



Full wwPDB EM Validation Report ⓘ

Oct 1, 2024 – 10:53 AM JST

PDB ID : 6LQG
EMDB ID : EMD-0944
Title : Human gamma-secretase in complex with small molecule Avagacestat
Authors : Yang, G.; Zhou, R.; Guo, X.; Lei, J.; Shi, Y.
Deposited on : 2020-01-13
Resolution : 3.10 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp>

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:

EMDB validation analysis : 0.0.1.dev113
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.39

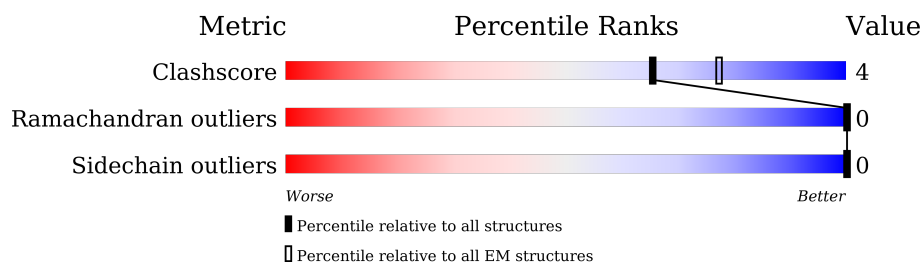
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.10 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)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	709	 83% 11% 6%
2	B	467	 59% 7% 34%
3	C	265	 88% 8%
4	D	143	 64% 33%
5	E	2	 100%
5	G	2	 50% 50%
5	H	2	 100%
5	I	2	 50% 50%

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Mol	Chain	Length	Quality of chain
5	J	2	<div><div></div><div>50%</div><div>50%</div></div>
6	F	5	<div><div>20%</div><div>60%</div><div>40%</div></div>

2 Entry composition

There are 10 unique types of molecules in this entry. The entry contains 10855 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Nicastrin.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	667	Total	C	N	O	S	0	0
			5235	3321	890	1003	21		

- Molecule 2 is a protein called Presenilin-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	309	Total	C	N	O	S	0	0
			2453	1661	373	405	14		

- Molecule 3 is a protein called Gamma-secretase subunit APH-1A.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	243	Total	C	N	O	S	0	0
			1872	1254	299	315	4		

- Molecule 4 is a protein called Gamma-secretase subunit PEN-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	96	Total	C	N	O	S	0	0
			814	559	126	128	1		

There are 43 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	-41	MET	-	expression tag	UNP Q9NZ42
D	-40	ALA	-	expression tag	UNP Q9NZ42
D	-39	SER	-	expression tag	UNP Q9NZ42
D	-38	TRP	-	expression tag	UNP Q9NZ42
D	-37	SER	-	expression tag	UNP Q9NZ42
D	-36	HIS	-	expression tag	UNP Q9NZ42
D	-35	PRO	-	expression tag	UNP Q9NZ42
D	-34	GLN	-	expression tag	UNP Q9NZ42
D	-33	PHE	-	expression tag	UNP Q9NZ42

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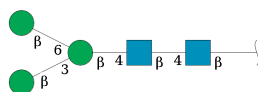
Chain	Residue	Modelled	Actual	Comment	Reference
D	-32	GLU	-	expression tag	UNP Q9NZ42
D	-31	LYS	-	expression tag	UNP Q9NZ42
D	-30	GLY	-	expression tag	UNP Q9NZ42
D	-29	GLY	-	expression tag	UNP Q9NZ42
D	-28	GLY	-	expression tag	UNP Q9NZ42
D	-27	ALA	-	expression tag	UNP Q9NZ42
D	-26	ARG	-	expression tag	UNP Q9NZ42
D	-25	GLY	-	expression tag	UNP Q9NZ42
D	-24	GLY	-	expression tag	UNP Q9NZ42
D	-23	SER	-	expression tag	UNP Q9NZ42
D	-22	GLY	-	expression tag	UNP Q9NZ42
D	-21	GLY	-	expression tag	UNP Q9NZ42
D	-20	GLY	-	expression tag	UNP Q9NZ42
D	-19	SER	-	expression tag	UNP Q9NZ42
D	-18	TRP	-	expression tag	UNP Q9NZ42
D	-17	SER	-	expression tag	UNP Q9NZ42
D	-16	HIS	-	expression tag	UNP Q9NZ42
D	-15	PRO	-	expression tag	UNP Q9NZ42
D	-14	GLN	-	expression tag	UNP Q9NZ42
D	-13	PHE	-	expression tag	UNP Q9NZ42
D	-12	GLU	-	expression tag	UNP Q9NZ42
D	-11	LYS	-	expression tag	UNP Q9NZ42
D	-10	GLY	-	expression tag	UNP Q9NZ42
D	-9	PHE	-	expression tag	UNP Q9NZ42
D	-8	ASP	-	expression tag	UNP Q9NZ42
D	-7	TYR	-	expression tag	UNP Q9NZ42
D	-6	LYS	-	expression tag	UNP Q9NZ42
D	-5	ASP	-	expression tag	UNP Q9NZ42
D	-4	ASP	-	expression tag	UNP Q9NZ42
D	-3	ASP	-	expression tag	UNP Q9NZ42
D	-2	ASP	-	expression tag	UNP Q9NZ42
D	-1	LYS	-	expression tag	UNP Q9NZ42
D	0	GLY	-	expression tag	UNP Q9NZ42
D	1	THR	-	expression tag	UNP Q9NZ42

- Molecule 5 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



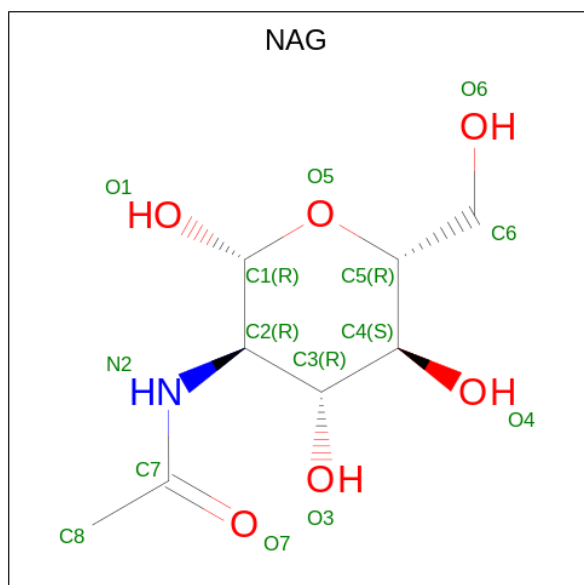
Mol	Chain	Residues	Atoms				AltConf	Trace
5	E	2	Total	C	N	O	0	0
			28	16	2	10		
5	G	2	Total	C	N	O	0	0
			28	16	2	10		
5	H	2	Total	C	N	O	0	0
			28	16	2	10		
5	I	2	Total	C	N	O	0	0
			28	16	2	10		
5	J	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 6 is an oligosaccharide called beta-D-mannopyranose-(1-3)-[beta-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



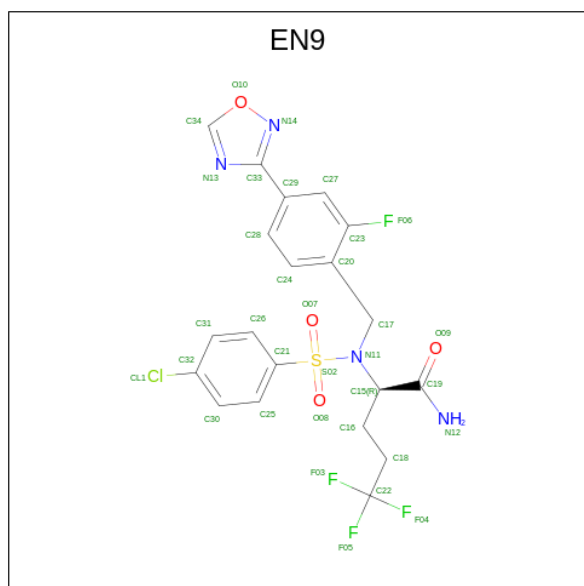
Mol	Chain	Residues	Atoms				AltConf	Trace
6	F	5	Total	C	N	O	0	0
			61	34	2	25		

- Molecule 7 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



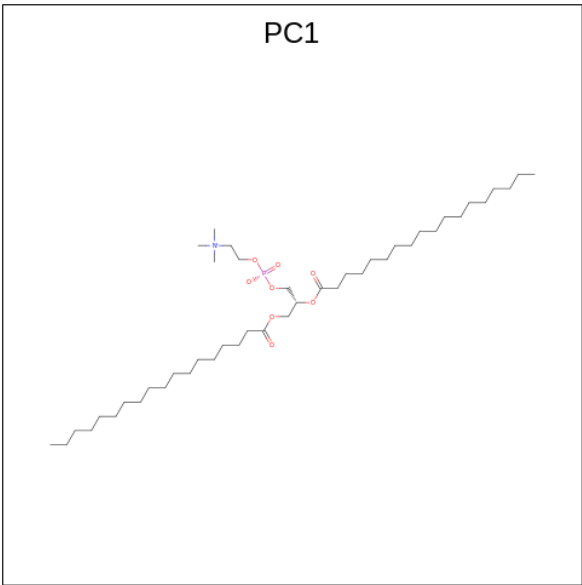
Mol	Chain	Residues	Atoms				AltConf
7	A	1	Total	C	N	O	0
			14	8	1	5	
7	A	1	Total	C	N	O	0
			14	8	1	5	
7	A	1	Total	C	N	O	0
			14	8	1	5	
7	A	1	Total	C	N	O	0
			14	8	1	5	
7	A	1	Total	C	N	O	0
			14	8	1	5	

- Molecule 8 is (2R)-2-[(4-chlorophenyl)sulfonyl]-[[2-fluoranyl-4-(1,2,4-oxadiazol-3-yl)phenyl]methyl]amino]-5,5,5-tris(fluoranyl)pentanamide (three-letter code: EN9) (formula: $C_{20}H_{17}ClF_4N_4O_4S$) (labeled as "Ligand of Interest" by depositor).



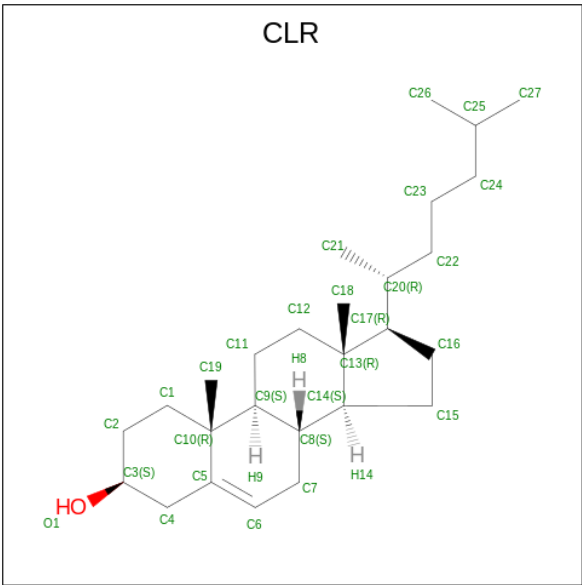
Mol	Chain	Residues	Atoms							AltConf
8	B	1	Total	C	Cl	F	N	O	S	0
			34	20	1	4	4	4	1	

- Molecule 9 is 1,2-DIACYL-SN-GLYCERO-3-PHOSPHOCHOLINE (three-letter code: PC1) (formula: $C_{44}H_{88}NO_8P$).



Mol	Chain	Residues	Atoms					AltConf
9	C	1	Total	C	N	O	P	0
			37	27	1	8	1	
9	C	1	Total	C	N	O	P	0
			41	31	1	8	1	

- Molecule 10 is CHOLESTEROL (three-letter code: CLR) (formula: C₂₇H₄₆O).

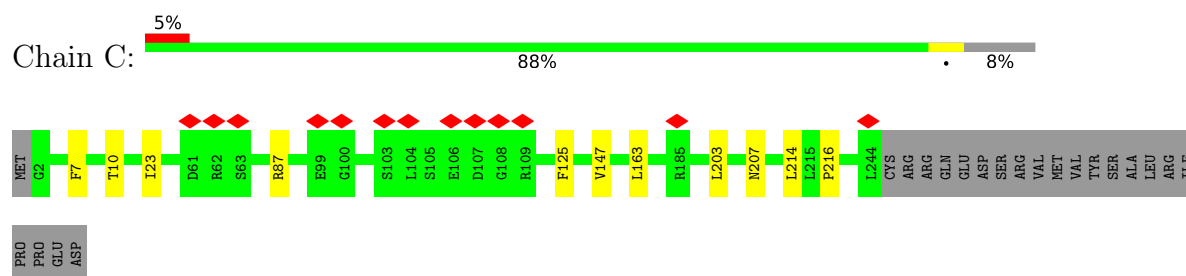


Mol	Chain	Residues	Atoms			AltConf
10	C	1	Total	C	O	0
			28	27	1	
10	C	1	Total	C	O	0
			28	27	1	

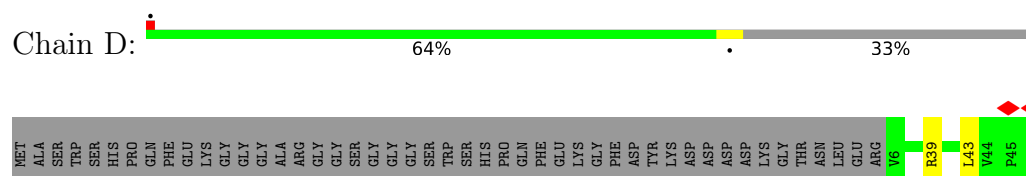
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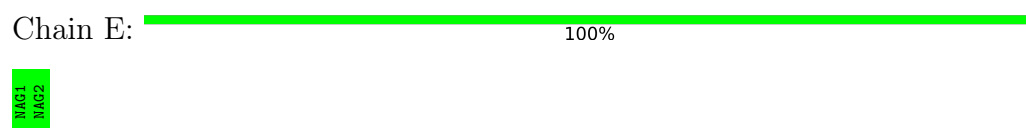
Mol	Chain	Residues	Atoms			AltConf
			Total	C	O	
10	C	1	28	27	1	0



- Molecule 4: Gamma-secretase subunit PEN-2



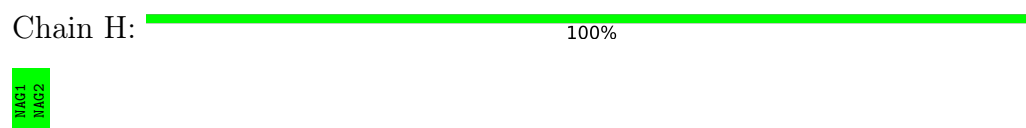
- Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



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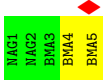
- Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain J:  50% 50%

 MAG1
MAG2

- Molecule 6: beta-D-mannopyranose-(1-3)-[beta-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain F:  20% 60% 40%

 MAG1
MAG2
BMA3
BMA4
BMA5

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	835806	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	1.5625	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.159	Depositor
Minimum map value	-0.092	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.004	Depositor
Recommended contour level	0.028	Depositor
Map size (\AA)	349.12, 349.12, 349.12	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.091, 1.091, 1.091	Depositor

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: CLR, NAG, BMA, PC1, EN9

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	0.32	0/5358	0.54	1/7302 (0.0%)
2	B	0.31	0/2516	0.51	0/3432
3	C	0.33	0/1924	0.57	0/2624
4	D	0.32	0/847	0.52	0/1157
All	All	0.32	0/10645	0.54	1/14515 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	282	LEU	CA-CB-CG	5.31	127.52	115.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	5235	0	5126	52	0
2	B	2453	0	2582	22	0
3	C	1872	0	1911	7	0
4	D	814	0	804	3	0
5	E	28	0	25	0	0
5	G	28	0	25	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	H	28	0	25	0	0
5	I	28	0	25	0	0
5	J	28	0	25	0	0
6	F	61	0	52	0	0
7	A	84	0	78	0	0
8	B	34	0	0	0	0
9	C	78	0	104	3	0
10	C	84	0	138	2	0
All	All	10855	0	10920	83	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 4.

All (83) 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:A:281:ARG:CD	1:A:333:GLU:HB2	1.68	1.22
1:A:281:ARG:HD3	1:A:333:GLU:HB2	1.40	1.02
1:A:281:ARG:HD3	1:A:333:GLU:CB	2.02	0.89
1:A:281:ARG:HD2	1:A:333:GLU:HB2	1.60	0.82
1:A:281:ARG:CG	1:A:333:GLU:HB2	2.14	0.76
1:A:281:ARG:CD	1:A:333:GLU:CB	2.56	0.72
1:A:218:PHE:O	1:A:656:ILE:HA	1.95	0.67
1:A:224:VAL:HG13	1:A:225:ILE:HG12	1.77	0.67
1:A:559:SER:HB3	1:A:629:ARG:HH12	1.60	0.65
1:A:139:GLN:HE21	1:A:163:GLN:HE21	1.45	0.63
4:D:47:TYR:HB2	4:D:50:GLN:HB2	1.82	0.62
4:D:39:ARG:HG3	4:D:43:LEU:HD12	1.84	0.59
9:C:505:PC1:H362	9:C:505:PC1:H2A1	1.83	0.59
1:A:281:ARG:HG3	1:A:333:GLU:HB2	1.84	0.59
1:A:530:ASN:OD1	1:A:535:GLN:NE2	2.36	0.58
1:A:99:GLU:OE1	1:A:101:LYS:NZ	2.37	0.57
1:A:111:LEU:HG	1:A:118:ILE:HD13	1.86	0.56
1:A:350:GLY:HA2	1:A:355:GLN:HE22	1.69	0.56
1:A:310:GLU:HG3	1:A:574:LEU:HD22	1.89	0.55
2:B:101:LYS:NZ	2:B:403:ASP:OD1	2.39	0.55
1:A:98:LEU:HB2	1:A:123:VAL:HG12	1.89	0.54
1:A:281:ARG:HD3	1:A:333:GLU:HB3	1.88	0.54
1:A:296:GLU:HG2	1:A:369:ALA:HB3	1.90	0.53
1:A:632:SER:OG	1:A:645:TYR:O	2.26	0.53
1:A:282:LEU:HD11	1:A:567:VAL:HG21	1.89	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:94:VAL:HG22	9:C:501:PC1:H291	1.90	0.53
2:B:106:TYR:HA	2:B:239:LYS:HD3	1.90	0.53
2:B:192:ALA:O	4:D:79:GLN:NE2	2.36	0.53
2:B:464:GLN:O	3:C:207:ASN:ND2	2.34	0.51
1:A:211:PRO:HA	1:A:663:ILE:O	2.11	0.51
1:A:605:VAL:O	1:A:618:PRO:HA	2.10	0.50
3:C:203:LEU:HD13	3:C:216:PRO:HB2	1.95	0.49
1:A:112:LYS:NZ	1:A:175:ASP:O	2.43	0.49
1:A:39:LYS:HB3	3:C:147:VAL:HG13	1.94	0.49
1:A:108:MET:HG3	1:A:171:LEU:HD11	1.95	0.49
1:A:200:ASN:HD21	1:A:213:CYS:H	1.61	0.49
1:A:54:LEU:HD11	1:A:223:ALA:HB1	1.95	0.48
1:A:691:ASN:HD22	3:C:23:ILE:HG22	1.78	0.48
1:A:243:ASN:ND2	2:B:184:GLU:OE2	2.39	0.48
1:A:537:ILE:HG22	1:A:569:TYR:HB3	1.95	0.48
1:A:136:PRO:HB2	1:A:172:ALA:HB2	1.95	0.48
2:B:85:LEU:HD22	2:B:381:LEU:HD22	1.94	0.47
2:B:142:VAL:HA	2:B:145:VAL:HG12	1.96	0.47
2:B:173:LEU:HD13	2:B:229:ILE:HG23	1.97	0.47
1:A:253:ASP:HB3	1:A:331:GLN:HG2	1.97	0.46
9:C:501:PC1:H32	9:C:501:PC1:H321	1.71	0.46
2:B:120:GLU:OE2	2:B:128:ARG:NE	2.40	0.45
2:B:120:GLU:HG3	2:B:128:ARG:HG3	1.97	0.45
2:B:256:TYR:HA	2:B:259:VAL:HG12	1.99	0.45
1:A:524:GLY:HA2	1:A:531:ASN:HD21	1.82	0.45
1:A:632:SER:HB3	1:A:635:PHE:HD2	1.82	0.45
10:C:502:CLR:H162	10:C:502:CLR:H222	1.73	0.45
1:A:72:VAL:HG21	1:A:212:LEU:HD13	1.99	0.44
2:B:96:VAL:HG21	2:B:390:SER:HB3	1.99	0.44
1:A:261:LYS:NZ	1:A:321:LEU:O	2.48	0.44
1:A:629:ARG:HH21	1:A:631:LEU:HD12	1.83	0.44
3:C:87:ARG:HH21	3:C:125:PHE:HD2	1.66	0.44
1:A:543:ARG:HD3	1:A:606:GLN:HE22	1.82	0.43
2:B:113:LEU:HD23	2:B:115:TYR:HD2	1.83	0.43
1:A:537:ILE:HD11	1:A:573:ASN:HD22	1.83	0.43
2:B:145:VAL:HA	2:B:148:ILE:HG22	2.00	0.43
1:A:551:LEU:HD22	1:A:562:ASN:HB3	2.01	0.43
1:A:130:PRO:O	1:A:452:TYR:OH	2.34	0.43
2:B:117:PRO:HD2	2:B:138:ILE:HD11	2.00	0.43
1:A:121:LEU:O	1:A:180:ILE:HA	2.18	0.42
3:C:163:LEU:HB2	3:C:214:LEU:HD21	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:7:PHE:HA	3:C:10:THR:HG22	2.01	0.42
1:A:82:LEU:HA	1:A:85:VAL:HG12	2.01	0.42
1:A:540:GLN:HG3	1:A:606:GLN:HE21	1.85	0.41
1:A:200:ASN:HD22	1:A:212:LEU:HD22	1.85	0.41
1:A:408:VAL:HG22	1:A:410:ALA:H	1.85	0.41
2:B:140:ILE:HD13	2:B:143:ILE:HD12	2.01	0.41
1:A:286:SER:OG	1:A:291:VAL:O	2.34	0.41
1:A:422:LEU:HD12	1:A:423:PRO:HD2	2.02	0.41
2:B:85:LEU:HD23	2:B:85:LEU:HA	1.93	0.41
2:B:211:ILE:HG23	2:B:215:TRP:HE3	1.85	0.41
1:A:256:VAL:HG13	1:A:329:PHE:HB2	2.02	0.41
1:A:305:GLN:HE21	1:A:327:PHE:HD1	1.67	0.40
2:B:421:THR:HG21	2:B:434:ALA:HA	2.03	0.40
2:B:435:LEU:HD22	2:B:439:ILE:HD11	2.02	0.40
2:B:385:ASP:HA	2:B:435:LEU:HD21	2.03	0.40
1:A:376:LEU:HB3	1:A:413:LEU:HD23	2.04	0.40
10:C:503:CLR:H162	10:C:503:CLR:H222	1.77	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 PDB entries followed by that with respect to all EM entries.

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	665/709 (94%)	618 (93%)	47 (7%)	0	100	100
2	B	305/467 (65%)	300 (98%)	5 (2%)	0	100	100
3	C	241/265 (91%)	235 (98%)	6 (2%)	0	100	100
4	D	94/143 (66%)	87 (93%)	7 (7%)	0	100	100
All	All	1305/1584 (82%)	1240 (95%)	65 (5%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

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	584/612 (95%)	584 (100%)	0	100	100
2	B	267/408 (65%)	267 (100%)	0	100	100
3	C	193/214 (90%)	193 (100%)	0	100	100
4	D	84/119 (71%)	84 (100%)	0	100	100
All	All	1128/1353 (83%)	1128 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	139	GLN
1	A	163	GLN
1	A	355	GLN
1	A	358	ASN
1	A	454	GLN
1	A	531	ASN
1	A	606	GLN
1	A	691	ASN
2	B	214	HIS
3	C	68	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates

15 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$
5	NAG	E	1	1,5	14,14,15	0.27	0	17,19,21	0.44	0
5	NAG	E	2	5	14,14,15	0.24	0	17,19,21	0.63	0
6	NAG	F	1	6,1	14,14,15	0.16	0	17,19,21	0.57	0
6	NAG	F	2	6	14,14,15	0.25	0	17,19,21	0.55	0
6	BMA	F	3	6	11,11,12	0.77	0	15,15,17	0.98	0
6	BMA	F	4	6	11,11,12	0.67	0	15,15,17	1.07	1 (6%)
6	BMA	F	5	6	11,11,12	1.67	3 (27%)	15,15,17	1.93	4 (26%)
5	NAG	G	1	1,5	14,14,15	0.31	0	17,19,21	1.07	1 (5%)
5	NAG	G	2	5	14,14,15	0.45	0	17,19,21	0.55	0
5	NAG	H	1	1,5	14,14,15	0.60	0	17,19,21	0.81	0
5	NAG	H	2	5	14,14,15	0.54	0	17,19,21	0.53	0
5	NAG	I	1	1,5	14,14,15	0.27	0	17,19,21	0.47	0
5	NAG	I	2	5	14,14,15	0.93	1 (7%)	17,19,21	2.44	5 (29%)
5	NAG	J	1	1,5	14,14,15	0.23	0	17,19,21	0.63	0
5	NAG	J	2	5	14,14,15	0.25	0	17,19,21	0.59	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
5	NAG	E	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	E	2	5	-	4/6/23/26	0/1/1/1
6	NAG	F	1	6,1	-	3/6/23/26	0/1/1/1
6	NAG	F	2	6	-	2/6/23/26	0/1/1/1
6	BMA	F	3	6	-	2/2/19/22	0/1/1/1
6	BMA	F	4	6	-	2/2/19/22	0/1/1/1
6	BMA	F	5	6	-	2/2/19/22	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	G	1	1,5	-	1/6/23/26	0/1/1/1
5	NAG	G	2	5	-	4/6/23/26	0/1/1/1
5	NAG	H	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	H	2	5	-	2/6/23/26	0/1/1/1
5	NAG	I	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	I	2	5	-	5/6/23/26	0/1/1/1
5	NAG	J	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	J	2	5	-	0/6/23/26	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	F	5	BMA	C2-C3	3.30	1.57	1.52
6	F	5	BMA	C1-C2	3.07	1.59	1.52
5	I	2	NAG	O5-C1	-2.26	1.40	1.43
6	F	5	BMA	O5-C1	2.26	1.47	1.43

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	I	2	NAG	C2-N2-C7	7.70	133.87	122.90
6	F	5	BMA	C1-O5-C5	5.14	119.15	112.19
5	I	2	NAG	C1-C2-N2	4.10	117.49	110.49
6	F	5	BMA	C1-C2-C3	3.25	113.66	109.67
5	G	1	NAG	C2-N2-C7	3.18	127.43	122.90
5	I	2	NAG	C3-C4-C5	2.89	115.40	110.24
6	F	5	BMA	O5-C1-C2	2.79	115.07	110.77
6	F	4	BMA	C1-O5-C5	2.60	115.72	112.19
5	I	2	NAG	C4-C3-C2	2.18	114.22	111.02
5	J	2	NAG	C1-O5-C5	2.06	114.98	112.19
5	I	2	NAG	C8-C7-N2	2.01	119.50	116.10
6	F	5	BMA	C2-C3-C4	2.00	114.36	110.89

There are no chirality outliers.

All (31) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	I	1	NAG	O5-C5-C6-O6
5	G	2	NAG	O5-C5-C6-O6
6	F	2	NAG	O5-C5-C6-O6

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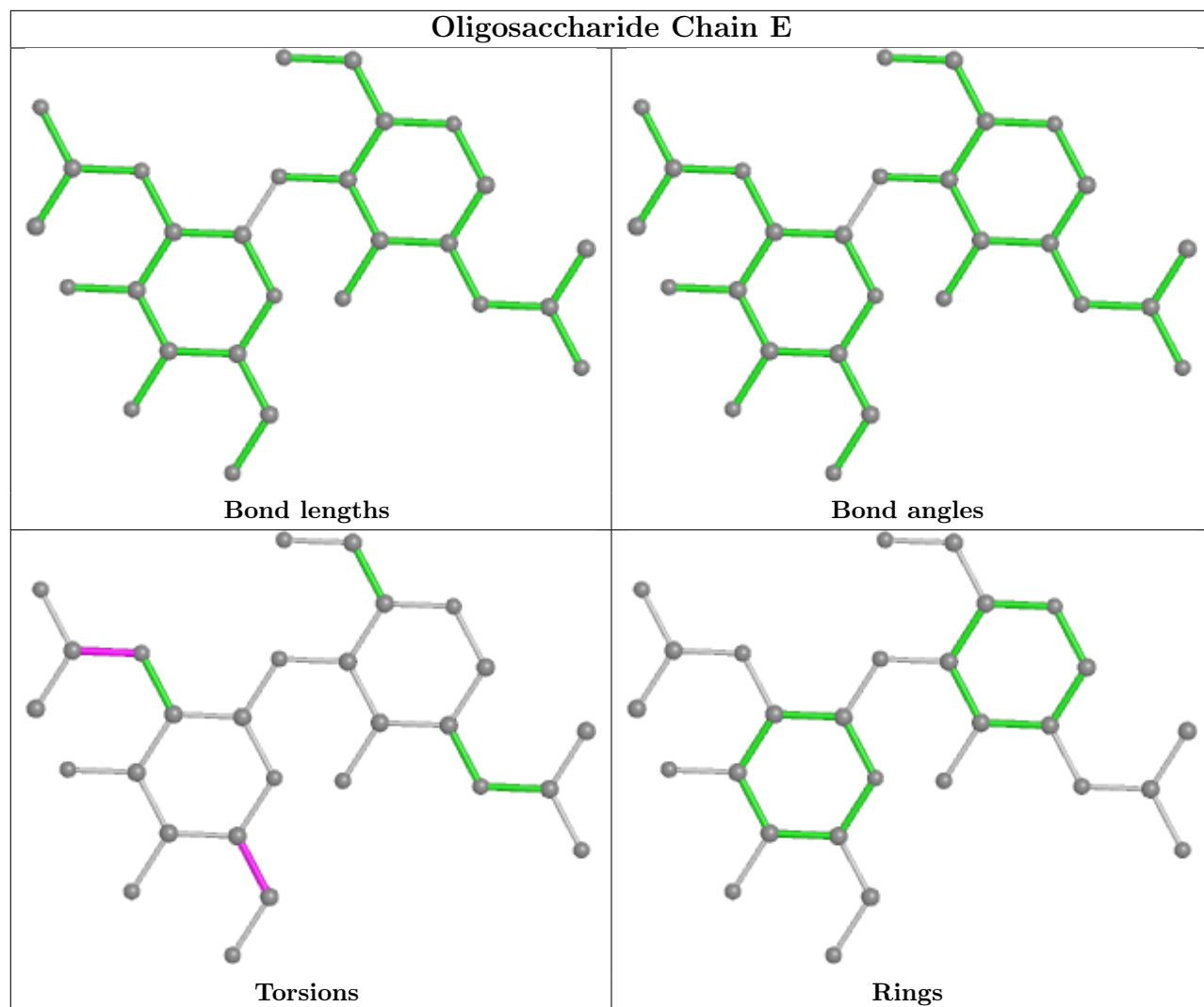
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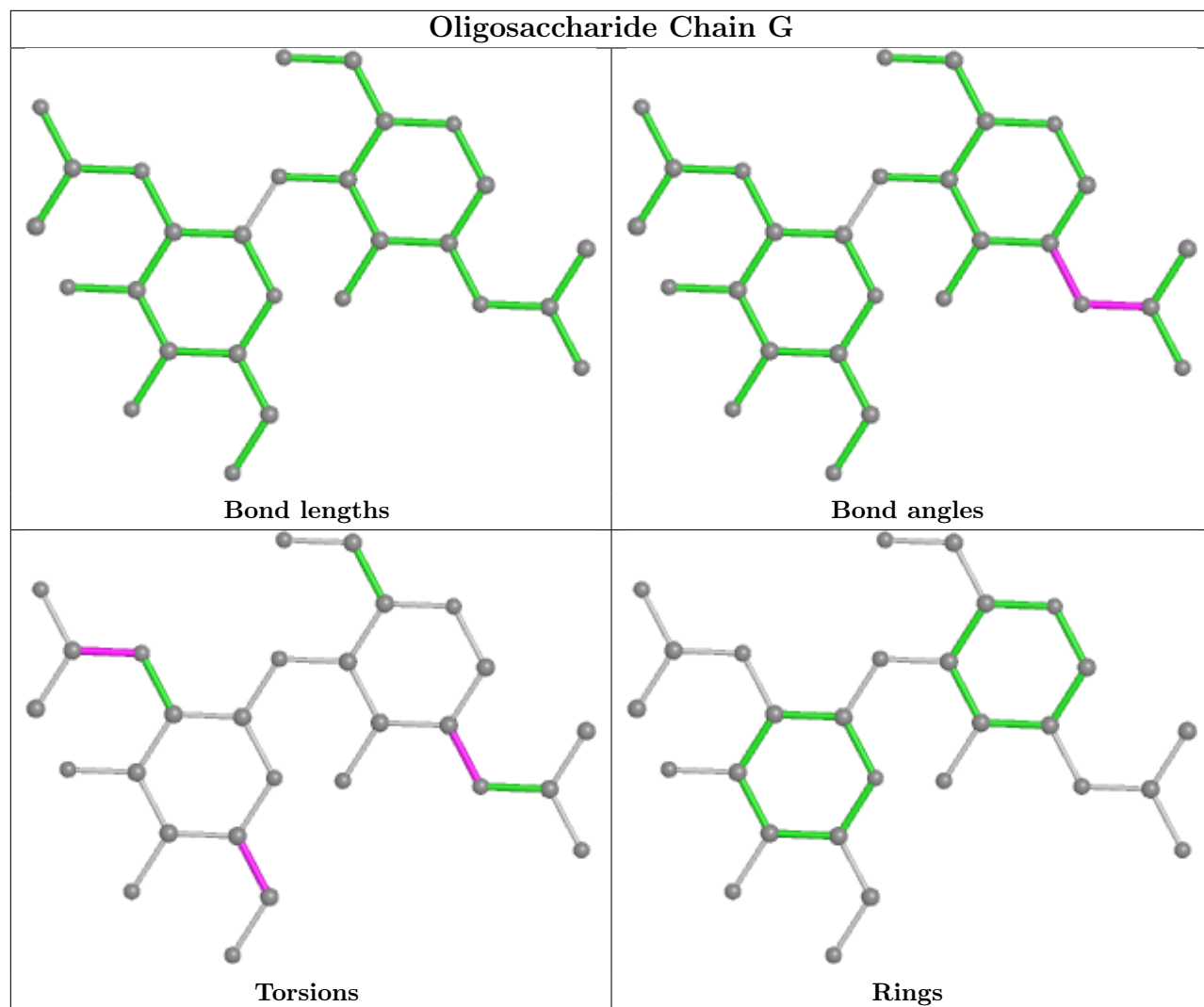
Mol	Chain	Res	Type	Atoms
6	F	2	NAG	C4-C5-C6-O6
5	I	2	NAG	O5-C5-C6-O6
6	F	4	BMA	O5-C5-C6-O6
5	I	1	NAG	C4-C5-C6-O6
5	G	2	NAG	C4-C5-C6-O6
5	E	2	NAG	C8-C7-N2-C2
5	E	2	NAG	O7-C7-N2-C2
5	G	2	NAG	C8-C7-N2-C2
5	G	2	NAG	O7-C7-N2-C2
5	H	2	NAG	C8-C7-N2-C2
5	H	2	NAG	O7-C7-N2-C2
5	I	2	NAG	C8-C7-N2-C2
5	I	2	NAG	O7-C7-N2-C2
6	F	1	NAG	C8-C7-N2-C2
6	F	1	NAG	O7-C7-N2-C2
5	E	2	NAG	O5-C5-C6-O6
5	I	2	NAG	C4-C5-C6-O6
5	E	2	NAG	C4-C5-C6-O6
6	F	3	BMA	C4-C5-C6-O6
6	F	4	BMA	C4-C5-C6-O6
5	H	1	NAG	C4-C5-C6-O6
6	F	3	BMA	O5-C5-C6-O6
5	H	1	NAG	O5-C5-C6-O6
6	F	5	BMA	C4-C5-C6-O6
5	G	1	NAG	C3-C2-N2-C7
5	I	2	NAG	C3-C2-N2-C7
6	F	5	BMA	O5-C5-C6-O6
6	F	1	NAG	C4-C5-C6-O6

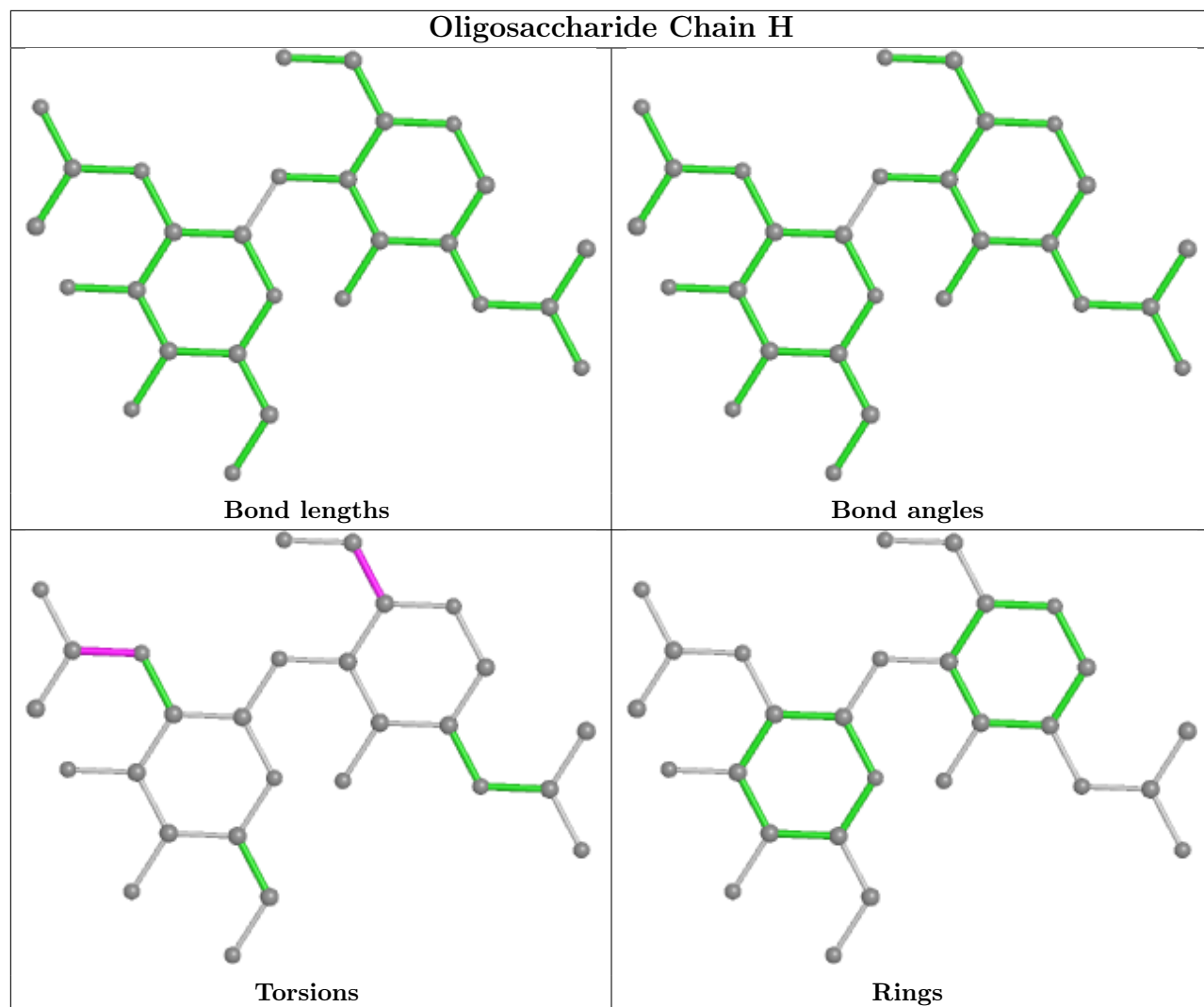
There are no ring outliers.

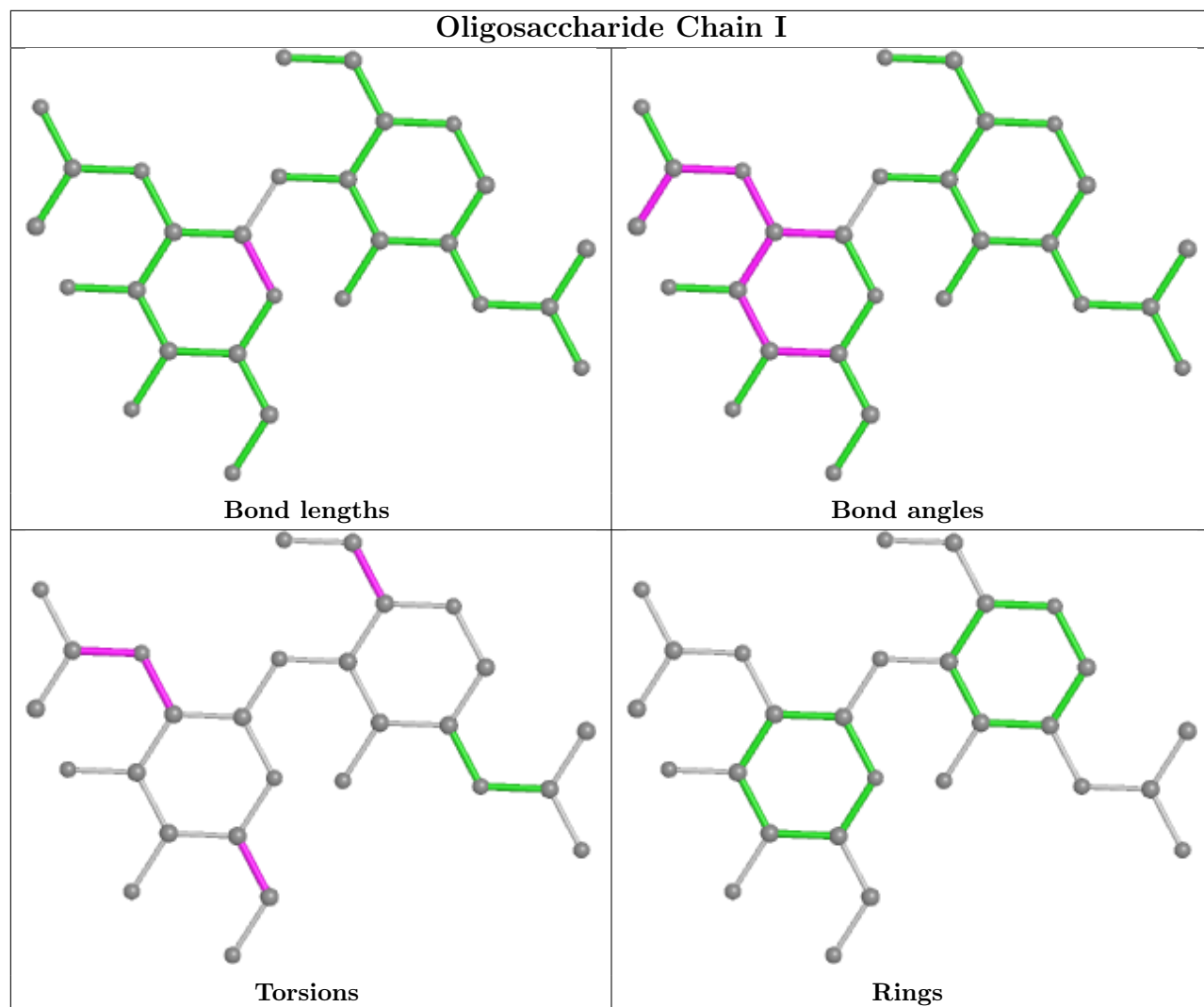
No monomer is involved in short contacts.

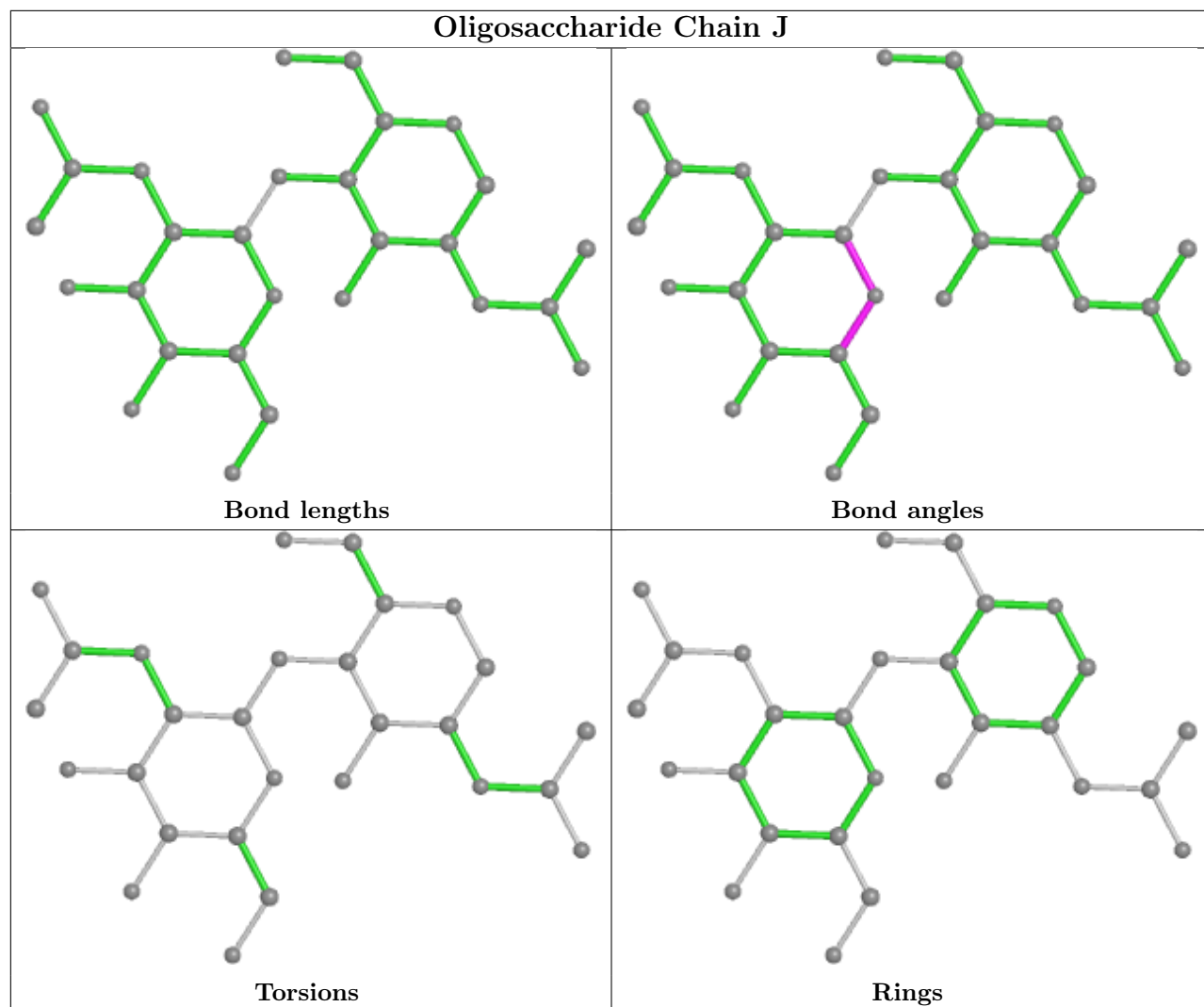
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

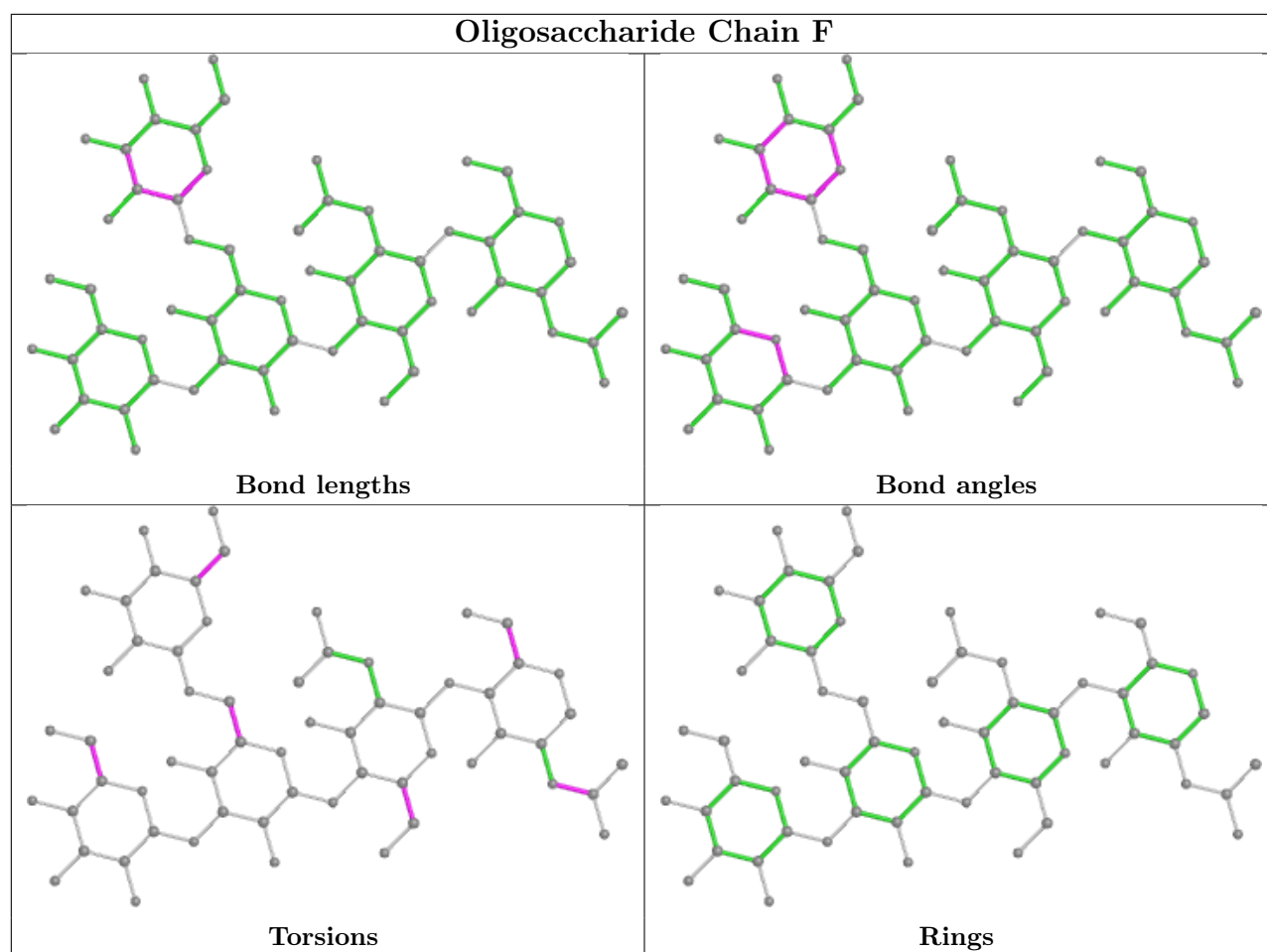












5.6 Ligand geometry [i](#)

12 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	$\# Z > 2$
9	PC1	C	505	-	40,40,53	0.30	0	46,48,61	0.44	0
7	NAG	A	819	1	14,14,15	0.92	1 (7%)	17,19,21	2.24	3 (17%)
10	CLR	C	502	-	31,31,31	0.32	0	48,48,48	0.57	0
7	NAG	A	821	1	14,14,15	0.24	0	17,19,21	0.51	0
7	NAG	A	820	1	14,14,15	0.36	0	17,19,21	0.54	0
7	NAG	A	818	1	14,14,15	0.40	0	17,19,21	0.51	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
9	PC1	C	501	-	36,36,53	0.33	0	42,44,61	0.48	0
10	CLR	C	503	-	31,31,31	0.32	0	48,48,48	0.58	0
10	CLR	C	504	-	31,31,31	0.34	0	48,48,48	0.56	0
8	EN9	B	701	-	32,36,36	3.86	17 (53%)	47,53,53	2.81	21 (44%)
7	NAG	A	817	-	14,14,15	0.60	0	17,19,21	0.92	1 (5%)
7	NAG	A	810	1	14,14,15	0.75	1 (7%)	17,19,21	2.27	3 (17%)

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
9	PC1	C	505	-	-	9/44/44/57	-
7	NAG	A	819	1	-	5/6/23/26	0/1/1/1
10	CLR	C	502	-	-	4/10/68/68	0/4/4/4
7	NAG	A	821	1	-	0/6/23/26	0/1/1/1
7	NAG	A	820	1	-	2/6/23/26	0/1/1/1
7	NAG	A	818	1	-	2/6/23/26	0/1/1/1
9	PC1	C	501	-	-	8/40/40/57	-
10	CLR	C	503	-	-	4/10/68/68	0/4/4/4
10	CLR	C	504	-	-	0/10/68/68	0/4/4/4
8	EN9	B	701	-	-	11/34/34/34	0/3/3/3
7	NAG	A	817	-	-	1/6/23/26	0/1/1/1
7	NAG	A	810	1	-	5/6/23/26	0/1/1/1

All (19) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	B	701	EN9	C21-S02	10.15	1.90	1.76
8	B	701	EN9	S02-N11	8.25	1.76	1.63
8	B	701	EN9	C33-N13	7.23	1.46	1.35
8	B	701	EN9	C15-N11	7.22	1.56	1.48
8	B	701	EN9	C17-C20	6.58	1.62	1.51
8	B	701	EN9	C17-N11	5.00	1.55	1.48
8	B	701	EN9	C29-C33	4.86	1.61	1.48
8	B	701	EN9	C20-C23	4.03	1.45	1.38
8	B	701	EN9	C27-C23	3.95	1.44	1.37
8	B	701	EN9	C32-CL1	3.34	1.81	1.74

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	B	701	EN9	C15-C19	3.19	1.59	1.53
8	B	701	EN9	C18-C22	2.76	1.58	1.49
7	A	819	NAG	C1-C2	2.70	1.56	1.52
8	B	701	EN9	C28-C24	2.68	1.43	1.38
8	B	701	EN9	C16-C15	2.65	1.57	1.53
8	B	701	EN9	C25-C21	2.39	1.42	1.38
8	B	701	EN9	C19-N12	2.36	1.38	1.32
8	B	701	EN9	C26-C21	2.25	1.42	1.38
7	A	810	NAG	C1-C2	2.17	1.55	1.52

All (28) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	B	701	EN9	C29-C33-N14	8.15	129.73	119.12
7	A	810	NAG	C2-N2-C7	7.88	134.12	122.90
7	A	819	NAG	C2-N2-C7	7.78	133.98	122.90
8	B	701	EN9	O08-S02-O07	-7.16	107.92	119.52
8	B	701	EN9	C25-C21-C26	-5.16	113.24	120.44
8	B	701	EN9	C30-C25-C21	5.09	124.72	119.45
8	B	701	EN9	C31-C26-C21	4.87	124.49	119.45
8	B	701	EN9	C29-C27-C23	4.36	123.30	119.59
8	B	701	EN9	C25-C21-S02	4.11	124.09	119.76
7	A	819	NAG	C1-C2-N2	3.75	116.90	110.49
8	B	701	EN9	C34-N13-C33	3.69	106.85	102.14
7	A	810	NAG	C1-C2-N2	3.66	116.74	110.49
8	B	701	EN9	C28-C29-C27	-3.61	113.06	118.16
8	B	701	EN9	O08-S02-C21	3.41	112.36	108.05
8	B	701	EN9	C15-C19-N12	3.03	123.94	116.55
7	A	817	NAG	C2-N2-C7	2.92	127.06	122.90
8	B	701	EN9	C26-C21-S02	2.77	122.67	119.76
8	B	701	EN9	C15-N11-S02	2.69	123.77	118.80
8	B	701	EN9	C16-C15-C19	-2.64	106.94	112.34
8	B	701	EN9	O07-S02-C21	2.63	111.37	108.05
8	B	701	EN9	C20-C17-N11	2.57	117.29	112.23
8	B	701	EN9	C24-C20-C23	-2.50	112.24	116.61
8	B	701	EN9	O09-C19-N12	-2.43	118.77	123.00
8	B	701	EN9	C28-C24-C20	2.39	124.54	121.39
8	B	701	EN9	C17-C20-C23	2.19	125.09	120.77
7	A	819	NAG	C8-C7-N2	2.17	119.77	116.10
8	B	701	EN9	C28-C29-C33	2.14	124.43	120.79
7	A	810	NAG	C8-C7-N2	2.12	119.69	116.10

There are no chirality outliers.

All (51) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	B	701	EN9	C16-C15-N11-C17
8	B	701	EN9	C16-C18-C22-F03
9	C	501	PC1	C11-O13-P-O14
9	C	501	PC1	C11-O13-P-O11
9	C	501	PC1	C12-C11-O13-P
9	C	501	PC1	O32-C31-O31-C3
9	C	501	PC1	C32-C31-O31-C3
9	C	505	PC1	C11-O13-P-O14
9	C	505	PC1	C11-O13-P-O11
9	C	505	PC1	C12-C11-O13-P
9	C	505	PC1	O22-C21-O21-C2
9	C	505	PC1	C22-C21-O21-C2
7	A	810	NAG	O5-C5-C6-O6
7	A	819	NAG	O5-C5-C6-O6
7	A	820	NAG	C4-C5-C6-O6
7	A	818	NAG	C4-C5-C6-O6
7	A	818	NAG	O5-C5-C6-O6
7	A	820	NAG	O5-C5-C6-O6
7	A	810	NAG	C4-C5-C6-O6
7	A	819	NAG	C4-C5-C6-O6
7	A	810	NAG	C8-C7-N2-C2
7	A	810	NAG	O7-C7-N2-C2
7	A	819	NAG	C8-C7-N2-C2
7	A	819	NAG	O7-C7-N2-C2
9	C	501	PC1	C22-C21-O21-C2
9	C	501	PC1	O22-C21-O21-C2
8	B	701	EN9	C16-C18-C22-F04
8	B	701	EN9	C16-C18-C22-F05
10	C	502	CLR	C16-C17-C20-C22
10	C	503	CLR	C16-C17-C20-C22
10	C	502	CLR	C13-C17-C20-C22
10	C	502	CLR	C16-C17-C20-C21
9	C	505	PC1	O13-C11-C12-N
10	C	503	CLR	C13-C17-C20-C22
10	C	502	CLR	C13-C17-C20-C21
8	B	701	EN9	C17-N11-S02-O08
10	C	503	CLR	C16-C17-C20-C21
9	C	505	PC1	C32-C33-C34-C35
10	C	503	CLR	C13-C17-C20-C21
9	C	501	PC1	C21-C22-C23-C24

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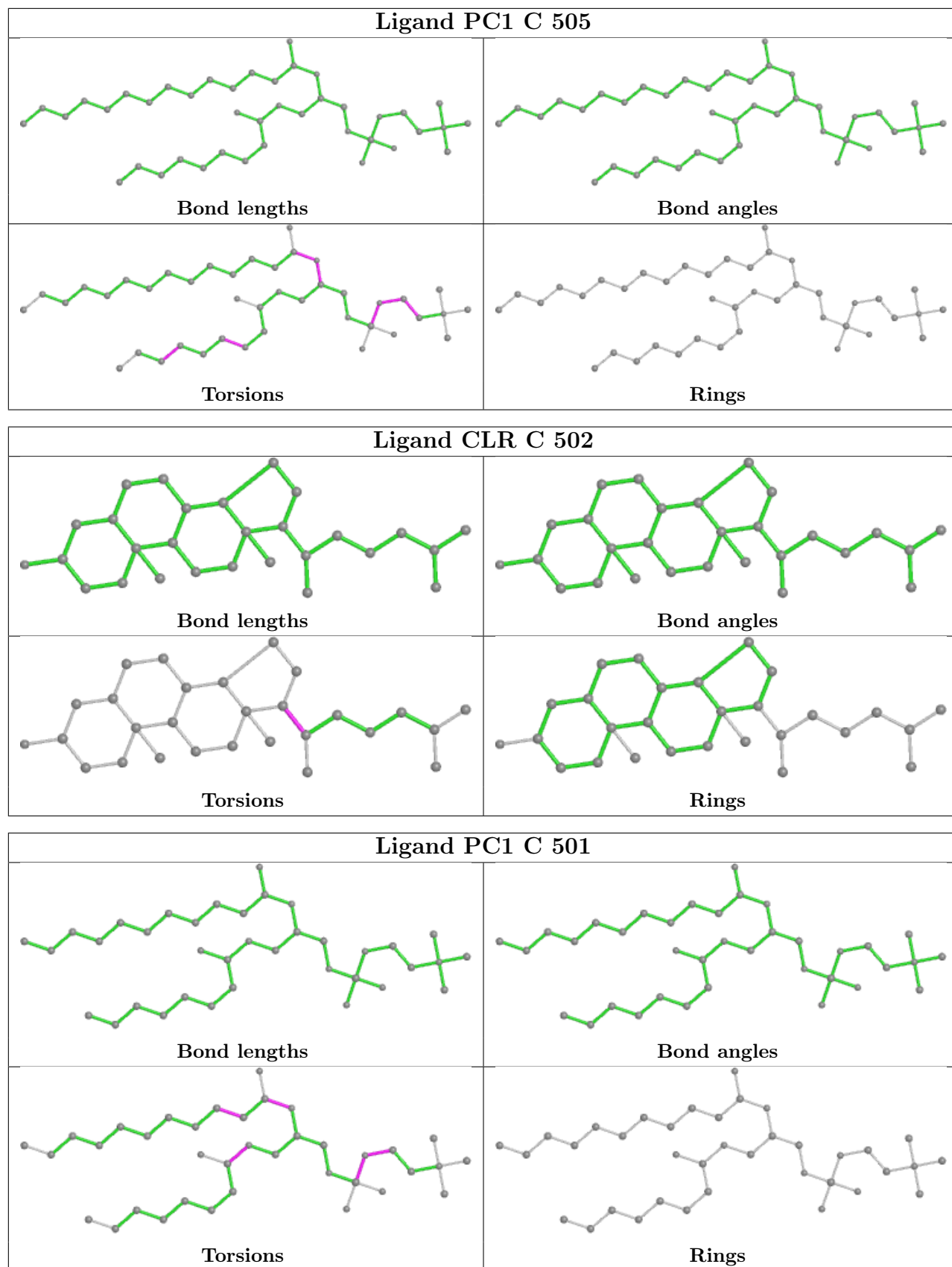
Mol	Chain	Res	Type	Atoms
8	B	701	EN9	C16-C15-C19-N12
8	B	701	EN9	C16-C15-C19-O09
8	B	701	EN9	N11-C15-C19-O09
9	C	505	PC1	C35-C36-C37-C38
7	A	810	NAG	C3-C2-N2-C7
7	A	817	NAG	C3-C2-N2-C7
7	A	819	NAG	C3-C2-N2-C7
8	B	701	EN9	C17-N11-S02-O07
9	C	505	PC1	C1-C2-O21-C21
8	B	701	EN9	C16-C15-N11-S02
8	B	701	EN9	C15-N11-S02-O08

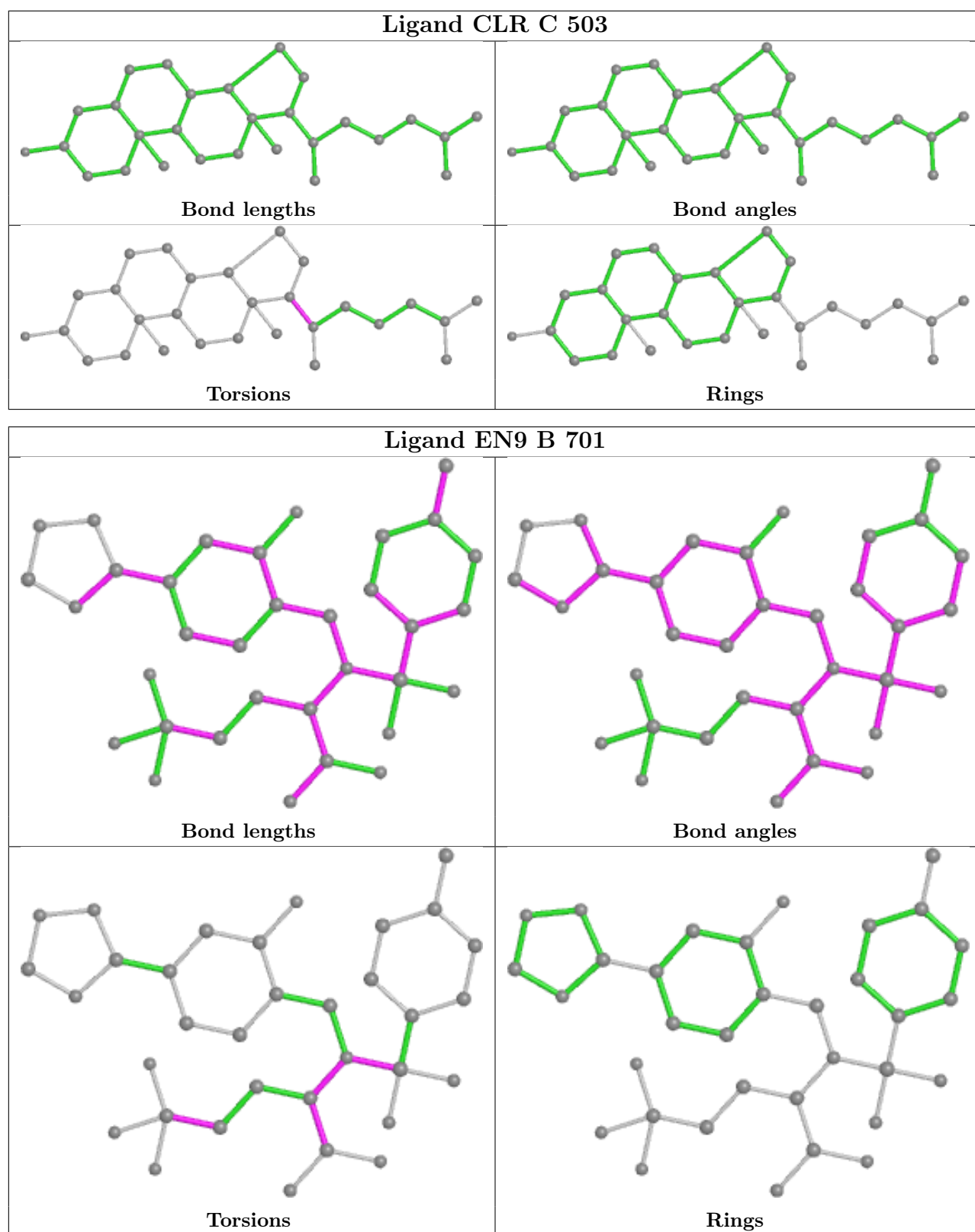
There are no ring outliers.

4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
9	C	505	PC1	1	0
10	C	502	CLR	1	0
9	C	501	PC1	2	0
10	C	503	CLR	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 ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

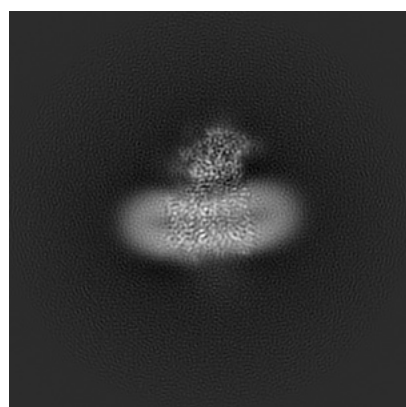
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-0944. These allow visual inspection of the internal detail of the map and identification of artifacts.

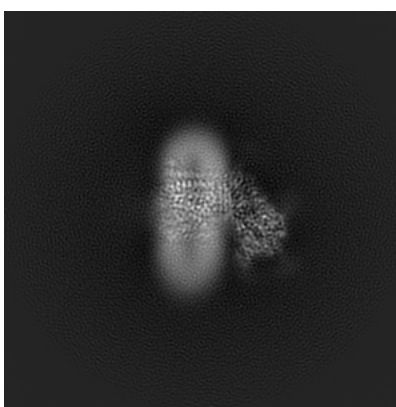
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

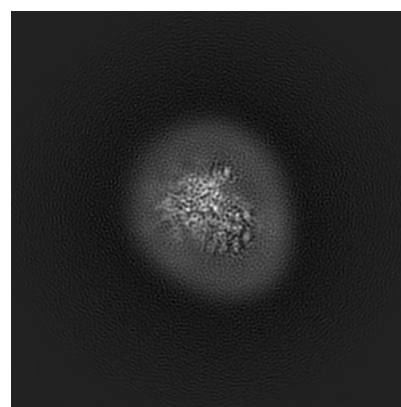
6.1.1 Primary map



X



Y

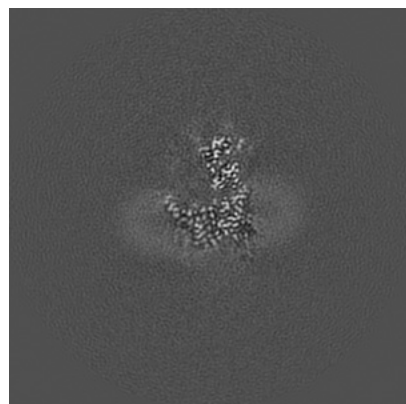


Z

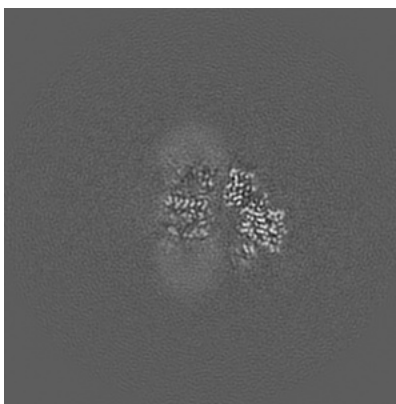
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

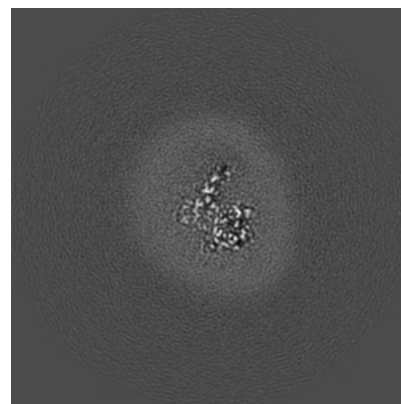
6.2.1 Primary map



X Index: 160



Y Index: 160

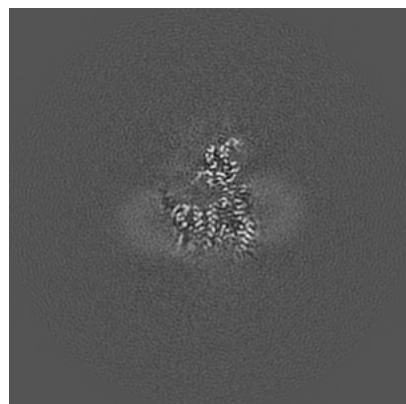


Z Index: 160

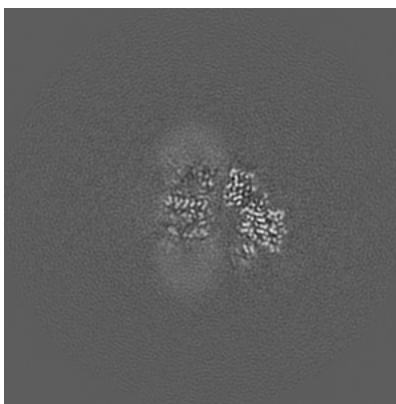
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

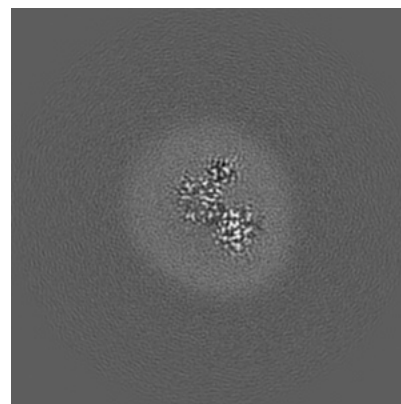
6.3.1 Primary map



X Index: 163



Y Index: 160

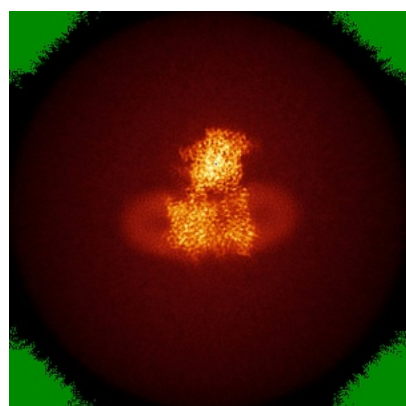


Z Index: 139

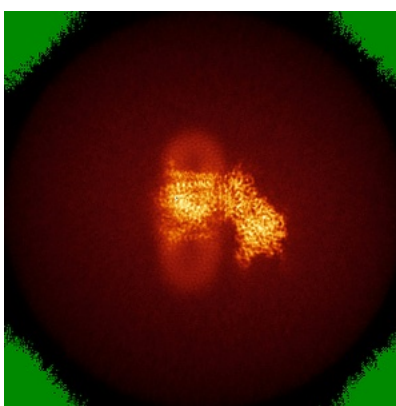
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) [i](#)

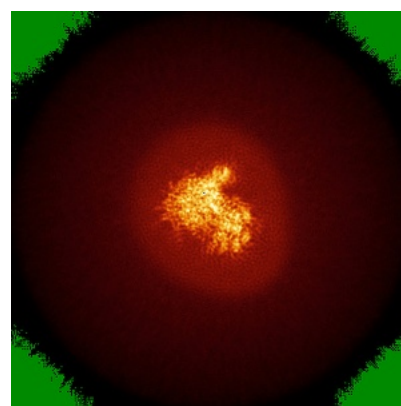
6.4.1 Primary map



X



Y



Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.028. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

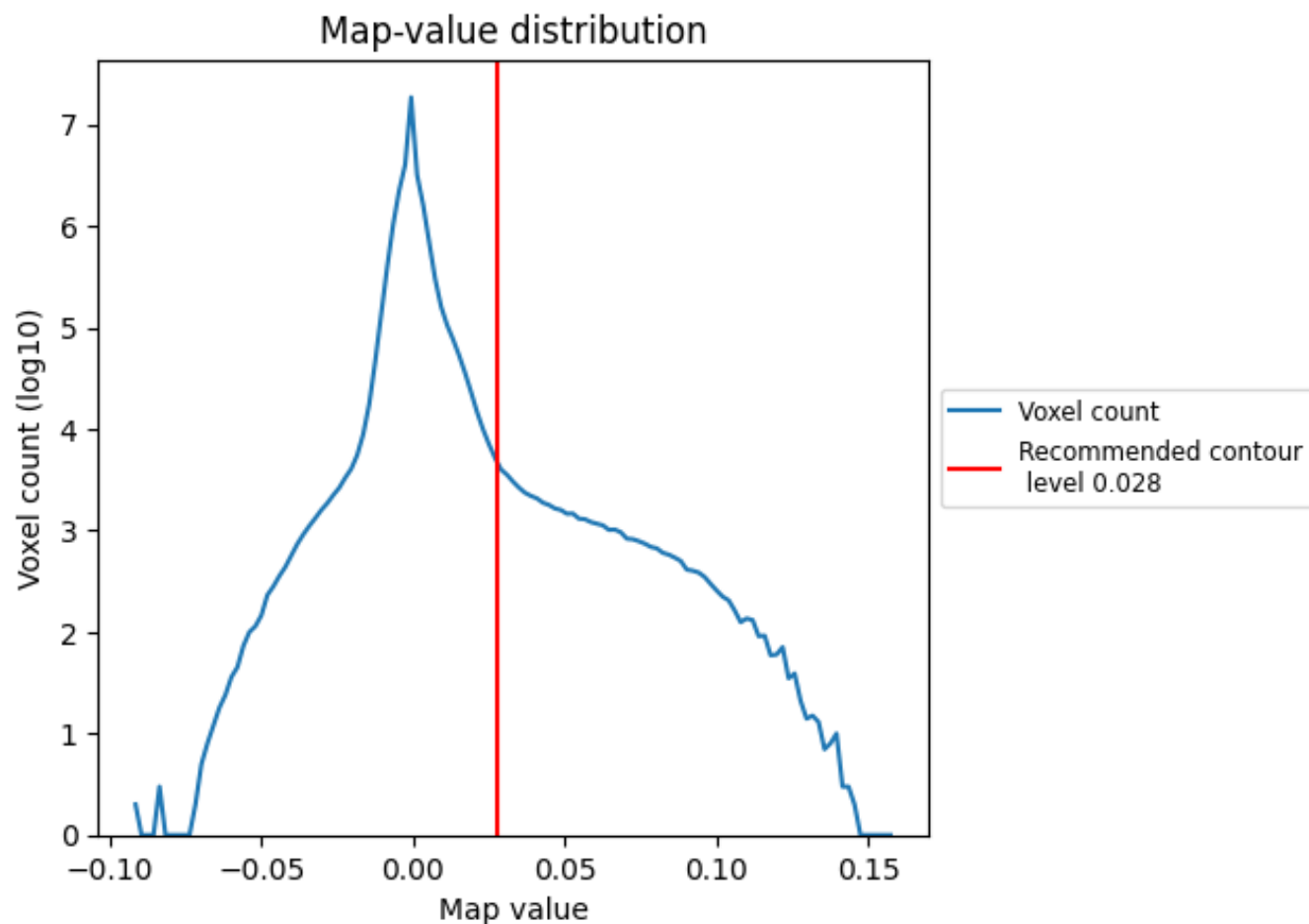
6.6 Mask visualisation [i](#)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis [i](#)

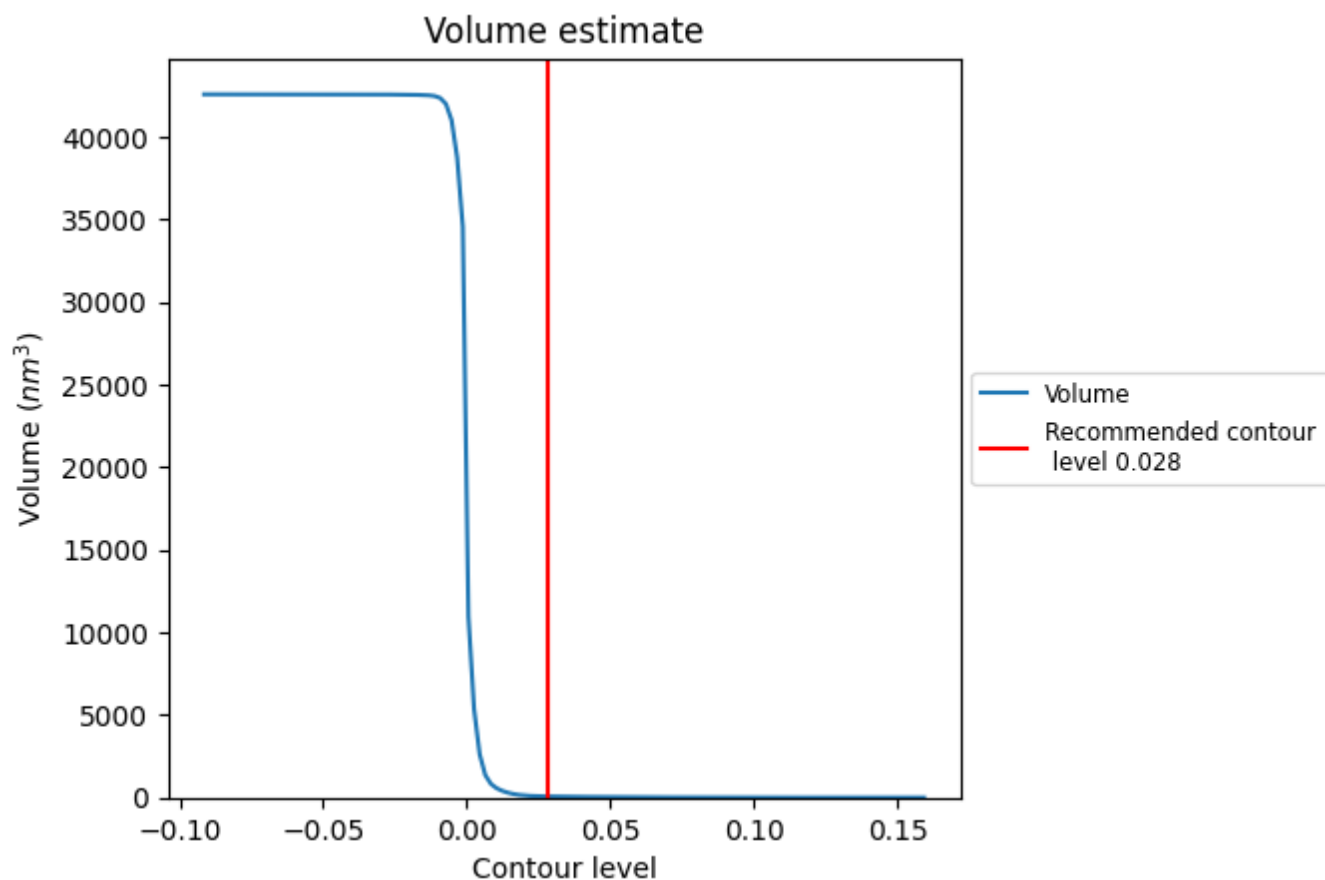
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

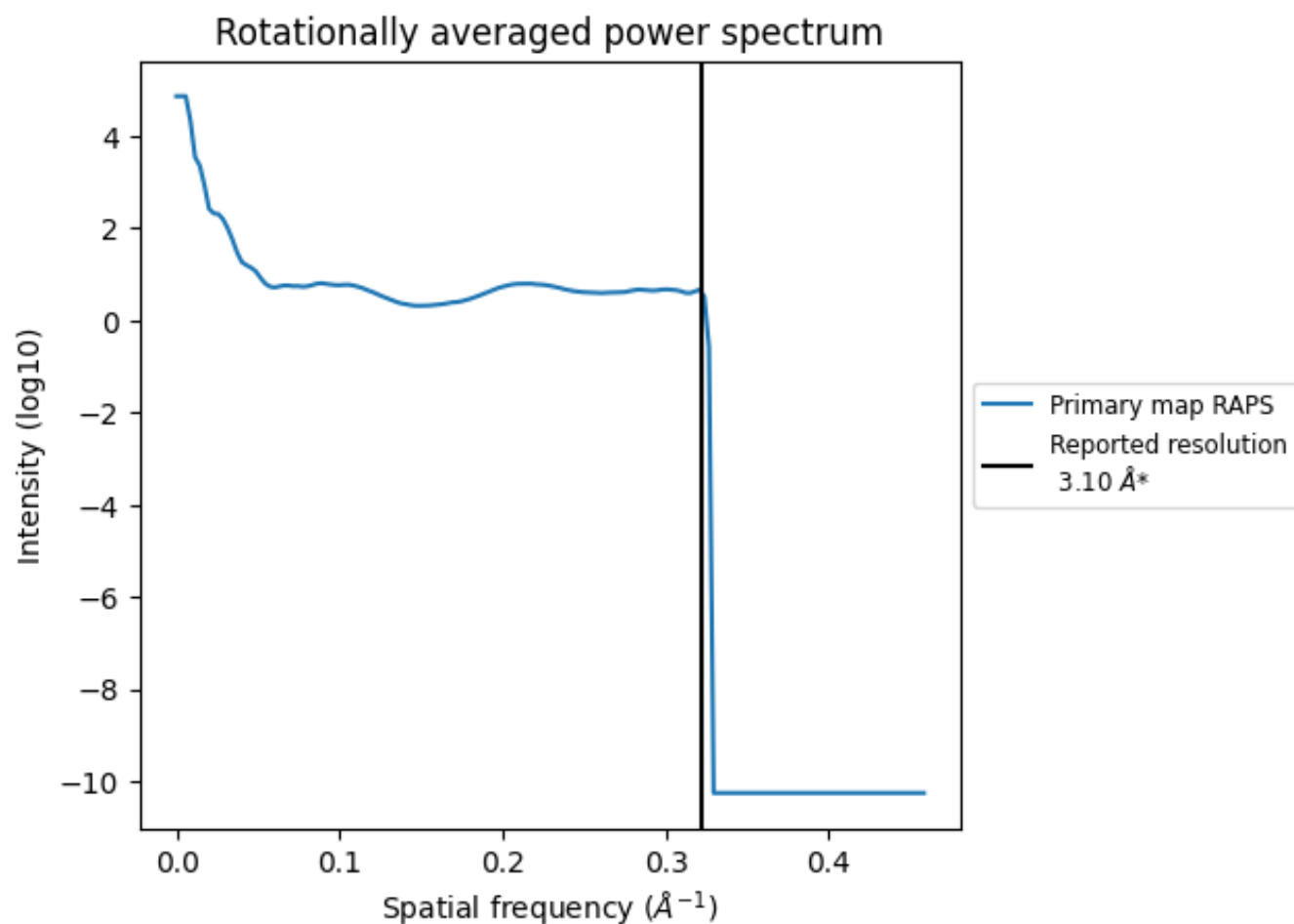
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 67 nm^3 ; this corresponds to an approximate mass of 61 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum ⓘ



*Reported resolution corresponds to spatial frequency of 0.323 \AA^{-1}

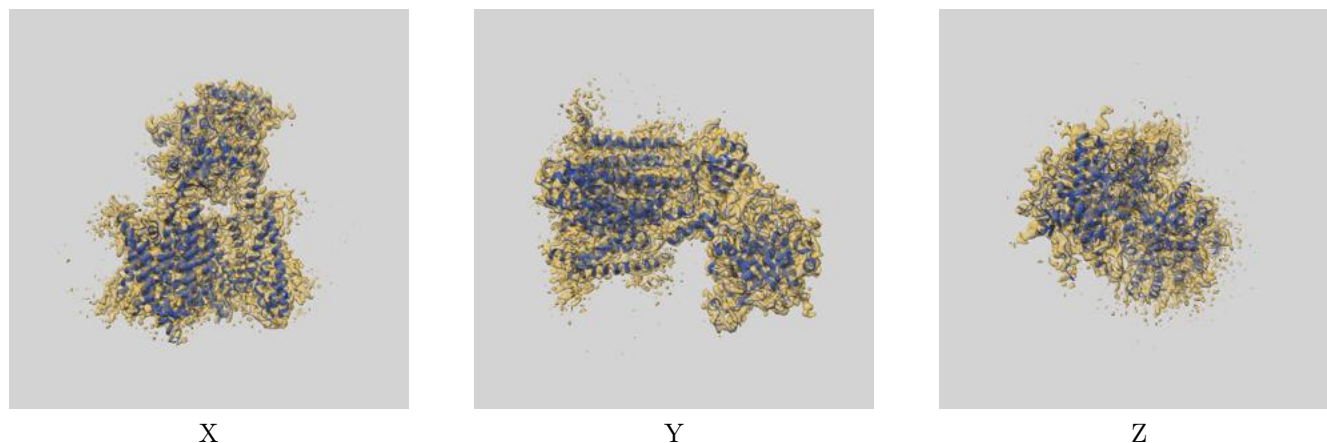
8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit [i](#)

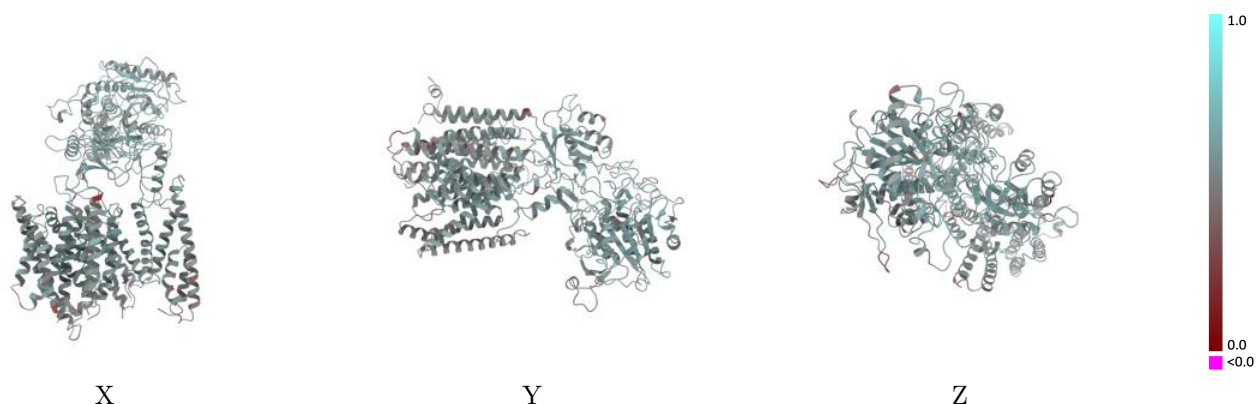
This section contains information regarding the fit between EMDB map EMD-0944 and PDB model 6LQG. Per-residue inclusion information can be found in section 3 on page 10.

9.1 Map-model overlay [i](#)



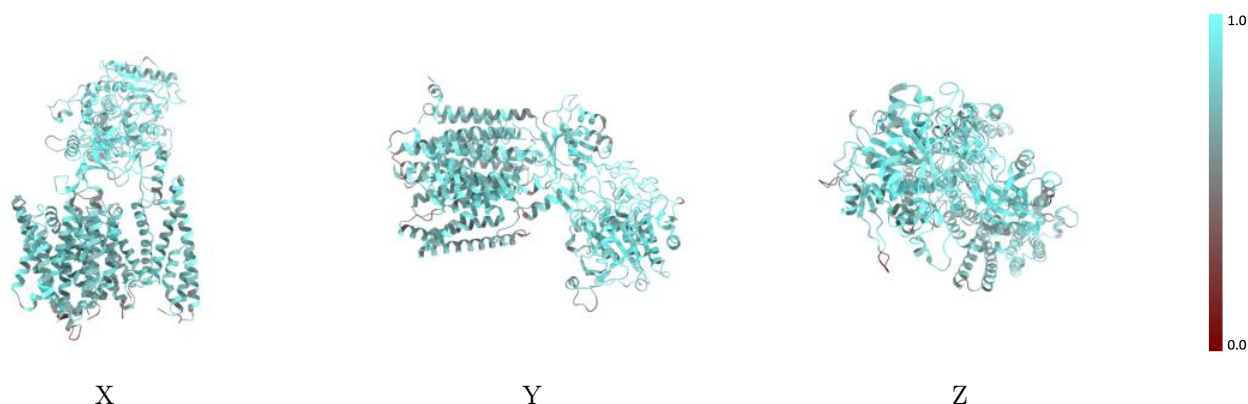
The images above show the 3D surface view of the map at the recommended contour level 0.028 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model [i](#)



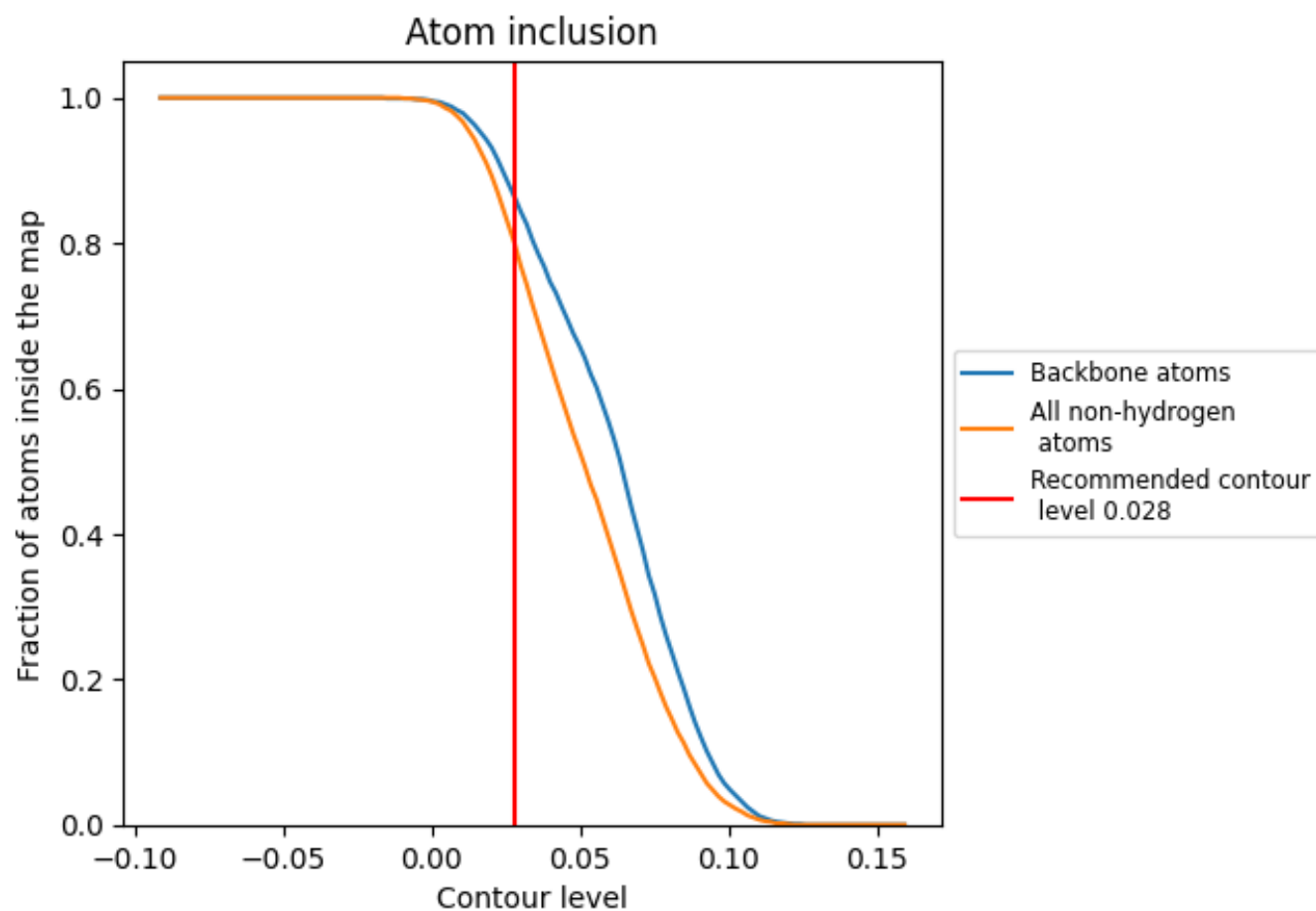
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

9.3 Atom inclusion mapped to coordinate model [i](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.028).

9.4 Atom inclusion [i](#)



At the recommended contour level, 86% of all backbone atoms, 80% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.028) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div><div></div>0.7980</div>	<div><div></div>0.5380</div>
A	<div><div></div>0.8300</div>	<div><div></div>0.5510</div>
B	<div><div></div>0.7530</div>	<div><div></div>0.5330</div>
C	<div><div></div>0.7850</div>	<div><div></div>0.5270</div>
D	<div><div></div>0.7760</div>	<div><div></div>0.5010</div>
E	<div><div></div>0.6790</div>	<div><div></div>0.5610</div>
F	<div><div></div>0.7700</div>	<div><div></div>0.5380</div>
G	<div><div></div>0.7860</div>	<div><div></div>0.4880</div>
H	<div><div></div>0.6070</div>	<div><div></div>0.4190</div>
I	<div><div></div>0.6070</div>	<div><div></div>0.5030</div>
J	<div><div></div>0.8210</div>	<div><div></div>0.5140</div>

1.0

0.0

<0.0