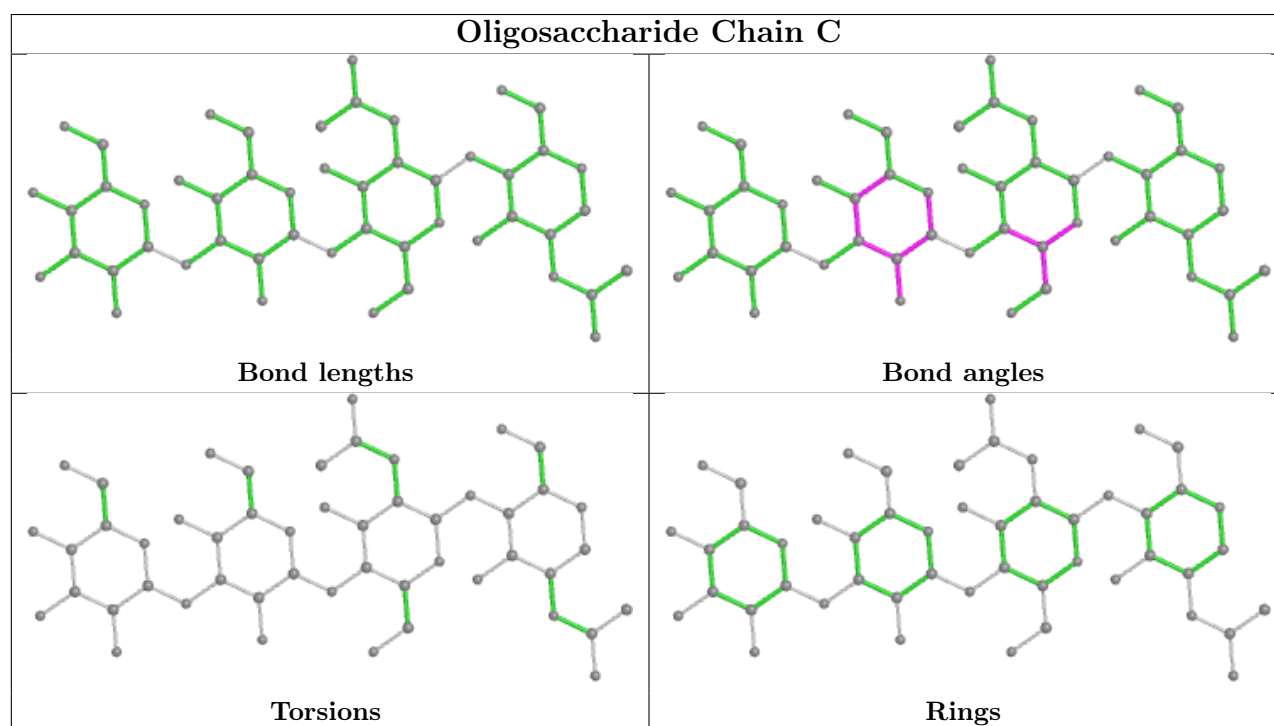
Mol	Chain	Res	Type	Atoms
3	F	2	NAG	O7-C7-N2-C2
3	D	1	NAG	C4-C5-C6-O6
2	E	2	NAG	C8-C7-N2-C2

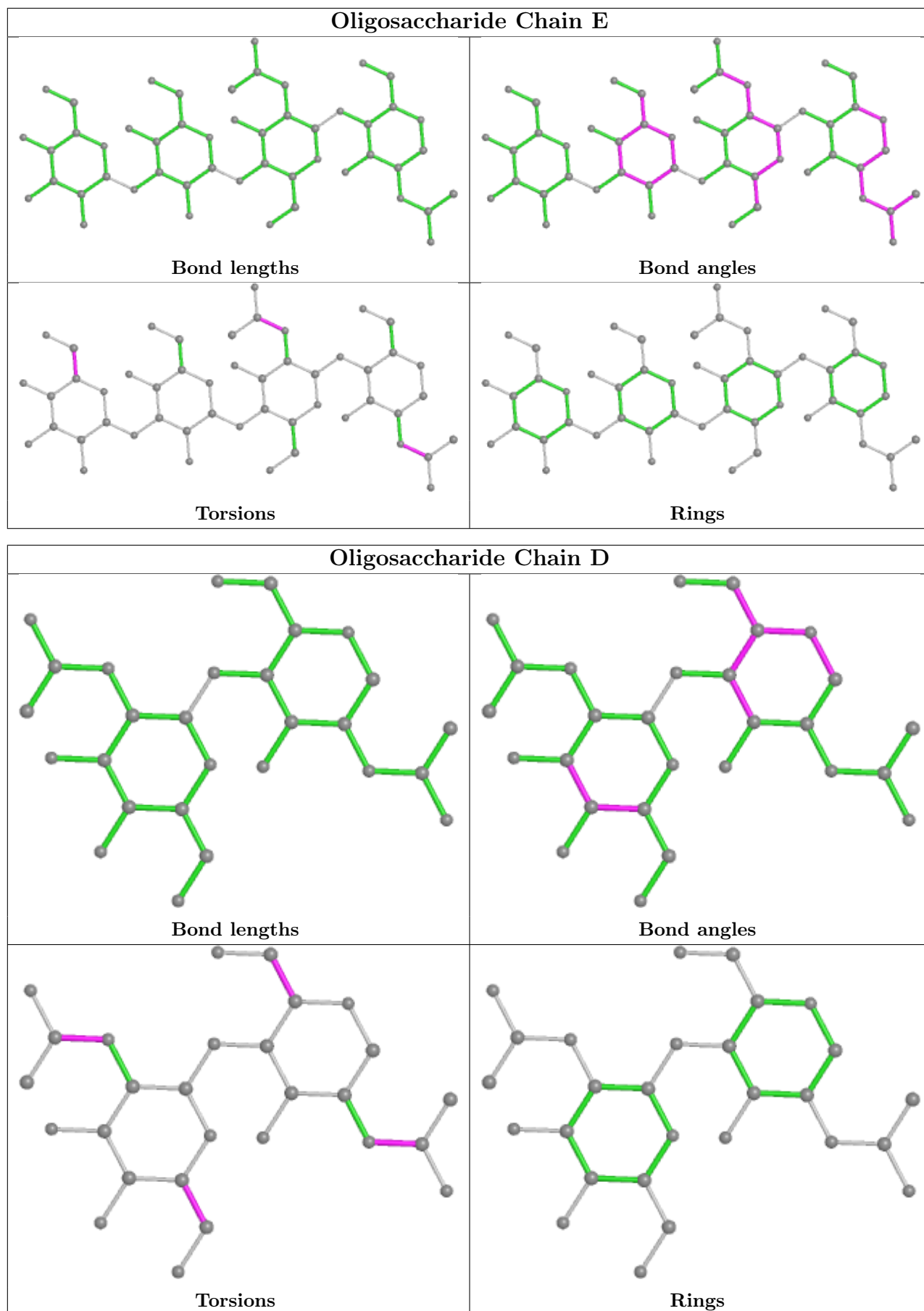
There are no ring outliers.

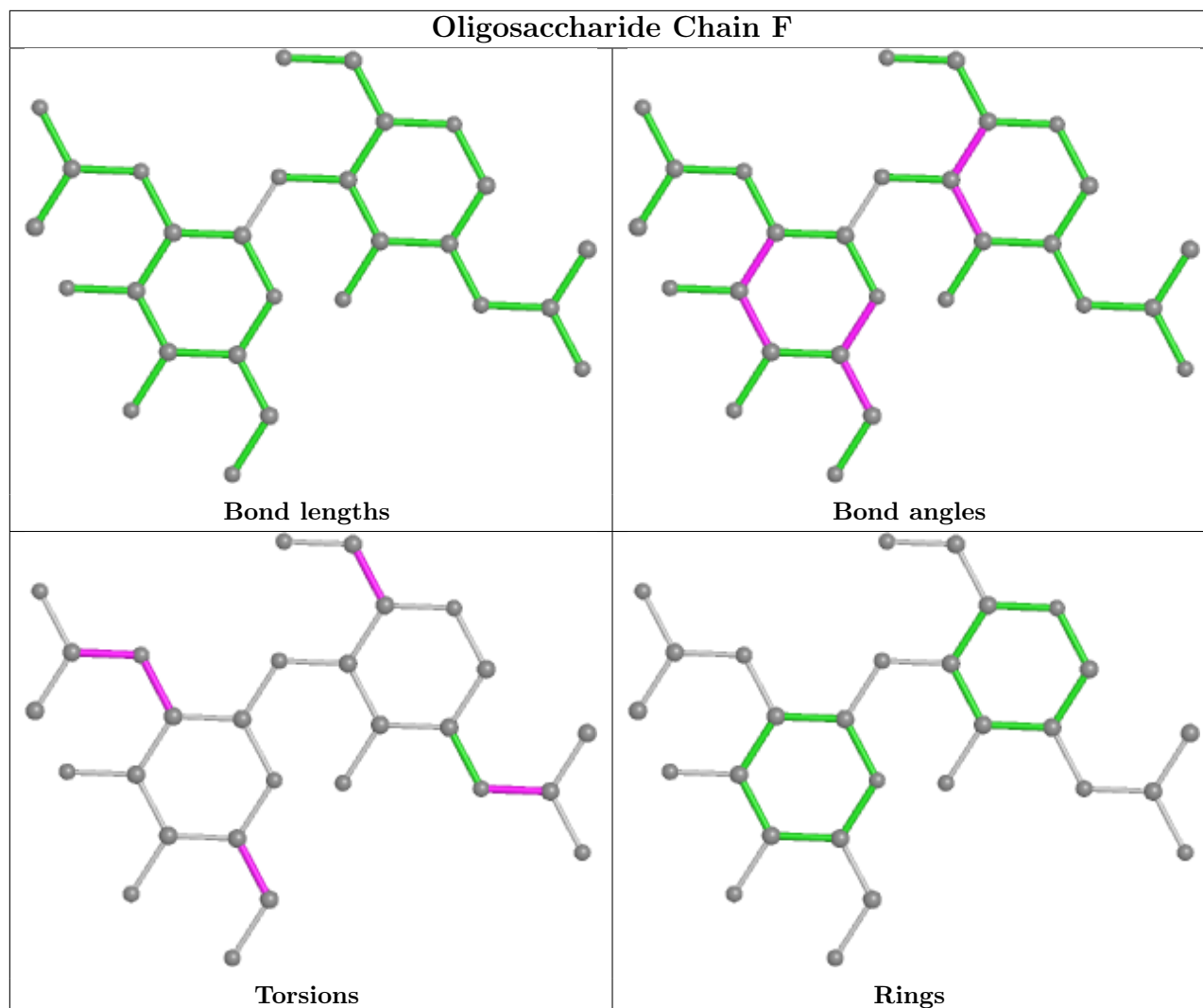
10 monomers are involved in 27 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	F	1	NAG	7	0
2	E	3	BMA	5	0
2	E	4	BMA	5	0
3	D	1	NAG	8	0
2	C	3	BMA	4	0
2	E	1	NAG	2	0
3	D	2	NAG	1	0
2	E	2	NAG	1	0
3	F	2	NAG	3	0
2	C	4	BMA	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](#)

8 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
4	BGL	A	803	-	20,20,20	0.40	0	24,25,25	0.57	0
4	BGL	A	804	-	20,20,20	0.56	0	24,25,25	0.91	1 (4%)
4	BGL	A	802	-	20,20,20	0.54	0	24,25,25	0.78	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	BGL	B	805	-	20,20,20	0.46	0	24,25,25	0.59	0
5	PLM	A	901	1	16,16,17	0.42	0	15,15,17	0.58	0
4	BGL	B	806	-	20,20,20	0.59	0	24,25,25	0.82	1 (4%)
5	PLM	B	902	1	16,16,17	0.41	0	15,15,17	0.58	0
4	BGL	A	801	-	20,20,20	0.53	0	24,25,25	0.84	1 (4%)

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	BGL	A	803	-	-	7/11/31/31	0/1/1/1
4	BGL	A	804	-	-	2/11/31/31	0/1/1/1
4	BGL	A	802	-	-	4/11/31/31	0/1/1/1
4	BGL	B	805	-	-	5/11/31/31	0/1/1/1
5	PLM	A	901	1	-	7/13/14/15	-
4	BGL	B	806	-	1/1/5/5	7/11/31/31	0/1/1/1
5	PLM	B	902	1	-	8/13/14/15	-
4	BGL	A	801	-	-	7/11/31/31	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	801	BGL	C3-C4-C5	2.40	114.52	110.24
4	A	804	BGL	C4-C3-C2	-2.19	104.69	109.68
4	B	806	BGL	C3-C4-C5	-2.08	106.53	110.24

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
4	B	806	BGL	C5

All (47) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	802	BGL	C1-C2-O2-C1'
4	B	806	BGL	C1-C2-O2-C1'

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Mol	Chain	Res	Type	Atoms
4	A	804	BGL	O5-C5-C6-O6
4	B	806	BGL	O5-C5-C6-O6
4	A	804	BGL	C4-C5-C6-O6
4	B	806	BGL	C4-C5-C6-O6
4	B	805	BGL	C4-C5-C6-O6
4	A	803	BGL	O5-C5-C6-O6
4	A	802	BGL	O5-C5-C6-O6
4	B	805	BGL	O2-C1'-C2'-C3'
4	B	805	BGL	O5-C5-C6-O6
4	B	806	BGL	O2-C1'-C2'-C3'
4	A	803	BGL	O2-C1'-C2'-C3'
4	A	801	BGL	C4-C5-C6-O6
4	A	803	BGL	C4-C5-C6-O6
4	A	803	BGL	C5'-C6'-C7'-C8'
5	A	901	PLM	C5-C6-C7-C8
5	A	901	PLM	C4-C5-C6-C7
5	A	901	PLM	C9-CA-CB-CC
5	B	902	PLM	C2-C3-C4-C5
5	B	902	PLM	CC-CD-CE-CF
4	A	803	BGL	C4'-C5'-C6'-C7'
4	B	806	BGL	C2'-C1'-O2-C2
5	B	902	PLM	C6-C7-C8-C9
5	B	902	PLM	C3-C4-C5-C6
4	B	806	BGL	C2'-C3'-C4'-C5'
5	A	901	PLM	C2-C3-C4-C5
5	B	902	PLM	C4-C5-C6-C7
5	A	901	PLM	CD-CE-CF-CG
5	B	902	PLM	CD-CE-CF-CG
5	A	901	PLM	C3-C4-C5-C6
4	B	805	BGL	C5'-C6'-C7'-C8'
4	A	803	BGL	C2'-C3'-C4'-C5'
4	A	803	BGL	C3'-C4'-C5'-C6'
4	B	805	BGL	C2'-C3'-C4'-C5'
4	A	802	BGL	C5'-C6'-C7'-C8'
4	A	801	BGL	C2'-C1'-O2-C2
4	B	806	BGL	C5'-C6'-C7'-C8'
4	A	801	BGL	O5-C5-C6-O6
4	A	801	BGL	O2-C1'-C2'-C3'
5	A	901	PLM	C8-C9-CA-CB
5	B	902	PLM	CB-CC-CD-CE
4	A	801	BGL	C2'-C3'-C4'-C5'
4	A	801	BGL	C1'-C2'-C3'-C4'

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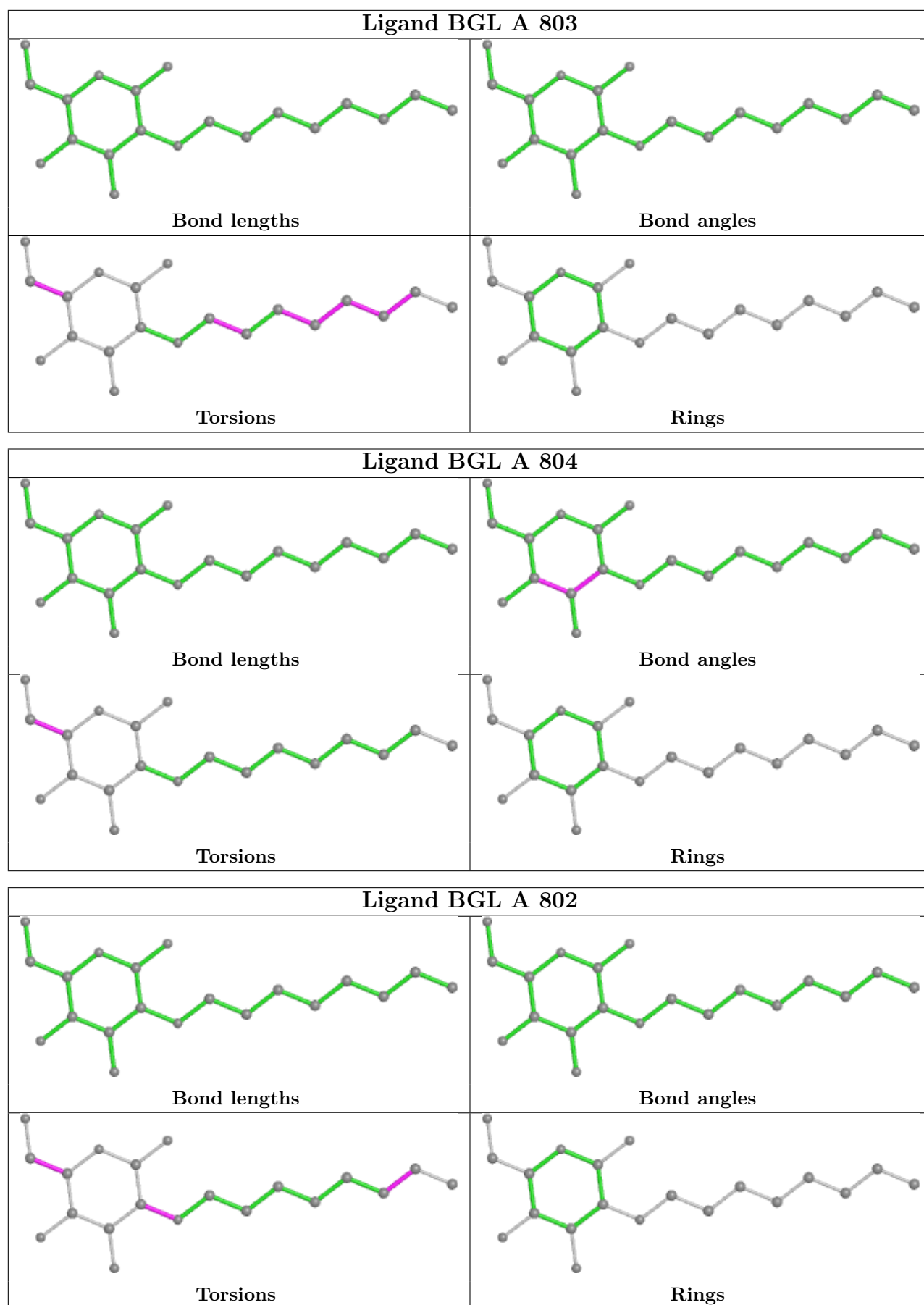
Mol	Chain	Res	Type	Atoms
4	A	801	BGL	C5'-C6'-C7'-C8'
5	B	902	PLM	C9-CA-CB-CC
4	A	802	BGL	C4-C5-C6-O6

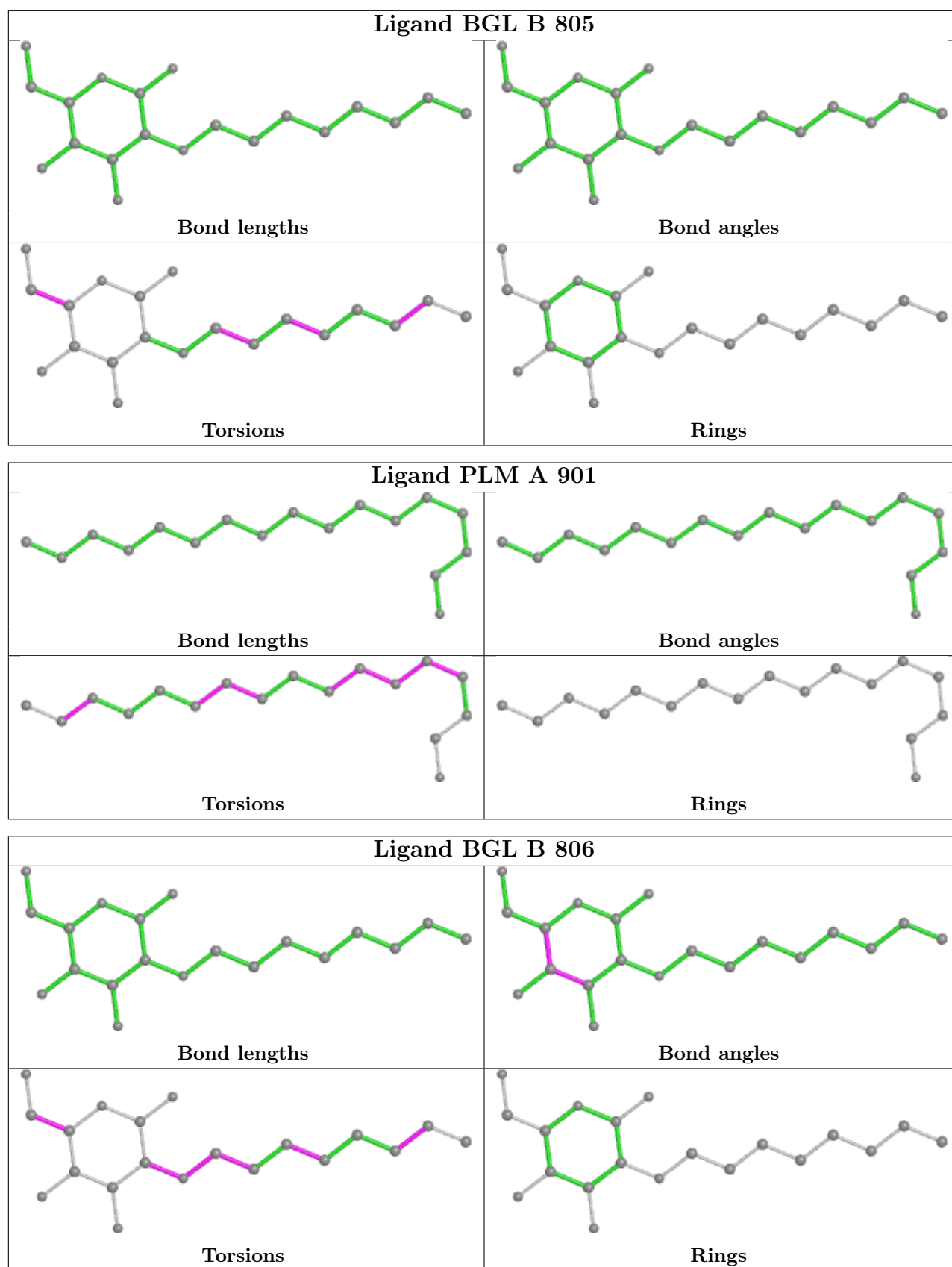
There are no ring outliers.

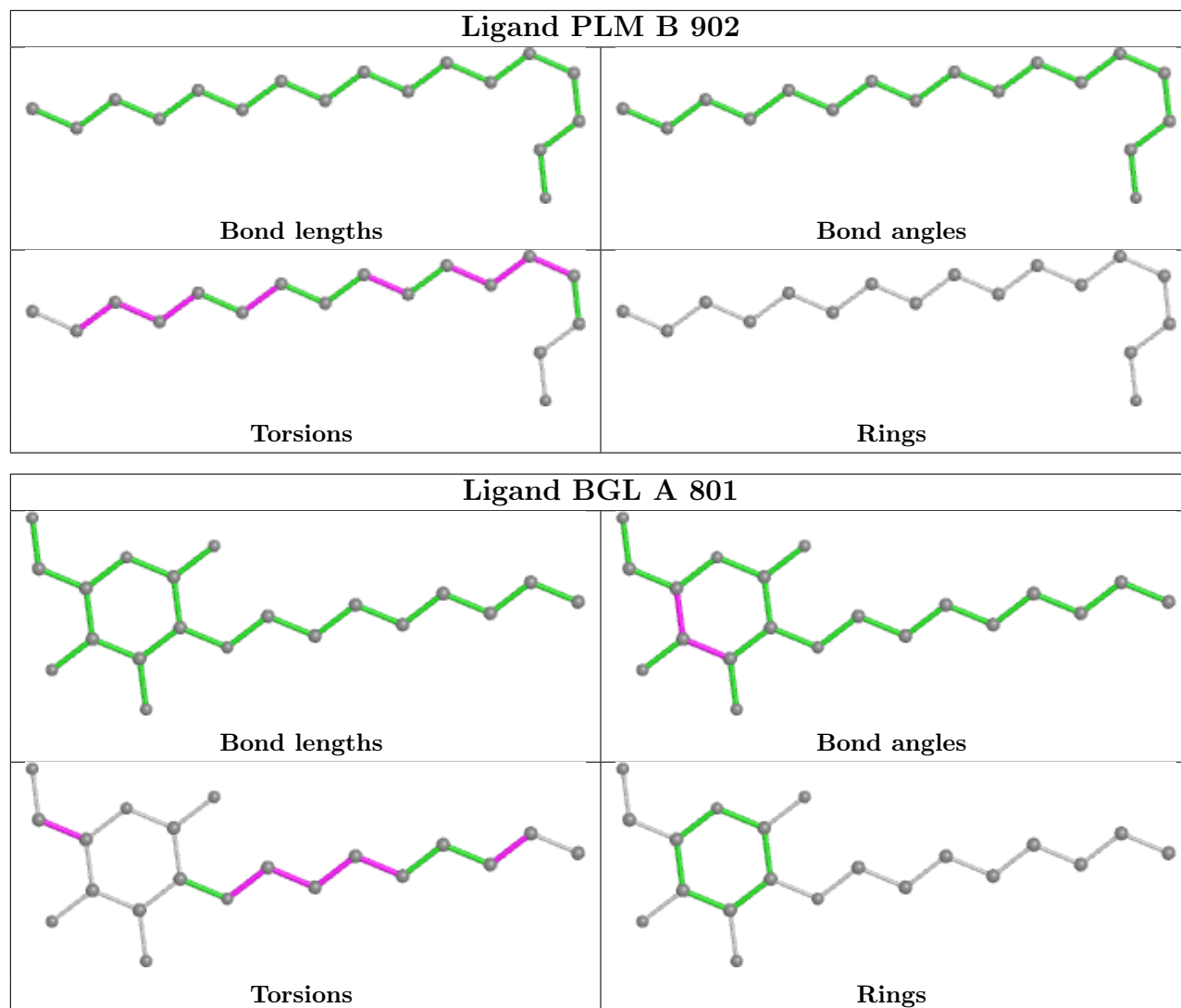
8 monomers are involved in 28 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	803	BGL	7	0
4	A	804	BGL	3	0
4	A	802	BGL	3	0
4	B	805	BGL	1	0
5	A	901	PLM	6	0
4	B	806	BGL	4	0
5	B	902	PLM	3	0
4	A	801	BGL	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	326/348 (93%)	0.63	8 (2%) 57 55	22, 47, 81, 114	1 (0%)
1	B	326/348 (93%)	0.63	14 (4%) 35 31	25, 46, 83, 118	1 (0%)
All	All	652/696 (93%)	0.63	22 (3%) 45 40	22, 47, 83, 118	2 (0%)

All (22) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	191	TYR	4.0
1	B	292	ALA	3.7
1	B	268	TYR	3.7
1	A	189	ILE	3.5
1	B	191	TYR	3.4
1	A	283	PHE	3.2
1	B	325	LYS	3.2
1	B	311	LYS	3.1
1	B	285	PRO	2.9
1	A	295	ALA	2.8
1	A	285	PRO	2.6
1	B	96	TYR	2.6
1	B	288	MET	2.5
1	A	296	LYS	2.5
1	B	295	ALA	2.5
1	A	313	PHE	2.4
1	A	308	MET	2.3
1	B	306	TYR	2.3
1	B	62	THR	2.2
1	B	248	LYS	2.2
1	B	23	PRO	2.1
1	B	68	LEU	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](#)

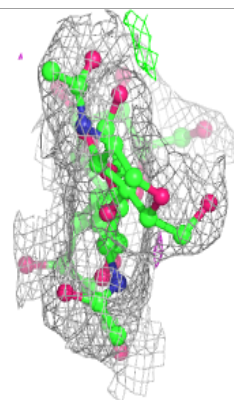
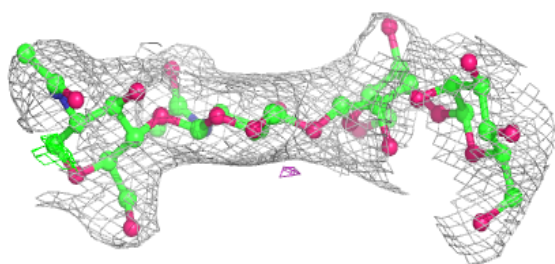
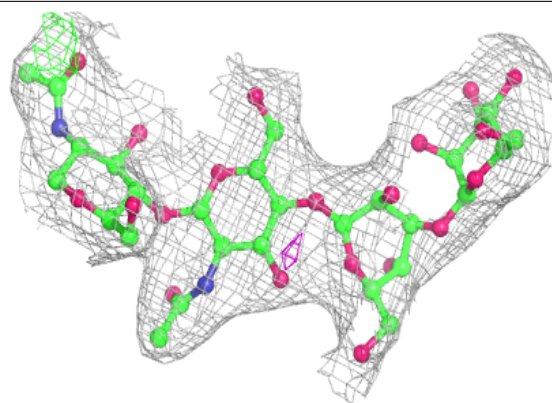
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	NAG	F	2	14/15	0.79	0.19	50,130,201,220	0
3	NAG	F	1	14/15	0.81	0.12	53,139,189,198	0
2	BMA	E	3	11/12	0.82	0.17	44,91,135,165	0
3	NAG	D	2	14/15	0.85	0.17	85,127,185,193	0
3	NAG	D	1	14/15	0.87	0.14	63,119,150,170	0
2	BMA	E	4	11/12	0.91	0.12	73,114,139,156	0
2	BMA	C	3	11/12	0.93	0.13	60,91,120,146	0
2	NAG	E	1	14/15	0.94	0.19	27,42,74,81	0
2	BMA	C	4	11/12	0.95	0.13	74,115,149,172	0
2	NAG	E	2	14/15	0.96	0.18	10,35,56,62	0
2	NAG	C	2	14/15	0.97	0.17	15,33,54,68	0
2	NAG	C	1	14/15	0.98	0.23	31,43,61,65	0

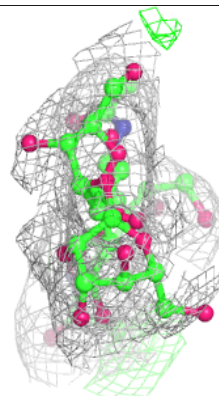
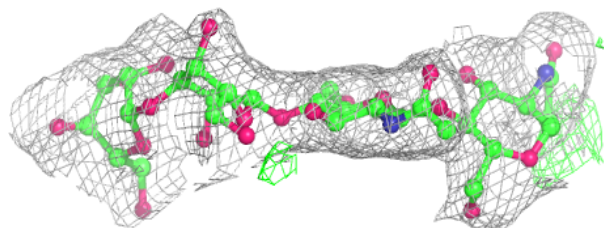
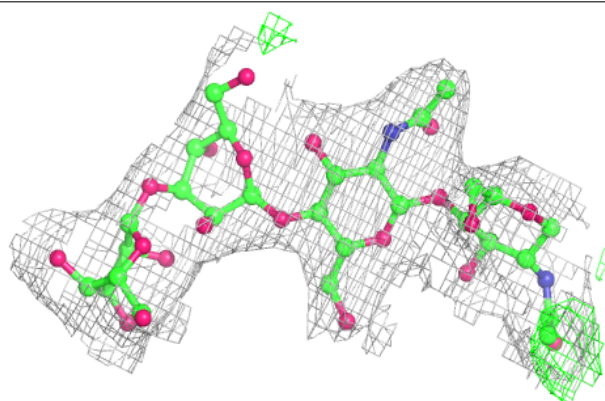
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around Chain C:

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

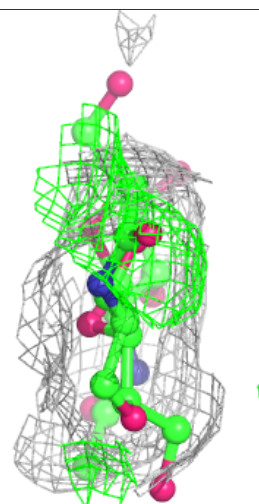
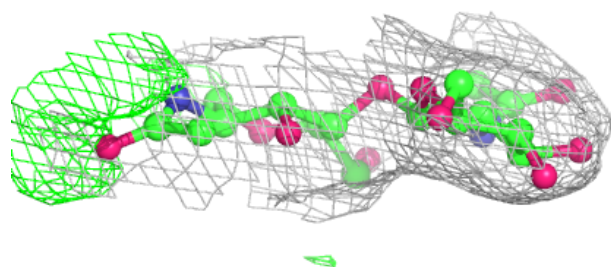
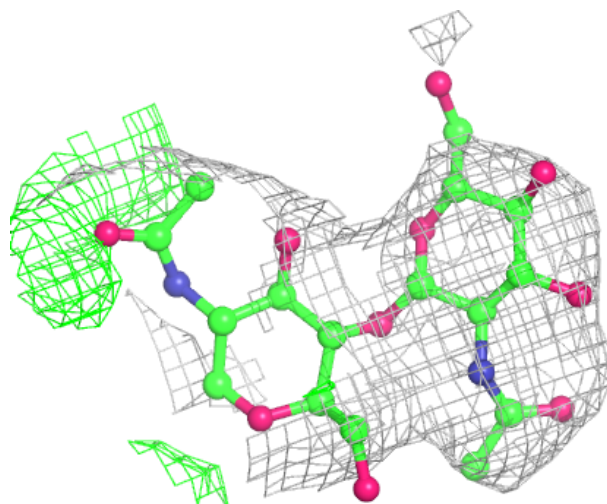
**Electron density around Chain E:**

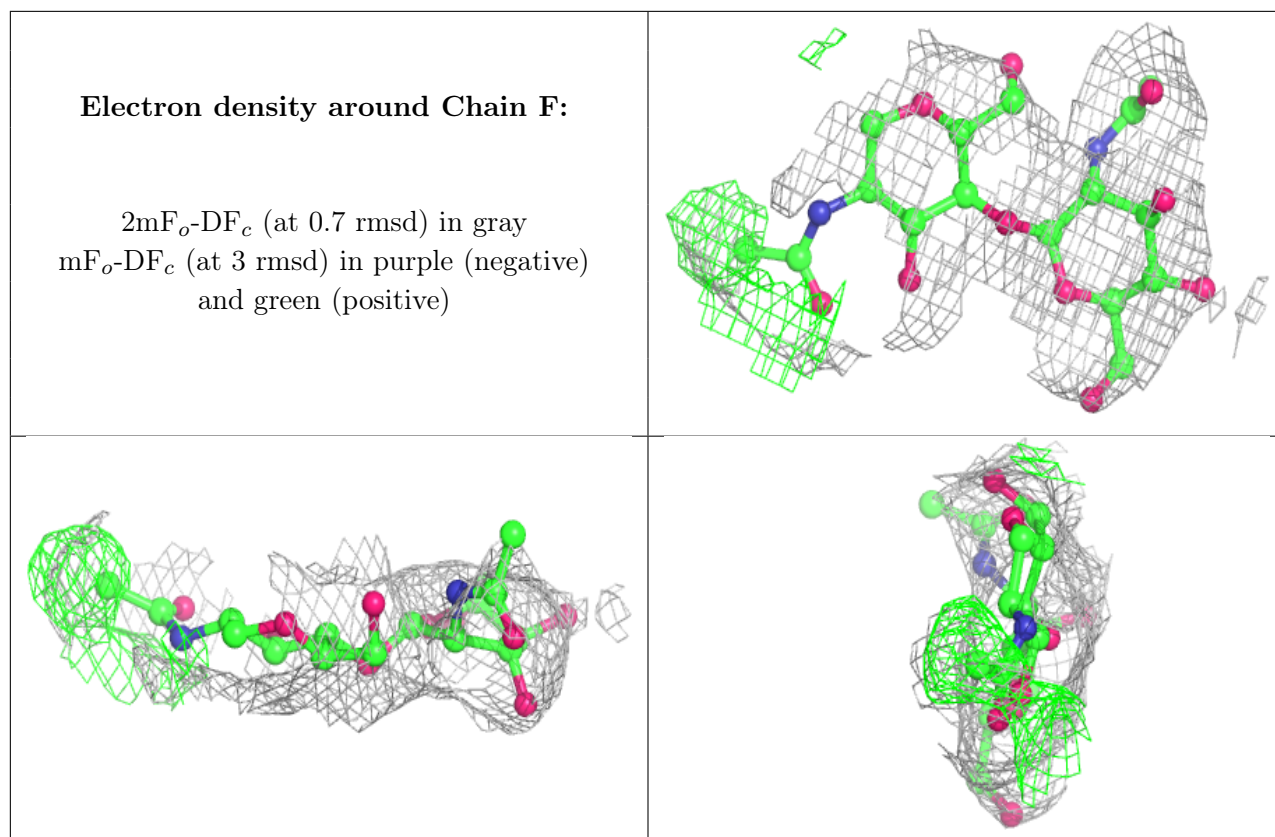
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain D:

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





6.4 Ligands [i](#)

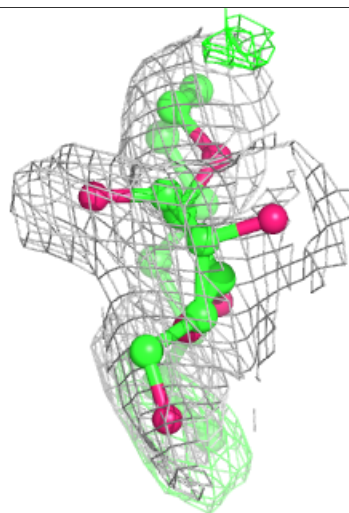
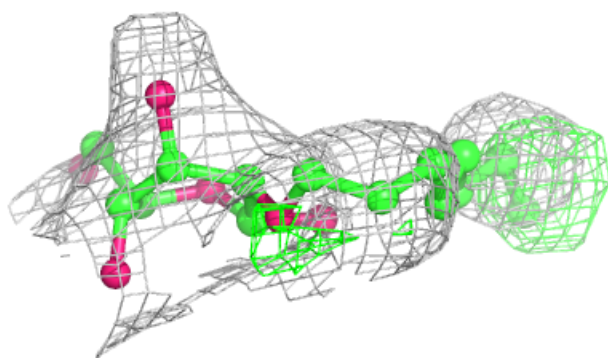
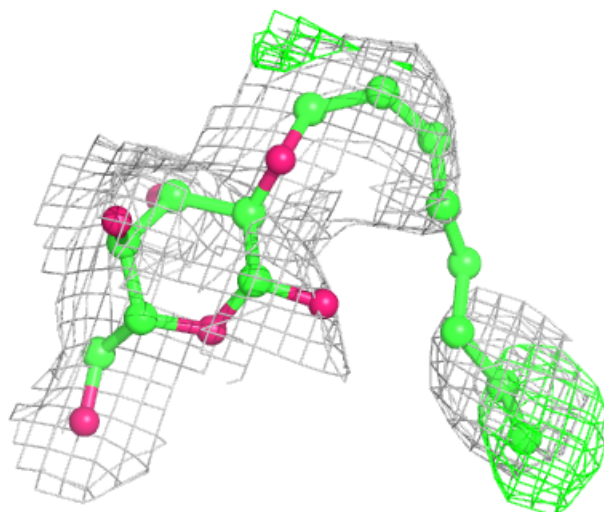
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	BGL	A	801	20/20	0.69	0.16	78,127,206,210	0
4	BGL	B	805	20/20	0.70	0.42	35,95,194,195	0
4	BGL	A	804	20/20	0.72	0.49	40,80,191,199	0
4	BGL	A	802	20/20	0.74	0.28	36,99,176,177	0
5	PLM	B	902	17/18	0.76	0.77	58,82,125,191	0
4	BGL	B	806	20/20	0.77	0.30	26,91,188,214	0
5	PLM	A	901	17/18	0.83	0.62	50,87,107,155	0
4	BGL	A	803	20/20	0.88	0.37	45,94,165,173	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.

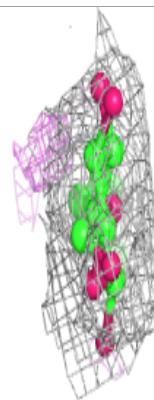
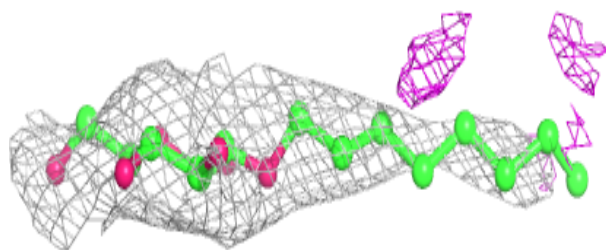
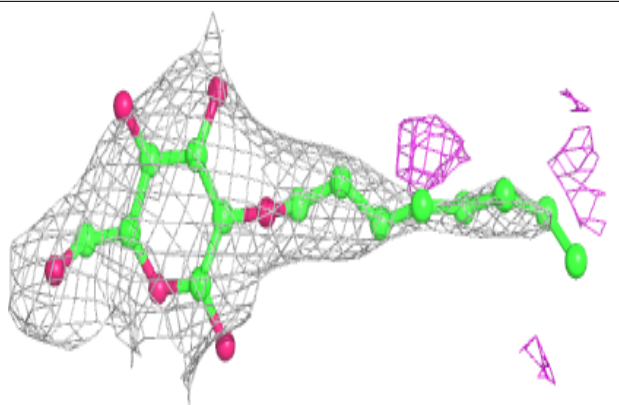
Electron density around BGL A 801:

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

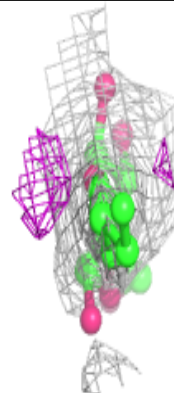
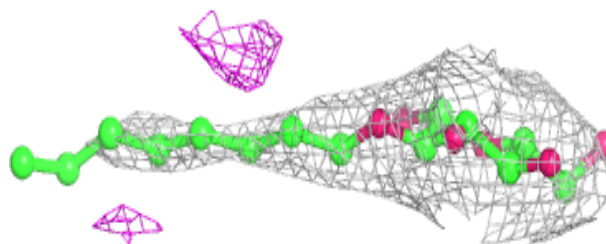
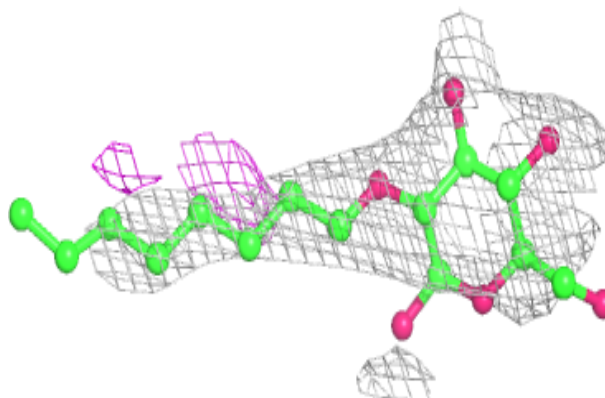


Electron density around BGL B 805:

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

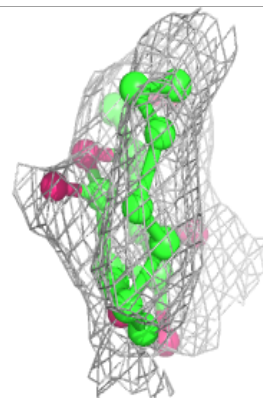
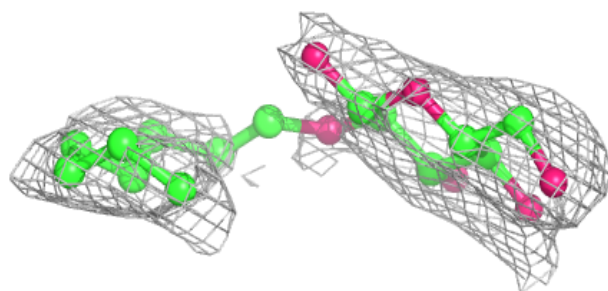
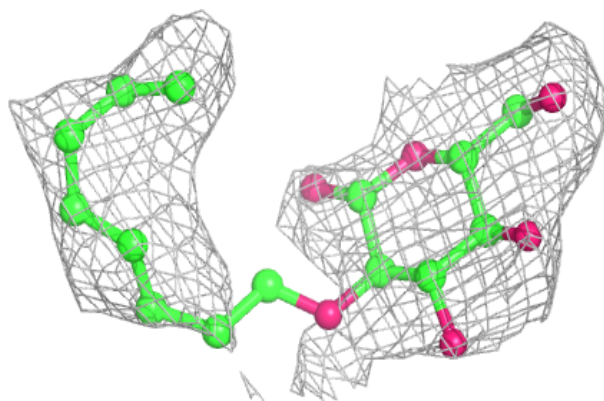
**Electron density around BGL A 804:**

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

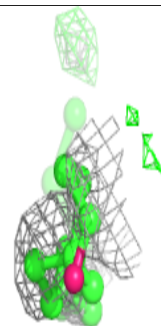
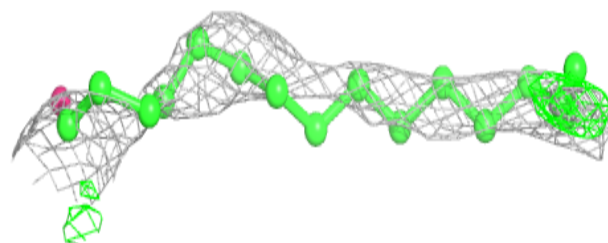
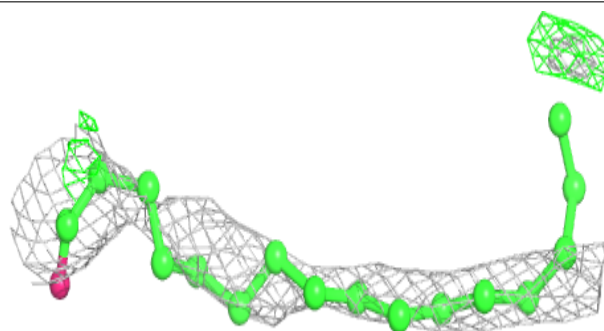


Electron density around BGL A 802:

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

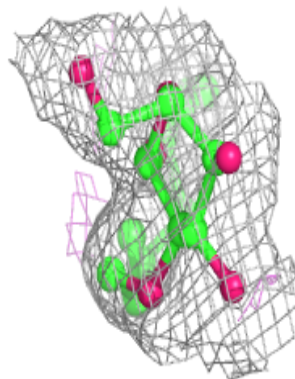
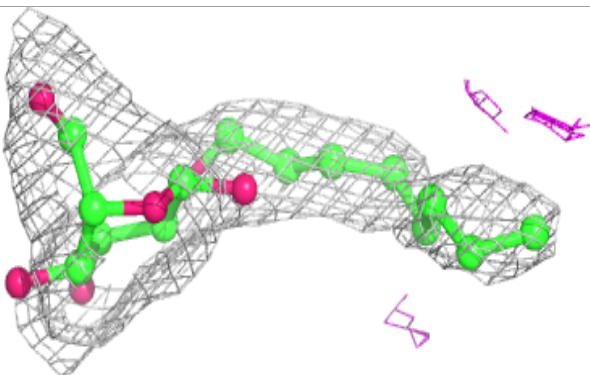
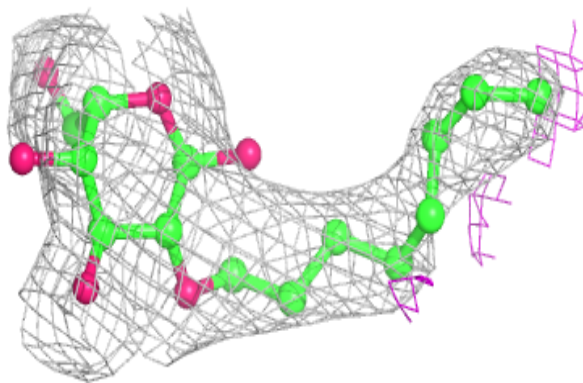
**Electron density around PLM B 902:**

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

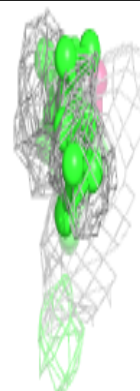
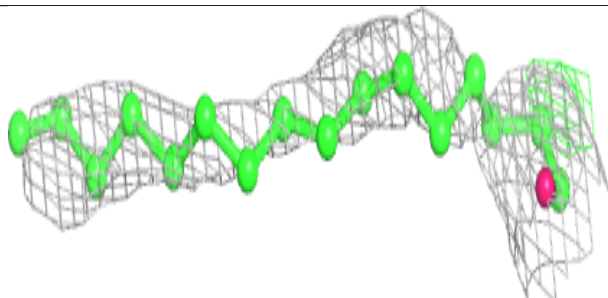
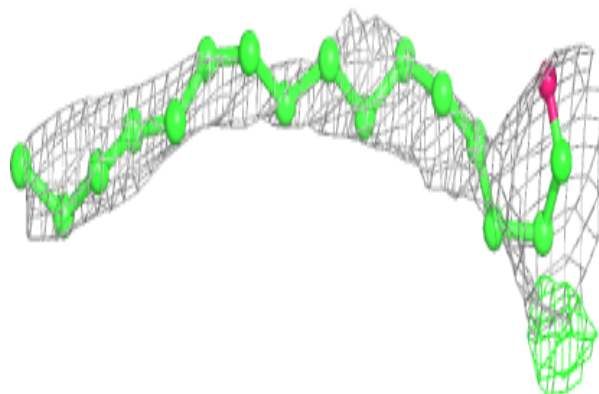


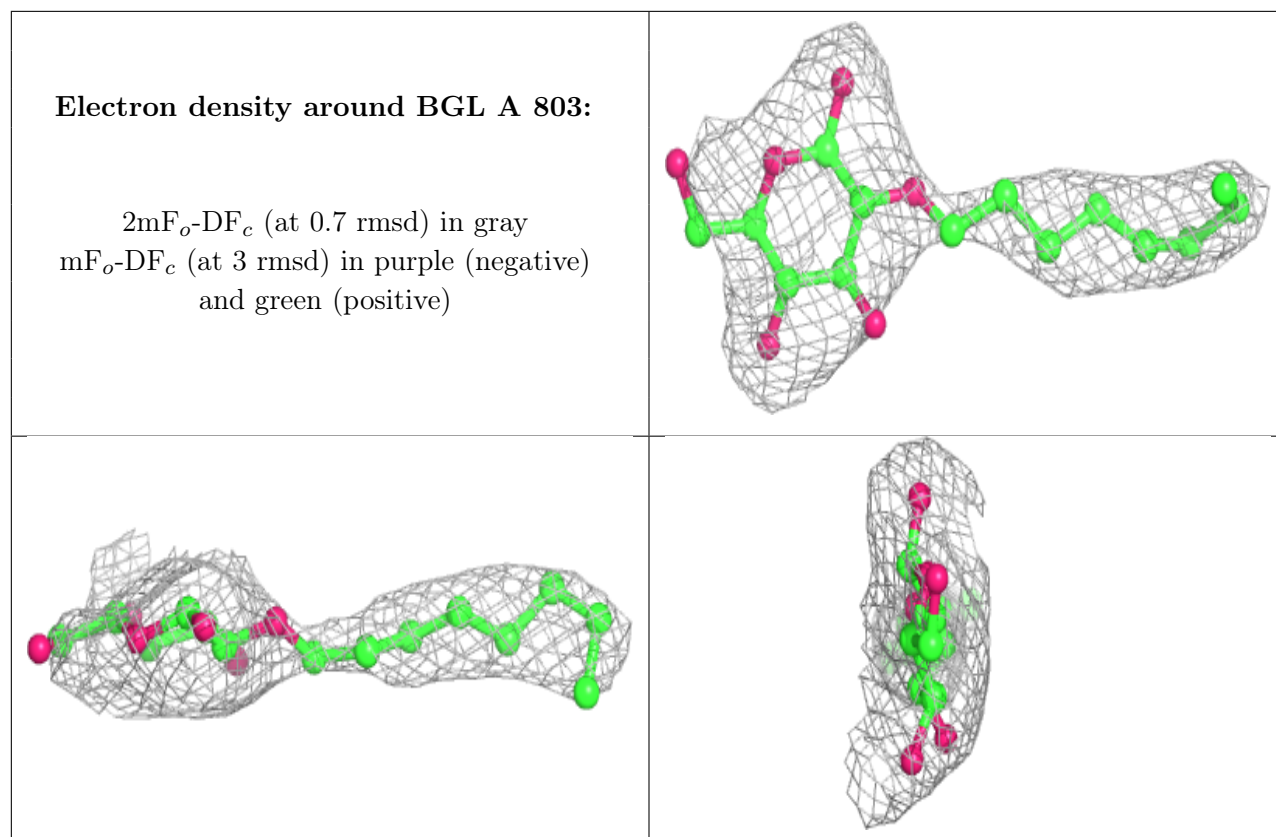
Electron density around BGL B 806:

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

**Electron density around PLM A 901:**

$2mF_o-DF_c$ (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.