



Full wwPDB EM Validation Report ⓘ

Feb 2, 2025 – 12:07 AM JST

PDB ID : 8YT8
EMDB ID : EMD-39568
Title : Cryo-EM structure of the dystrophin glycoprotein complex
Authors : Wu, J.P.; Yan, Z.; Wan, L.
Deposited on : 2024-03-25
Resolution : 3.50 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:

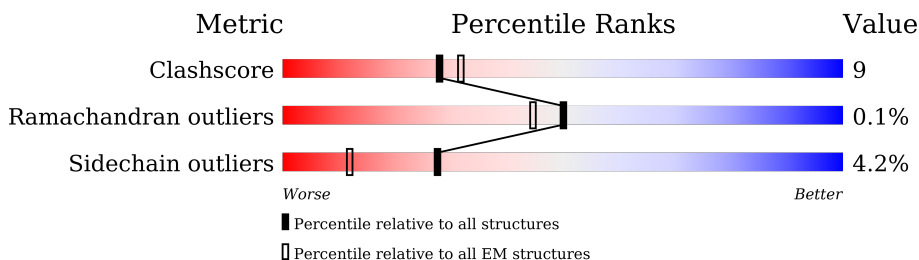
EMDB validation analysis : **FAILED**
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.40

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 3.50 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 $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	291	
2	B	263	
3	C	206	
4	D	263	
5	E	331	
6	G	265	
7	I	5	
8	O	289	
9	S	179	

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Mol	Chain	Length	Quality of chain
10	F	3	 100%
10	K	3	 100%
10	L	3	 100%
10	M	3	 100%
10	N	3	 100%
11	H	3	 67% 33%
12	J	2	 100%
12	Q	2	 100%
13	P	3	 100%

2 Entry composition [i](#)

There are 18 unique types of molecules in this entry. The entry contains 16309 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 Alpha-sarcoglycan.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	291	2296	1481	389	418	8	0	0

- Molecule 2 is a protein called Beta-sarcoglycan.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	263	2009	1259	357	379	14	0	0

- Molecule 3 is a protein called Dystrobrevin alpha.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	206	1078	649	215	213	1	0	0

- Molecule 4 is a protein called Delta-sarcoglycan.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	D	263	2045	1303	354	376	12	0	0

- Molecule 5 is a protein called Dystrophin.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	E	331	2686	1705	479	478	24	0	0

- Molecule 6 is a protein called Gamma-sarcoglycan.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	G	265	2031	1284	349	387	11	0	0

- Molecule 7 is a protein called unknown segment.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	I	5	37	25	6	5	1	0	0

- Molecule 8 is a protein called Beta-dystroglycan.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	O	289	2247	1423	399	418	7	0	0

- Molecule 9 is a protein called Sarcospan.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	S	179	1390	921	217	233	19	0	0

- Molecule 10 is an oligosaccharide called 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
			Total	C	N	O		
10	F	3	39	22	2	15	0	0
10	K	3	39	22	2	15	0	0
10	L	3	39	22	2	15	0	0
10	M	3	39	22	2	15	0	0
10	N	3	39	22	2	15	0	0

- Molecule 11 is an oligosaccharide called beta-D-mannopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
11	H	3	39	22	2	15	0	0

- Molecule 12 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
			Total	C	N	O		
12	J	2	28	16	2	10	0	0
12	Q	2	28	16	2	10	0	0

- Molecule 13 is an oligosaccharide called beta-D-mannopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



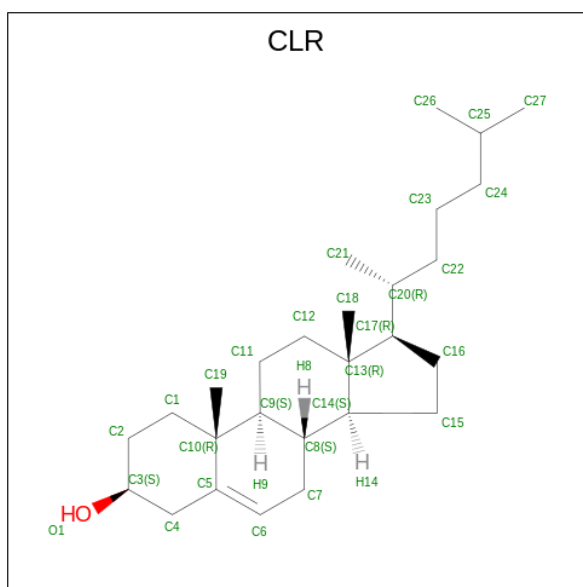
Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
13	P	3	39	22	2	15	0	0

- Molecule 14 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C₈H₁₅NO₆).



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

- Molecule 15 is CHOLESTEROL (three-letter code: CLR) (formula: $C_{27}H_{46}O$).



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

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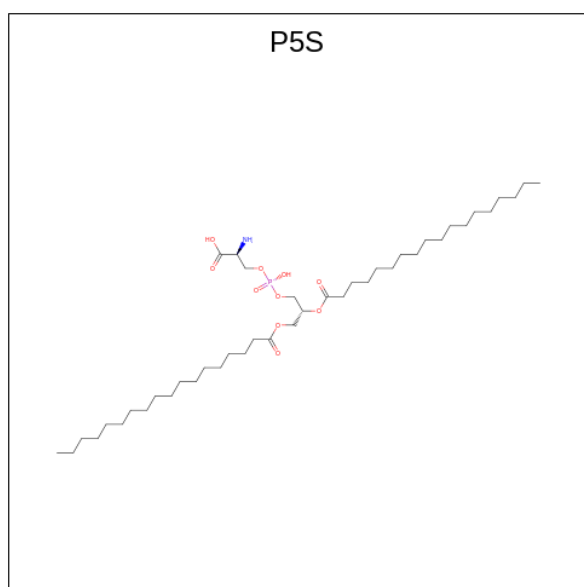
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Mol	Chain	Residues	Atoms			AltConf
15	D	1	Total	C	O	0
			28	27	1	
15	S	1	Total	C	O	0
			28	27	1	

- Molecule 16 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
16	E	1	Total	Zn	0
			1	1	

- Molecule 17 is O-[(R)-{[(2R)-2,3-bis(octadecanoyloxy)propyl]oxy}(hydroxy)phosphoryl]-L-serine (three-letter code: P5S) (formula: C₄₂H₈₂NO₁₀P) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
17	G	1	Total	C	N	O	P	0
			33	21	1	10	1	


- Molecule 18 is CALCIUM ION (three-letter code: CA) (formula: Ca).

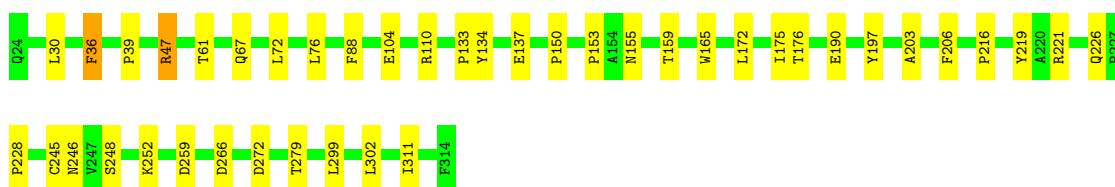
Mol	Chain	Residues	Atoms		AltConf
18	O	1	Total	Ca	0
			1	1	

3 Residue-property plots


These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Alpha-sarcoglycan

Chain A:  86% 14%



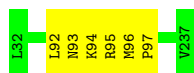
- Molecule 2: Beta-sarcoglycan

Chain B:  80% 19%




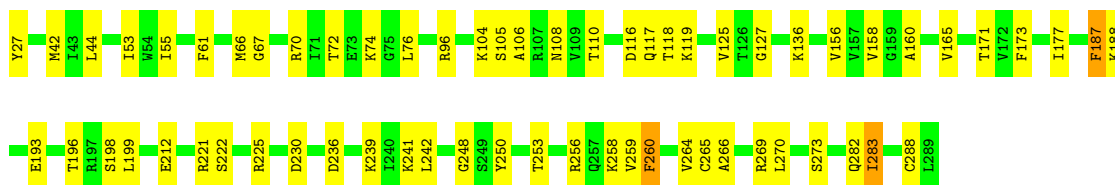
- Molecule 3: Dystrobrevin alpha

Chain C:  97%

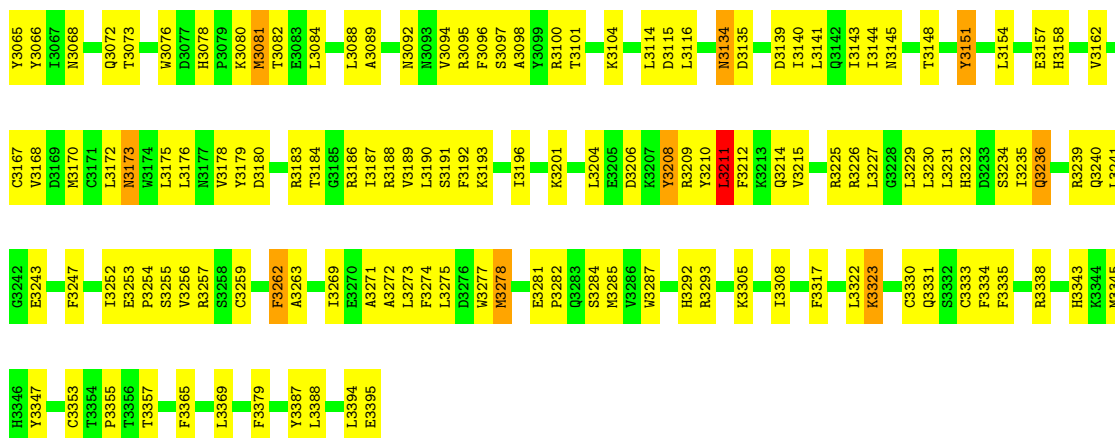


- Molecule 4: Delta-sarcoglycan

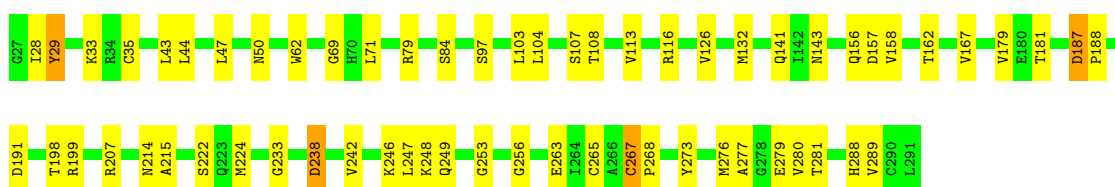
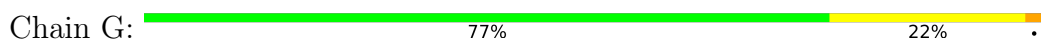
Chain D:  76% 23%



- Molecule 5: Dystrophin



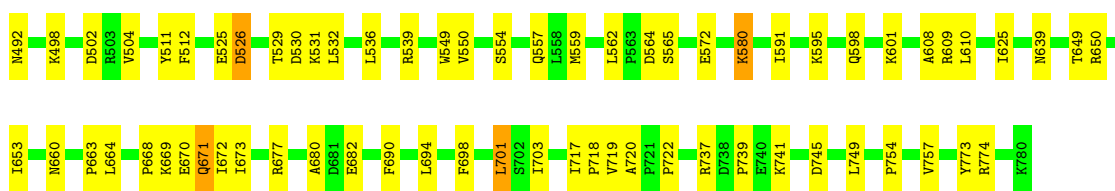
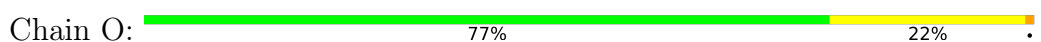
• Molecule 6: Gamma-sarcoglycan



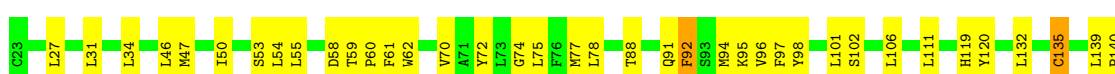
• Molecule 7: unknown segment



• Molecule 8: Beta-dystroglycan



• Molecule 9: Sarcospan





- Molecule 10: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain F:  100%



- Molecule 10: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain K:  100%



- Molecule 10: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain L:  100%



- Molecule 10: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain M:  100%



- Molecule 10: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain N:  100%



- Molecule 11: beta-D-mannopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain H:  67%  33%



- Molecule 12: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain J:  100%

MAG1
MAG2

- Molecule 12: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain Q:  100%

MAG1
MAG2

- Molecule 13: beta-D-mannopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain P:  100%

MAG1
MAG2
EMAS

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	499658	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 ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1400	Depositor
Maximum defocus (nm)	1900	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	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, P5S, CA, NAG, ZN, BMA

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	0.26	0/2366	0.51	0/3248
2	B	0.27	0/2042	0.51	0/2758
3	C	0.24	0/1082	0.37	0/1503
4	D	0.27	0/2076	0.53	0/2799
5	E	0.26	0/2747	0.58	1/3713 (0.0%)
6	G	0.28	0/2067	0.53	0/2799
7	I	0.21	0/37	0.45	0/48
8	O	0.26	0/2299	0.49	0/3119
9	S	0.27	0/1422	0.53	0/1934
All	All	0.26	0/16138	0.52	1/21921 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	E	3211	LEU	CA-CB-CG	5.61	128.20	115.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	311	ILE	Peptide

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	2296	0	2269	29	0
2	B	2009	0	2022	44	0
3	C	1078	0	556	4	0
4	D	2045	0	2129	43	0
5	E	2686	0	2678	99	0
6	G	2031	0	2039	53	0
7	I	37	0	44	1	0
8	O	2247	0	2257	46	0
9	S	1390	0	1434	32	0
10	F	39	0	34	0	0
10	K	39	0	34	0	0
10	L	39	0	34	0	0
10	M	39	0	34	0	0
10	N	39	0	34	0	0
11	H	39	0	34	2	0
12	J	28	0	25	0	0
12	Q	28	0	25	0	0
13	P	39	0	34	0	0
14	A	28	0	26	2	0
14	O	14	0	13	1	0
15	D	56	0	92	3	0
15	S	28	0	46	4	0
16	E	1	0	0	0	0
17	G	33	0	32	3	0
18	O	1	0	0	0	0
All	All	16309	0	15925	303	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 9.

All (303) 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)
6:G:35:CYS:SG	17:G:301:P5S:H21A	2.11	0.90
5:E:3275:LEU:HA	5:E:3278:MET:HE2	1.60	0.83
6:G:187:ASP:HB2	6:G:188:PRO:HD2	1.61	0.81
5:E:3104:LYS:HD3	5:E:3241:LEU:HD21	1.67	0.76
4:D:265:CYS:SG	4:D:266:ALA:N	2.57	0.76
6:G:141:GLN:NE2	6:G:143:ASN:OD1	2.19	0.76
5:E:3141:LEU:O	5:E:3145:ASN:ND2	2.21	0.74
4:D:42:MET:HB2	6:G:43:LEU:HD11	1.71	0.72
5:E:3092:ASN:OD1	5:E:3104:LYS:NZ	2.17	0.71
1:A:228:PRO:HB3	1:A:245:CYS:HB3	1.73	0.70
4:D:173:PHE:HB2	6:G:181:THR:HG22	1.72	0.70
2:B:145:PRO:HB3	2:B:158:GLU:HG3	1.71	0.70
2:B:208:GLU:HG3	4:D:188:LYS:HD2	1.73	0.69
8:O:737:ARG:HG3	8:O:739:PRO:HD3	1.75	0.68
5:E:3282:PRO:HG2	5:E:3285:MET:HB2	1.76	0.68
6:G:157:ASP:OD1	6:G:158:VAL:N	2.27	0.68
5:E:3227:LEU:HD11	5:E:3256:VAL:HG13	1.77	0.67
1:A:72:LEU:HD22	1:A:76:LEU:HD23	1.76	0.67
6:G:35:CYS:SG	17:G:301:P5S:O18	2.53	0.66
7:I:213:LEU:O	8:O:773:TYR:OH	2.13	0.66
5:E:3098:ALA:HB3	5:E:3388:LEU:HG	1.77	0.65
5:E:3236:GLN:HA	5:E:3239:ARG:HE	1.58	0.65
5:E:3293:ARG:NH1	5:E:3353:CYS:SG	2.70	0.65
2:B:229:ARG:NH1	4:D:212:GLU:OE2	2.30	0.64
4:D:53:ILE:HD12	15:D:302:CLR:H183	1.80	0.63
9:S:77:MET:HE2	9:S:95:LYS:HD2	1.78	0.63
1:A:133:PRO:HD2	1:A:203:ALA:HA	1.79	0.63
5:E:3078:HIS:O	5:E:3082:THR:N	2.30	0.63
4:D:110:THR:HG23	4:D:125:VAL:HG22	1.81	0.62
2:B:263:VAL:HG21	4:D:242:LEU:HD23	1.81	0.62
1:A:272:ASP:OD2	6:G:116:ARG:NH2	2.32	0.62
9:S:27:LEU:HA	9:S:78:LEU:HD13	1.81	0.61
5:E:3178:VAL:HG12	5:E:3240:GLN:HG3	1.81	0.61
6:G:62:TRP:O	6:G:69:GLY:N	2.29	0.61
2:B:292:CYS:SG	2:B:293:ALA:N	2.74	0.61
9:S:88:THR:HG22	9:S:91:GLN:HG2	1.81	0.61
6:G:187:ASP:HB2	6:G:188:PRO:CD	2.30	0.61
5:E:3333:CYS:SG	5:E:3338:ARG:NH1	2.71	0.61
9:S:135:CYS:HB2	9:S:154:VAL:HG21	1.81	0.61
6:G:107:SER:OG	6:G:108:THR:N	2.34	0.60
6:G:279:GLU:HG2	6:G:280:VAL:HG13	1.83	0.60
8:O:609:ARG:HD2	8:O:701:LEU:HD11	1.82	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:E:3115:ASP:N	5:E:3115:ASP:OD1	2.33	0.60
5:E:3231:LEU:O	5:E:3235:ILE:HG12	2.02	0.59
5:E:3252:ILE:O	5:E:3255:SER:OG	2.20	0.59
2:B:269:ARG:NH1	6:G:238:ASP:OD1	2.32	0.59
5:E:3176:LEU:HD12	5:E:3180:ASP:HB3	1.85	0.59
2:B:74:LEU:HD11	6:G:44:LEU:HD12	1.85	0.59
5:E:3184:THR:HG23	5:E:3186:ARG:H	1.68	0.59
9:S:120:TYR:HB2	9:S:168:LEU:HD23	1.85	0.59
2:B:207:THR:OG1	2:B:208:GLU:N	2.37	0.58
5:E:3135:ASP:HA	5:E:3188:ARG:HD2	1.84	0.58
5:E:3135:ASP:O	5:E:3188:ARG:NH1	2.36	0.58
9:S:47:MET:HE1	9:S:167:PHE:HB3	1.86	0.58
2:B:150:GLN:NE2	6:G:108:THR:O	2.37	0.58
1:A:221:ARG:HH11	1:A:226:GLN:HB3	1.69	0.57
5:E:3272:ALA:HA	5:E:3275:LEU:HD12	1.86	0.57
9:S:59:THR:HG1	9:S:61:PHE:HD2	1.52	0.57
6:G:248:LYS:NZ	6:G:249:GLN:O	2.37	0.57
8:O:663:PRO:HD2	8:O:668:PRO:HG3	1.85	0.57
2:B:245:MET:HE3	2:B:245:MET:HA	1.86	0.57
1:A:67:GLN:NE2	1:A:104:GLU:OE2	2.30	0.57
5:E:3068:ASN:O	5:E:3072:GLN:N	2.37	0.57
5:E:3154:LEU:O	5:E:3158:HIS:ND1	2.31	0.57
4:D:76:LEU:HD11	6:G:71:LEU:HD12	1.86	0.57
9:S:91:GLN:O	9:S:95:LYS:HG2	2.06	0.56
9:S:60:PRO:HG2	9:S:171:GLN:HE22	1.70	0.56
5:E:3104:LYS:NZ	5:E:3241:LEU:HD11	2.21	0.55
4:D:187:PHE:O	6:G:199:ARG:NH1	2.39	0.55
5:E:3285:MET:HE3	5:E:3285:MET:HA	1.88	0.55
5:E:3104:LYS:HZ1	5:E:3241:LEU:HD11	1.72	0.55
5:E:3206:ASP:OD1	5:E:3206:ASP:N	2.39	0.55
8:O:530:ASP:HA	8:O:557:GLN:HE22	1.72	0.54
8:O:673:ILE:O	8:O:677:ARG:HG2	2.07	0.54
9:S:102:SER:OG	9:S:186:CYS:SG	2.59	0.54
9:S:70:VAL:HG22	9:S:101:LEU:HG	1.89	0.54
1:A:266:ASP:OD1	1:A:266:ASP:N	2.41	0.54
5:E:3076:TRP:O	5:E:3173:ASN:ND2	2.40	0.54
5:E:3154:LEU:O	5:E:3158:HIS:N	2.39	0.54
1:A:133:PRO:HA	1:A:252:LYS:HB2	1.90	0.54
2:B:77:LEU:HD23	6:G:47:LEU:HD21	1.89	0.54
2:B:277:ASP:HB3	4:D:283:ILE:HG23	1.89	0.53
5:E:3254:PRO:HA	5:E:3257:ARG:HD2	1.89	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:E:3134:ASN:ND2	5:E:3214:GLN:OE1	2.41	0.53
4:D:248:GLY:HA2	6:G:289:VAL:HG11	1.91	0.53
8:O:529:THR:HA	8:O:532:LEU:HD12	1.89	0.53
8:O:680:ALA:HB2	8:O:703:ILE:HD11	1.89	0.53
6:G:113:VAL:HB	6:G:126:VAL:HG22	1.91	0.52
8:O:717:ILE:HG12	8:O:719:VAL:HG22	1.90	0.52
2:B:135:GLU:HG3	2:B:136:ASN:H	1.74	0.52
5:E:3084:LEU:O	5:E:3088:LEU:HG	2.10	0.52
9:S:53:SER:HA	9:S:152:ARG:HH11	1.75	0.51
9:S:92:PHE:HE1	15:S:301:CLR:H152	1.74	0.51
4:D:177:ILE:HD11	6:G:179:VAL:HG11	1.92	0.51
5:E:3151:TYR:CE2	5:E:3167:CYS:HB3	2.46	0.51
5:E:3157:GLU:HB2	5:E:3158:HIS:CE1	2.46	0.51
5:E:3226:ARG:O	5:E:3230:LEU:HG	2.11	0.51
8:O:610:LEU:HB2	8:O:653:ILE:HB	1.93	0.51
1:A:137:GLU:HB3	1:A:248:SER:HB2	1.92	0.51
4:D:253:THR:O	4:D:256:ARG:NH2	2.44	0.51
5:E:3080:LYS:O	5:E:3084:LEU:HG	2.10	0.51
5:E:3116:LEU:HD23	5:E:3116:LEU:H	1.76	0.50
8:O:670:GLU:HG2	8:O:671:GLN:N	2.25	0.50
4:D:158:VAL:HG12	4:D:160:ALA:H	1.75	0.50
8:O:671:GLN:H	8:O:671:GLN:CD	2.13	0.50
9:S:96:VAL:HG23	15:S:301:CLR:H182	1.93	0.50
5:E:3100:ARG:NH2	5:E:3243:GLU:OE2	2.40	0.50
2:B:56:LYS:O	2:B:60:ARG:NH1	2.45	0.50
2:B:190:GLU:OE2	2:B:192:HIS:NE2	2.45	0.50
8:O:741:LYS:HB2	9:S:145:LEU:HD12	1.93	0.50
2:B:124:LEU:HD23	4:D:96:ARG:HG3	1.92	0.49
2:B:312:SER:HB3	6:G:253:GLY:HA3	1.93	0.49
5:E:3076:TRP:HZ2	5:E:3183:ARG:HG2	1.77	0.49
5:E:3269:ILE:HG23	5:E:3273:LEU:HD22	1.93	0.49
5:E:3204:LEU:HD21	5:E:3292:HIS:CD2	2.47	0.49
4:D:117:GLN:HE22	4:D:119:LYS:HB3	1.76	0.49
15:D:301:CLR:H3	15:D:302:CLR:H12	1.93	0.49
5:E:3193:LYS:HA	5:E:3196:ILE:HG22	1.95	0.49
1:A:246:ASN:HD21	11:H:1:NAG:C7	2.26	0.49
1:A:246:ASN:HB2	11:H:1:NAG:O5	2.13	0.49
9:S:139:LEU:HD13	9:S:140:PRO:HD2	1.95	0.49
2:B:167:ASP:OD1	2:B:167:ASP:N	2.34	0.49
5:E:3095:ARG:NH2	5:E:3334:PHE:O	2.46	0.49
5:E:3189:VAL:O	5:E:3193:LYS:HG2	2.13	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:132:ARG:NH1	2:B:135:GLU:OE2	2.46	0.48
5:E:3144:ILE:O	5:E:3148:THR:OG1	2.29	0.48
2:B:271:PRO:HG3	4:D:269:ARG:HH21	1.78	0.48
3:C:94:LYS:O	5:E:3092:ASN:ND2	2.42	0.48
8:O:598:GLN:NE2	8:O:660:ASN:OD1	2.46	0.48
8:O:720:ALA:O	8:O:722:PRO:HD3	2.13	0.48
9:S:77:MET:HE1	9:S:94:MET:HG2	1.96	0.48
1:A:176:THR:HG23	1:A:197:TYR:HB2	1.96	0.48
9:S:60:PRO:HG2	9:S:171:GLN:NE2	2.28	0.48
2:B:255:ASN:HB2	6:G:224:MET:O	2.14	0.48
8:O:504:VAL:HB	8:O:591:ILE:HG12	1.96	0.48
3:C:92:LEU:HA	3:C:95:ARG:HE	1.80	0.47
4:D:165:VAL:HG11	4:D:171:THR:HG21	1.96	0.47
4:D:222:SER:O	6:G:233:GLY:HA3	2.14	0.47
5:E:3241:LEU:HD12	5:E:3241:LEU:O	2.14	0.47
5:E:3333:CYS:SG	5:E:3338:ARG:HD2	2.54	0.47
8:O:526:ASP:N	8:O:526:ASP:OD1	2.47	0.47
8:O:668:PRO:HB2	8:O:671:GLN:OE1	2.14	0.47
4:D:239:LYS:HD2	4:D:241:LYS:HE2	1.95	0.47
5:E:3094:VAL:O	5:E:3100:ARG:NH1	2.48	0.47
4:D:105:SER:OG	4:D:106:ALA:N	2.48	0.47
9:S:106:LEU:HB2	9:S:182:CYS:HB3	1.96	0.47
4:D:260:PHE:HA	4:D:273:SER:O	2.15	0.47
5:E:3148:THR:HA	5:E:3168:VAL:HG11	1.96	0.47
9:S:77:MET:CE	9:S:94:MET:HG2	2.44	0.47
1:A:216:PRO:HA	1:A:219:TYR:HD2	1.80	0.47
2:B:252:LYS:HG2	4:D:236:ASP:HB2	1.96	0.47
5:E:3116:LEU:HD12	5:E:3158:HIS:CD2	2.50	0.47
6:G:198:THR:OG1	8:O:502:ASP:OD1	2.33	0.47
2:B:81:ASN:ND2	6:G:50:ASN:OD1	2.32	0.47
5:E:3271:ALA:O	5:E:3275:LEU:HG	2.15	0.47
9:S:74:GLY:HA2	9:S:98:TYR:HE2	1.78	0.47
1:A:172:LEU:HD13	1:A:175:ILE:HD11	1.97	0.47
9:S:31:LEU:O	9:S:34:LEU:HG	2.15	0.47
9:S:54:LEU:HD12	9:S:55:LEU:O	2.16	0.47
5:E:3206:ASP:O	5:E:3209:ARG:HG3	2.14	0.46
6:G:35:CYS:HB3	17:G:301:P5S:H43	1.96	0.46
5:E:3247:PHE:HB3	5:E:3284:SER:HA	1.98	0.46
6:G:156:GLN:NE2	6:G:157:ASP:HB3	2.30	0.46
9:S:193:ARG:HG2	15:S:301:CLR:H161	1.97	0.46
1:A:134:TYR:HB3	1:A:206:PHE:CE1	2.50	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:288:LYS:NZ	6:G:263:GLU:OE2	2.38	0.46
5:E:3212:PHE:CE2	5:E:3271:ALA:HB2	2.50	0.46
1:A:279:THR:HB	14:A:401:NAG:C7	2.46	0.46
9:S:72:TYR:O	9:S:75:LEU:HG	2.15	0.46
2:B:287:TYR:HB3	2:B:299:LYS:HB2	1.98	0.46
5:E:3088:LEU:HD22	5:E:3104:LYS:HG2	1.97	0.46
5:E:3179:TYR:HB3	5:E:3187:ILE:HG12	1.98	0.46
8:O:694:LEU:HD21	8:O:698:PHE:HB2	1.98	0.46
6:G:97:SER:HB2	6:G:103:LEU:HB2	1.97	0.46
2:B:245:MET:HG3	2:B:249:VAL:HG22	1.98	0.46
5:E:3305:LYS:HD2	6:G:29:TYR:HE2	1.81	0.46
2:B:306:ASN:HA	6:G:281:THR:HG23	1.99	0.45
2:B:287:TYR:HB2	4:D:264:VAL:HG13	1.99	0.45
5:E:3225:ARG:O	5:E:3229:LEU:HG	2.17	0.45
8:O:682:GLU:HB2	8:O:718:PRO:HB2	1.97	0.45
2:B:89:TRP:CD1	4:D:55:ILE:HD11	2.52	0.45
5:E:3088:LEU:HB3	5:E:3104:LYS:HE2	1.99	0.45
4:D:259:VAL:HG12	6:G:267:CYS:HB2	1.99	0.45
1:A:39:PRO:HB3	1:A:88:PHE:CE1	2.52	0.45
4:D:72:THR:HG21	4:D:74:LYS:HZ2	1.82	0.45
5:E:3263:ALA:HB2	5:E:3273:LEU:HD21	1.99	0.45
1:A:302:LEU:HA	1:A:302:LEU:HD23	1.79	0.45
8:O:598:GLN:HE22	8:O:660:ASN:HA	1.82	0.45
2:B:86:LEU:HD23	2:B:86:LEU:HA	1.81	0.44
5:E:3355:PRO:HB2	9:S:197:PHE:HE2	1.81	0.44
5:E:3097:SER:O	5:E:3101:THR:HG23	2.18	0.44
2:B:231:ASN:ND2	8:O:572:GLU:OE1	2.41	0.44
5:E:3097:SER:HA	5:E:3100:ARG:HH21	1.82	0.44
5:E:3322:LEU:HD23	5:E:3322:LEU:HA	1.83	0.44
8:O:539:ARG:NH1	8:O:572:GLU:OE2	2.50	0.44
5:E:3208:TYR:O	5:E:3211:LEU:HD12	2.18	0.44
4:D:196:THR:HG22	4:D:196:THR:O	2.18	0.44
5:E:3114:LEU:HD11	5:E:3196:ILE:HD11	1.98	0.44
2:B:302:VAL:HG12	2:B:307:MET:SD	2.57	0.44
6:G:198:THR:OG1	6:G:198:THR:O	2.33	0.44
1:A:279:THR:HB	14:A:401:NAG:N2	2.32	0.44
6:G:28:ILE:HG22	6:G:33:LYS:HB2	2.00	0.44
5:E:3175:LEU:HA	5:E:3178:VAL:HG22	2.00	0.43
5:E:3065:TYR:HB3	5:E:3076:TRP:CD1	2.53	0.43
8:O:549:TRP:CE3	8:O:550:VAL:HG23	2.53	0.43
8:O:690:PHE:HE2	8:O:703:ILE:HG21	1.82	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:E:3144:ILE:HG22	5:E:3172:LEU:HD22	1.99	0.43
5:E:3317:PHE:HB2	5:E:3331:GLN:HB3	2.00	0.43
8:O:717:ILE:O	8:O:719:VAL:N	2.45	0.43
2:B:135:GLU:HG3	2:B:136:ASN:N	2.34	0.43
2:B:312:SER:HA	6:G:256:GLY:HA3	2.00	0.43
1:A:30:LEU:HD21	1:A:36:PHE:CD2	2.53	0.43
2:B:218:LEU:HD23	4:D:199:LEU:HD12	2.00	0.43
8:O:511:TYR:HD1	8:O:625:ILE:HD12	1.83	0.43
5:E:3096:PHE:HE2	5:E:3387:TYR:HB3	1.82	0.43
1:A:150:PRO:O	1:A:153:PRO:HD2	2.18	0.43
4:D:177:ILE:HG13	6:G:181:THR:HG21	2.01	0.43
3:C:93:ASN:HA	3:C:96:MET:HB3	2.00	0.43
8:O:562:LEU:HB2	8:O:625:ILE:HD11	2.01	0.43
4:D:104:LYS:HD3	6:G:116:ARG:HH22	1.84	0.43
5:E:3323:LYS:HE3	5:E:3343:HIS:NE2	2.34	0.43
2:B:133:ARG:HA	2:B:133:ARG:HD3	1.88	0.42
4:D:260:PHE:HE2	6:G:268:PRO:HA	1.83	0.42
5:E:3068:ASN:ND2	5:E:3073:THR:OG1	2.30	0.42
5:E:3098:ALA:HB3	5:E:3388:LEU:CG	2.48	0.42
5:E:3305:LYS:HE3	5:E:3305:LYS:HB2	1.78	0.42
9:S:46:LEU:O	9:S:50:ILE:HG12	2.19	0.42
2:B:83:LEU:HD23	2:B:83:LEU:HA	1.89	0.42
3:C:97:PRO:HA	5:E:3089:ALA:O	2.19	0.42
1:A:61:THR:HG21	1:A:110:ARG:HE	1.84	0.42
5:E:3175:LEU:HA	5:E:3175:LEU:HD23	1.81	0.42
5:E:3235:ILE:O	5:E:3239:ARG:HG3	2.19	0.42
8:O:580:LYS:HE3	8:O:580:LYS:HB3	1.82	0.42
2:B:286:ARG:HD3	4:D:282:GLN:HE22	1.84	0.42
5:E:3215:VAL:CG2	5:E:3230:LEU:HD21	2.49	0.42
8:O:649:THR:HB	14:O:801:NAG:H81	2.02	0.42
8:O:650:ARG:HD2	8:O:650:ARG:HA	1.76	0.42
2:B:126:LYS:HA	2:B:126:LYS:HD3	1.78	0.42
5:E:3234:SER:HB2	5:E:3287:TRP:HZ2	1.85	0.42
8:O:595:LYS:HD2	8:O:595:LYS:HA	1.74	0.42
8:O:668:PRO:HB2	8:O:671:GLN:CD	2.38	0.42
1:A:47:ARG:HA	1:A:47:ARG:HD3	1.74	0.42
5:E:3081:MET:HB2	5:E:3170:MET:HE1	2.00	0.42
4:D:136:LYS:HB3	4:D:136:LYS:HE2	1.80	0.42
6:G:187:ASP:OD1	6:G:187:ASP:N	2.52	0.42
8:O:492:ASN:ND2	8:O:525:GLU:OE1	2.52	0.42
8:O:749:LEU:HD23	8:O:749:LEU:HA	1.81	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:259:ASP:OD1	1:A:259:ASP:N	2.42	0.42
2:B:202:VAL:HG12	6:G:167:VAL:HB	2.01	0.42
4:D:67:GLY:O	4:D:70:ARG:NH1	2.52	0.42
4:D:258:LYS:HD2	4:D:258:LYS:HA	1.87	0.42
6:G:84:SER:O	6:G:84:SER:OG	2.34	0.42
9:S:58:ASP:OD2	9:S:119:HIS:ND1	2.52	0.42
2:B:106:GLU:H	2:B:106:GLU:CD	2.23	0.42
4:D:270:LEU:HB2	6:G:242:VAL:HG13	2.01	0.42
6:G:214:ASN:OD1	6:G:215:ALA:N	2.53	0.42
1:A:299:LEU:HD23	1:A:299:LEU:HA	1.87	0.41
5:E:3141:LEU:O	5:E:3144:ILE:HG12	2.18	0.41
5:E:3323:LYS:HE2	5:E:3347:TYR:CD1	2.55	0.41
5:E:3330:CYS:SG	5:E:3333:CYS:HB2	2.59	0.41
5:E:3394:LEU:O	5:E:3395:GLU:HG3	2.20	0.41
5:E:3179:TYR:CE1	5:E:3191:SER:HB3	2.55	0.41
8:O:669:LYS:HA	8:O:672:ILE:HD12	2.02	0.41
8:O:682:GLU:HA	8:O:718:PRO:HD2	2.01	0.41
1:A:76:LEU:HD12	1:A:76:LEU:HA	1.93	0.41
1:A:155:ASN:O	1:A:159:THR:HG23	2.20	0.41
5:E:3253:GLU:CD	5:E:3253:GLU:H	2.22	0.41
6:G:276:MET:SD	6:G:277:ALA:N	2.93	0.41
4:D:156:VAL:HG23	6:G:162:THR:HG21	2.02	0.41
5:E:3094:VAL:HB	5:E:3100:ARG:HB2	2.02	0.41
5:E:3387:TYR:O	5:E:3387:TYR:CG	2.73	0.41
8:O:564:ASP:OD1	8:O:565:SER:N	2.52	0.41
5:E:3139:ASP:O	5:E:3143:ILE:HG22	2.21	0.41
5:E:3369:LEU:HD23	5:E:3369:LEU:HA	1.80	0.41
5:E:3140:ILE:O	5:E:3144:ILE:HG23	2.21	0.41
5:E:3151:TYR:CZ	5:E:3167:CYS:HB3	2.56	0.41
5:E:3158:HIS:HB2	5:E:3162:VAL:HG23	2.02	0.41
1:A:221:ARG:NH1	1:A:226:GLN:HB3	2.35	0.41
4:D:117:GLN:O	4:D:118:THR:OG1	2.38	0.41
4:D:198:SER:HB3	6:G:207:ARG:HB3	2.02	0.41
5:E:3094:VAL:HG13	5:E:3335:PHE:HB3	2.03	0.41
5:E:3190:LEU:HA	5:E:3193:LYS:HE2	2.03	0.41
6:G:246:LYS:HD2	6:G:247:LEU:N	2.36	0.41
8:O:526:ASP:HB3	8:O:531:LYS:HB2	2.02	0.41
9:S:92:PHE:CE1	15:S:301:CLR:H152	2.55	0.41
4:D:108:ASN:OD1	4:D:127:GLY:HA2	2.21	0.41
15:D:302:CLR:H222	15:D:302:CLR:H162	1.84	0.41
5:E:3308:ILE:HG21	5:E:3338:ARG:HB3	2.01	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:117:ASP:HB3	6:G:79:ARG:HA	2.03	0.40
8:O:498:LYS:HA	8:O:498:LYS:HD3	1.68	0.40
9:S:77:MET:CE	9:S:95:LYS:HD2	2.49	0.40
2:B:299:LYS:HG2	6:G:248:LYS:O	2.21	0.40
4:D:44:LEU:HD23	4:D:44:LEU:HA	1.86	0.40
5:E:3262:PHE:CD2	5:E:3277:TRP:HB2	2.56	0.40
6:G:265:CYS:HB2	6:G:273:TYR:CZ	2.57	0.40
9:S:193:ARG:HG3	9:S:194:TYR:CD1	2.56	0.40
8:O:754:PRO:HG3	9:S:111:LEU:HD11	2.03	0.40
2:B:310:GLN:NE2	6:G:253:GLY:O	2.54	0.40
8:O:608:ALA:HA	8:O:703:ILE:HG22	2.02	0.40
1:A:252:LYS:HA	1:A:252:LYS:HD2	1.87	0.40
5:E:3357:THR:OG1	8:O:774:ARG:O	2.36	0.40
8:O:601:LYS:HB2	8:O:664:LEU:HD11	2.03	0.40
8:O:754:PRO:O	8:O:757:VAL:HG12	2.22	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 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	289/291 (99%)	275 (95%)	14 (5%)	0	100 100
2	B	261/263 (99%)	241 (92%)	19 (7%)	1 (0%)	30 64
3	C	204/206 (99%)	201 (98%)	3 (2%)	0	100 100
4	D	261/263 (99%)	230 (88%)	30 (12%)	1 (0%)	30 64
5	E	329/331 (99%)	307 (93%)	22 (7%)	0	100 100
6	G	263/265 (99%)	249 (95%)	13 (5%)	1 (0%)	30 64
7	I	3/5 (60%)	2 (67%)	1 (33%)	0	100 100
8	O	287/289 (99%)	272 (95%)	15 (5%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
9	S	177/179 (99%)	171 (97%)	6 (3%)	0	100	100
All	All	2074/2092 (99%)	1948 (94%)	123 (6%)	3 (0%)	50	79

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
6	G	187	ASP
2	B	160	ASN
4	D	283	ILE

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	256/256 (100%)	252 (98%)	4 (2%)	58	76
2	B	228/228 (100%)	220 (96%)	8 (4%)	31	59
3	C	16/184 (9%)	16 (100%)	0	100	100
4	D	225/225 (100%)	213 (95%)	12 (5%)	19	46
5	E	297/297 (100%)	276 (93%)	21 (7%)	12	38
6	G	224/224 (100%)	216 (96%)	8 (4%)	30	59
7	I	4/4 (100%)	3 (75%)	1 (25%)	0	3
8	O	246/246 (100%)	236 (96%)	10 (4%)	26	55
9	S	157/157 (100%)	151 (96%)	6 (4%)	28	57
All	All	1653/1821 (91%)	1583 (96%)	70 (4%)	27	54

All (70) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	36	PHE
1	A	47	ARG
1	A	165	TRP
1	A	190	GLU

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Mol	Chain	Res	Type
2	B	73	LEU
2	B	125	TYR
2	B	133	ARG
2	B	160	ASN
2	B	212	SER
2	B	256	SER
2	B	284	TRP
2	B	286	ARG
4	D	27	TYR
4	D	61	PHE
4	D	66	MET
4	D	116	ASP
4	D	187	PHE
4	D	193	GLU
4	D	221	ARG
4	D	225	ARG
4	D	230	ASP
4	D	250	TYR
4	D	260	PHE
4	D	288	CYS
5	E	3066	TYR
5	E	3081	MET
5	E	3134	ASN
5	E	3151	TYR
5	E	3173	ASN
5	E	3192	PHE
5	E	3201	LYS
5	E	3208	TYR
5	E	3210	TYR
5	E	3211	LEU
5	E	3232	HIS
5	E	3236	GLN
5	E	3259	CYS
5	E	3262	PHE
5	E	3274	PHE
5	E	3278	MET
5	E	3281	GLU
5	E	3323	LYS
5	E	3345	MET
5	E	3365	PHE
5	E	3379	PHE
6	G	29	TYR

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Mol	Chain	Res	Type
6	G	104	LEU
6	G	132	MET
6	G	191	ASP
6	G	222	SER
6	G	238	ASP
6	G	267	CYS
6	G	288	HIS
7	I	215	LYS
8	O	512	PHE
8	O	526	ASP
8	O	536	LEU
8	O	554	SER
8	O	559	MET
8	O	580	LYS
8	O	639	ASN
8	O	671	GLN
8	O	701	LEU
8	O	745	ASP
9	S	62	TRP
9	S	92	PHE
9	S	97	PHE
9	S	132	LEU
9	S	135	CYS
9	S	164	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
5	E	3145	ASN
6	G	141	GLN
6	G	143	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

25 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
10	NAG	F	1	1,10	14,14,15	0.25	0	17,19,21	0.43	0
10	NAG	F	2	10	14,14,15	0.24	0	17,19,21	0.43	0
10	BMA	F	3	10	11,11,12	0.66	0	15,15,17	0.72	0
11	NAG	H	1	1,11	14,14,15	0.36	0	17,19,21	0.37	0
11	NAG	H	2	11	14,14,15	0.28	0	17,19,21	0.37	0
11	BMA	H	3	11	11,11,12	0.63	0	15,15,17	0.72	0
12	NAG	J	1	2,12	14,14,15	0.16	0	17,19,21	0.44	0
12	NAG	J	2	12	14,14,15	0.21	0	17,19,21	0.43	0
10	NAG	K	1	2,10	14,14,15	0.32	0	17,19,21	0.41	0
10	NAG	K	2	10	14,14,15	0.22	0	17,19,21	0.34	0
10	BMA	K	3	10	11,11,12	0.59	0	15,15,17	0.77	0
10	NAG	L	1	2,10	14,14,15	0.22	0	17,19,21	0.41	0
10	NAG	L	2	10	14,14,15	0.21	0	17,19,21	0.41	0
10	BMA	L	3	10	11,11,12	0.58	0	15,15,17	0.74	0
10	NAG	M	1	4,10	14,14,15	0.30	0	17,19,21	0.41	0
10	NAG	M	2	10	14,14,15	0.18	0	17,19,21	0.44	0
10	BMA	M	3	10	11,11,12	0.57	0	15,15,17	0.76	0
10	NAG	N	1	6,10	14,14,15	0.19	0	17,19,21	0.40	0
10	NAG	N	2	10	14,14,15	0.19	0	17,19,21	0.39	0
10	BMA	N	3	10	11,11,12	0.60	0	15,15,17	0.73	0
13	NAG	P	1	8,13	14,14,15	0.20	0	17,19,21	0.44	0
13	NAG	P	2	13	14,14,15	0.22	0	17,19,21	0.45	0
13	BMA	P	3	13	11,11,12	0.56	0	15,15,17	0.84	0
12	NAG	Q	1	12,8	14,14,15	0.21	0	17,19,21	0.48	0
12	NAG	Q	2	12	14,14,15	0.28	0	17,19,21	0.42	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
10	NAG	F	1	1,10	-	1/6/23/26	0/1/1/1
10	NAG	F	2	10	-	0/6/23/26	0/1/1/1
10	BMA	F	3	10	-	1/2/19/22	0/1/1/1
11	NAG	H	1	1,11	-	2/6/23/26	0/1/1/1
11	NAG	H	2	11	-	2/6/23/26	0/1/1/1
11	BMA	H	3	11	-	1/2/19/22	0/1/1/1
12	NAG	J	1	2,12	-	0/6/23/26	0/1/1/1
12	NAG	J	2	12	-	2/6/23/26	0/1/1/1
10	NAG	K	1	2,10	-	2/6/23/26	0/1/1/1
10	NAG	K	2	10	-	2/6/23/26	0/1/1/1
10	BMA	K	3	10	-	0/2/19/22	0/1/1/1
10	NAG	L	1	2,10	-	2/6/23/26	0/1/1/1
10	NAG	L	2	10	-	2/6/23/26	0/1/1/1
10	BMA	L	3	10	-	0/2/19/22	0/1/1/1
10	NAG	M	1	4,10	-	0/6/23/26	0/1/1/1
10	NAG	M	2	10	-	2/6/23/26	0/1/1/1
10	BMA	M	3	10	-	0/2/19/22	0/1/1/1
10	NAG	N	1	6,10	-	2/6/23/26	0/1/1/1
10	NAG	N	2	10	-	2/6/23/26	0/1/1/1
10	BMA	N	3	10	-	1/2/19/22	0/1/1/1
13	NAG	P	1	8,13	-	2/6/23/26	0/1/1/1
13	NAG	P	2	13	-	2/6/23/26	0/1/1/1
13	BMA	P	3	13	-	0/2/19/22	0/1/1/1
12	NAG	Q	1	12,8	-	2/6/23/26	0/1/1/1
12	NAG	Q	2	12	-	4/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (34) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
11	H	1	NAG	O5-C5-C6-O6
12	Q	1	NAG	O5-C5-C6-O6
10	K	2	NAG	O5-C5-C6-O6
12	Q	2	NAG	O5-C5-C6-O6
13	P	1	NAG	O5-C5-C6-O6
13	P	2	NAG	O5-C5-C6-O6
12	J	2	NAG	O5-C5-C6-O6

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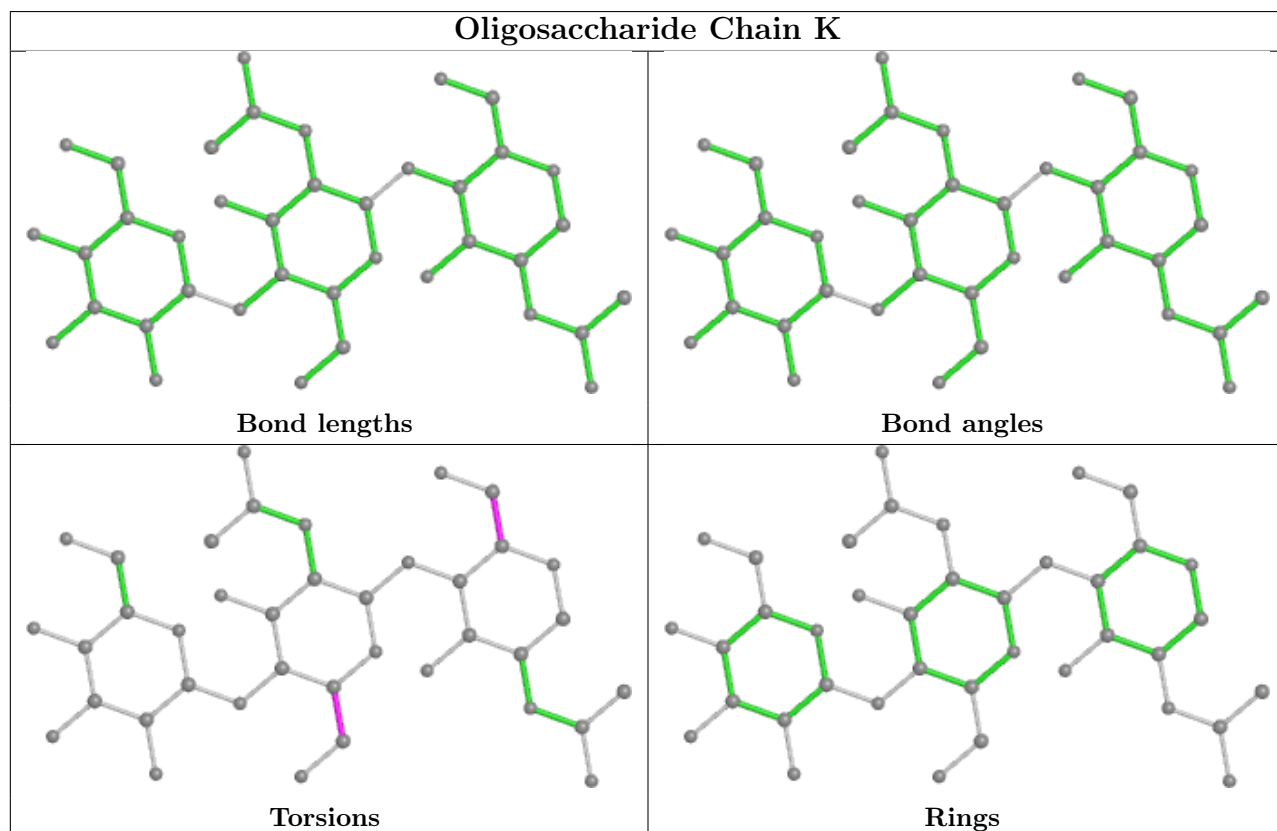
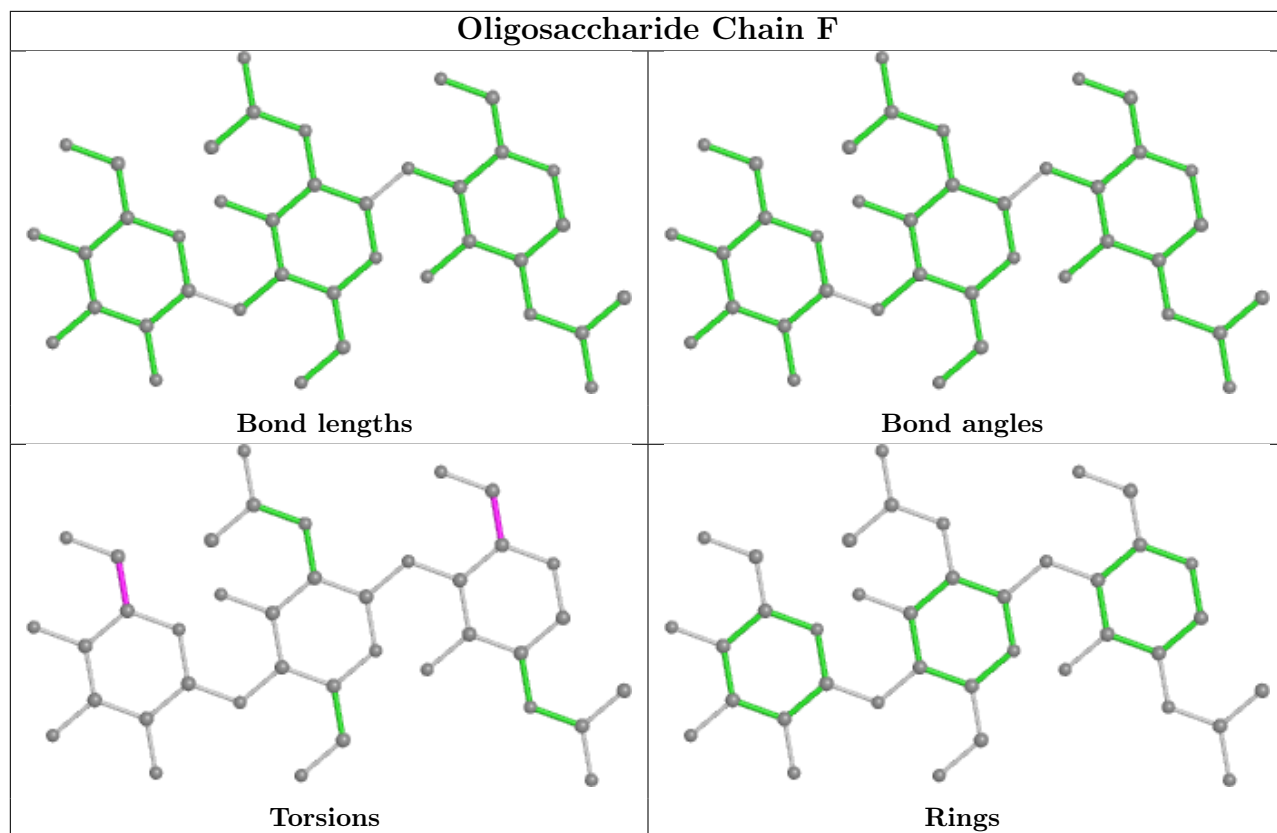
Mol	Chain	Res	Type	Atoms
12	Q	1	NAG	C4-C5-C6-O6
11	H	1	NAG	C4-C5-C6-O6
10	K	2	NAG	C4-C5-C6-O6
13	P	1	NAG	C4-C5-C6-O6
12	J	2	NAG	C4-C5-C6-O6
12	Q	2	NAG	C4-C5-C6-O6
13	P	2	NAG	C4-C5-C6-O6
10	M	2	NAG	C8-C7-N2-C2
10	M	2	NAG	O7-C7-N2-C2
12	Q	2	NAG	C8-C7-N2-C2
12	Q	2	NAG	O7-C7-N2-C2
10	K	1	NAG	O5-C5-C6-O6
11	H	2	NAG	O5-C5-C6-O6
10	N	1	NAG	O5-C5-C6-O6
10	N	1	NAG	C4-C5-C6-O6
10	L	1	NAG	C4-C5-C6-O6
10	N	2	NAG	C4-C5-C6-O6
10	F	1	NAG	O5-C5-C6-O6
10	N	3	BMA	O5-C5-C6-O6
11	H	2	NAG	C4-C5-C6-O6
11	H	3	BMA	O5-C5-C6-O6
10	L	1	NAG	O5-C5-C6-O6
10	N	2	NAG	O5-C5-C6-O6
10	K	1	NAG	C4-C5-C6-O6
10	L	2	NAG	C4-C5-C6-O6
10	L	2	NAG	O5-C5-C6-O6
10	F	3	BMA	C4-C5-C6-O6

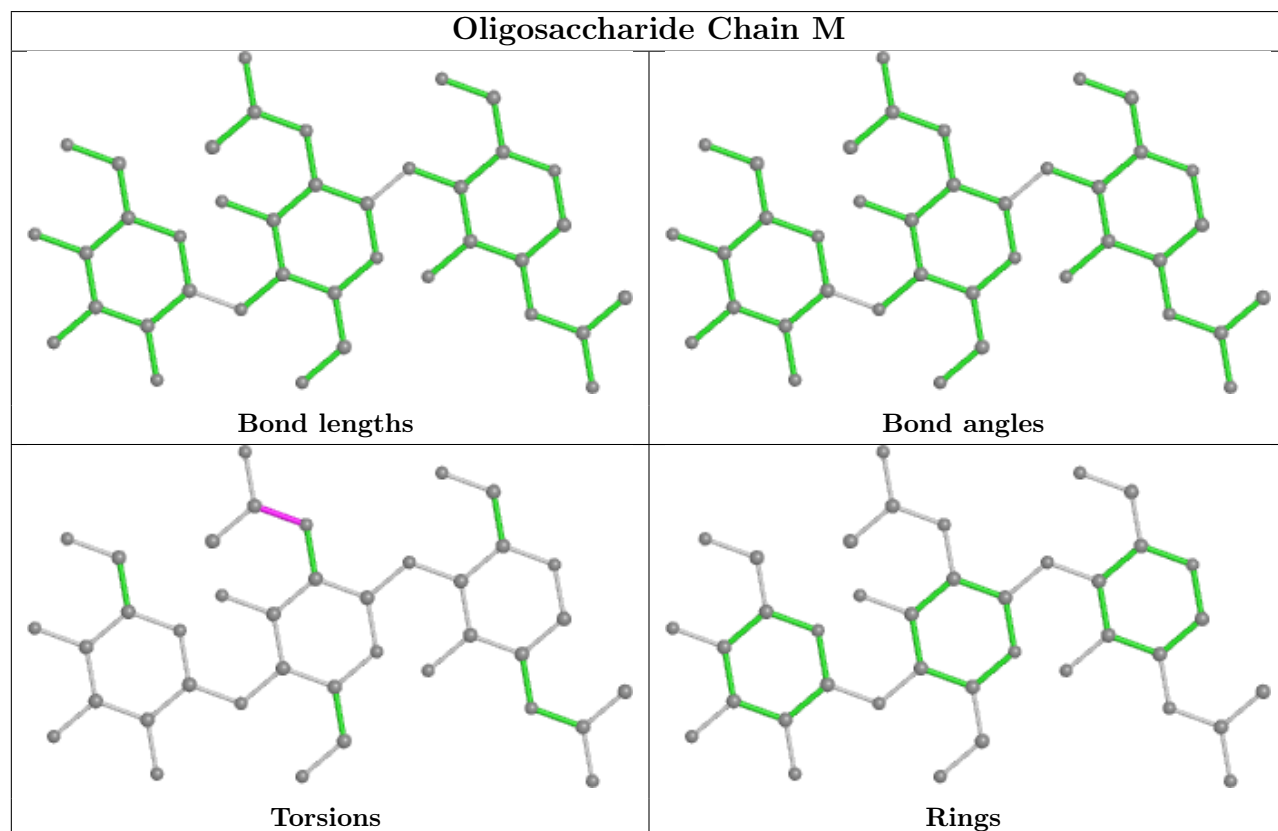
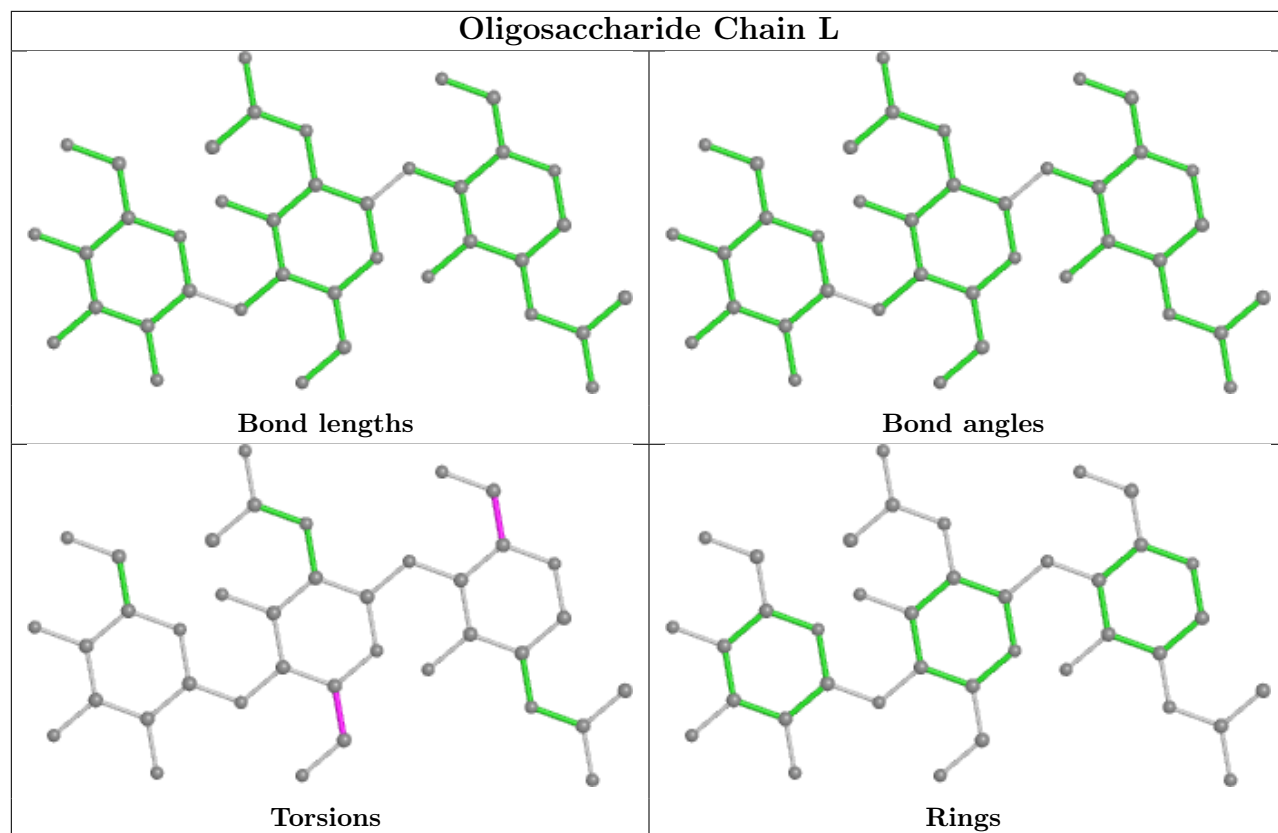
There are no ring outliers.

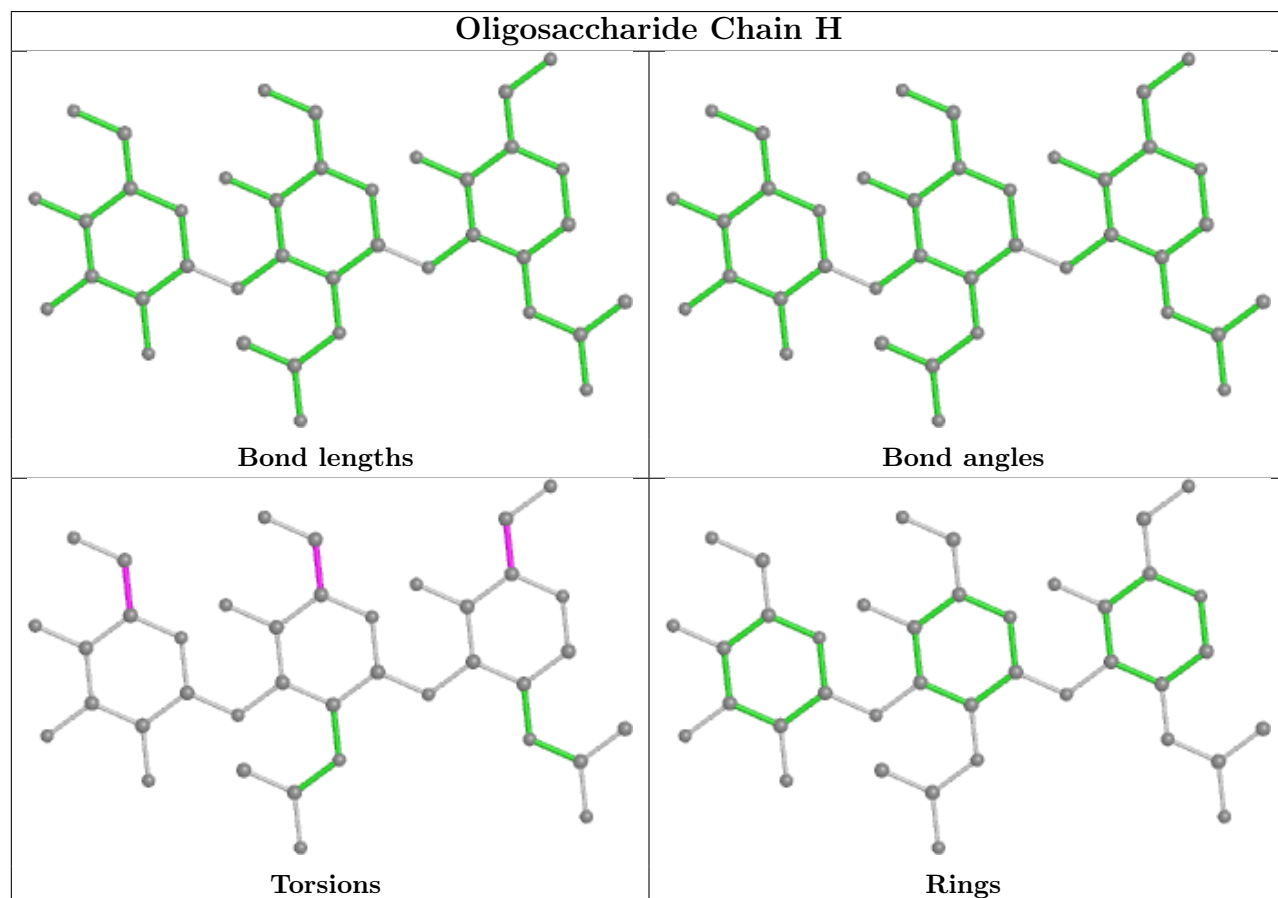
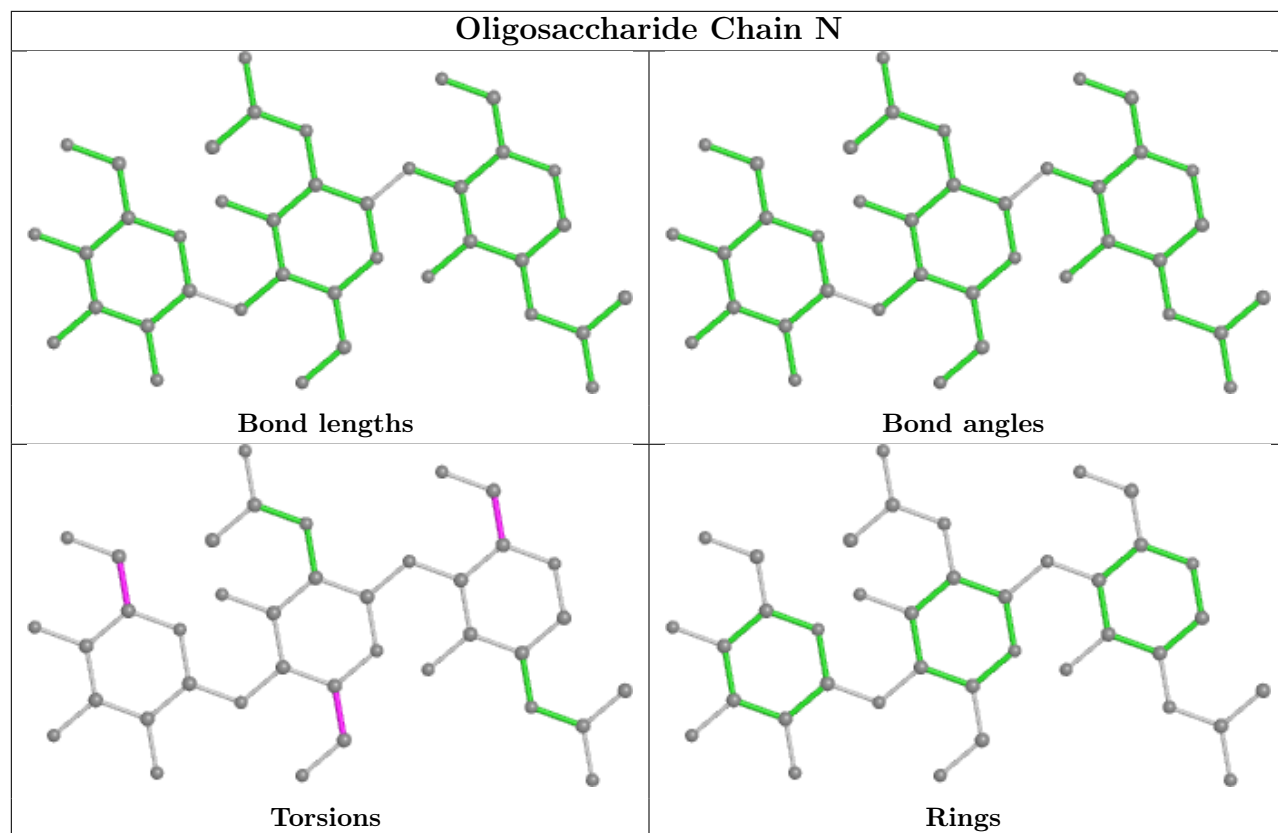
1 monomer is involved in 2 short contacts:

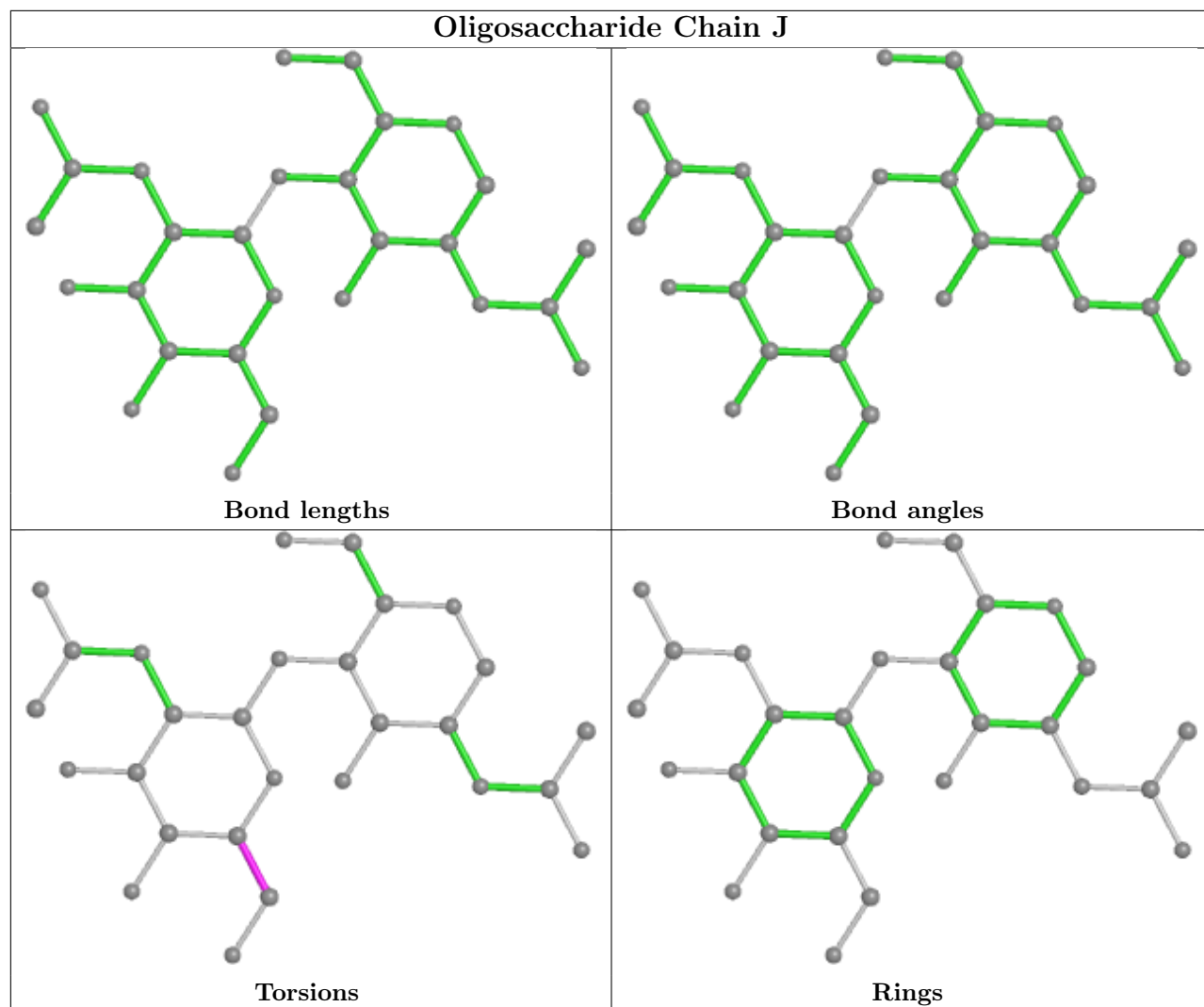
Mol	Chain	Res	Type	Clashes	Symm-Clashes
11	H	1	NAG	2	0

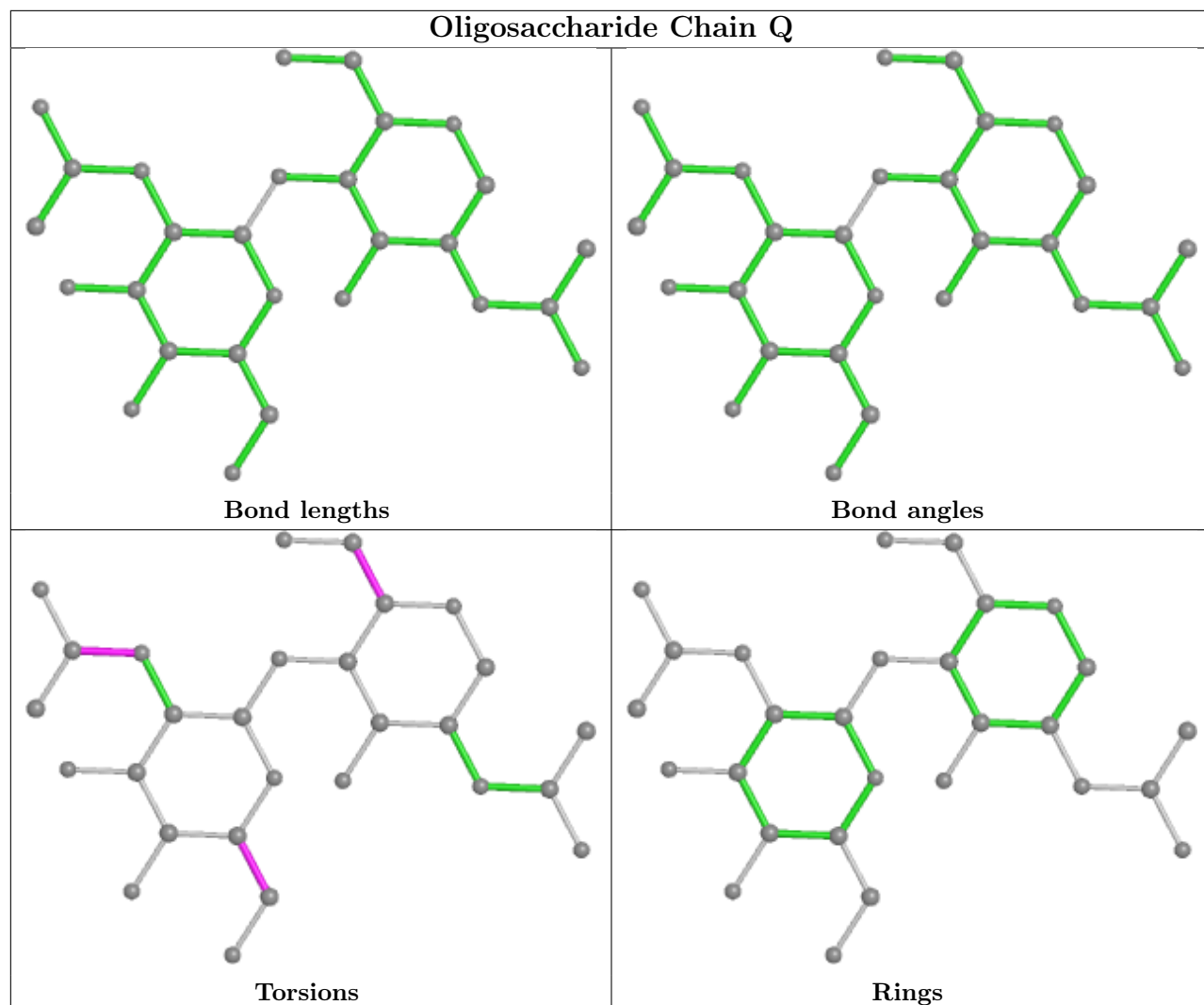
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

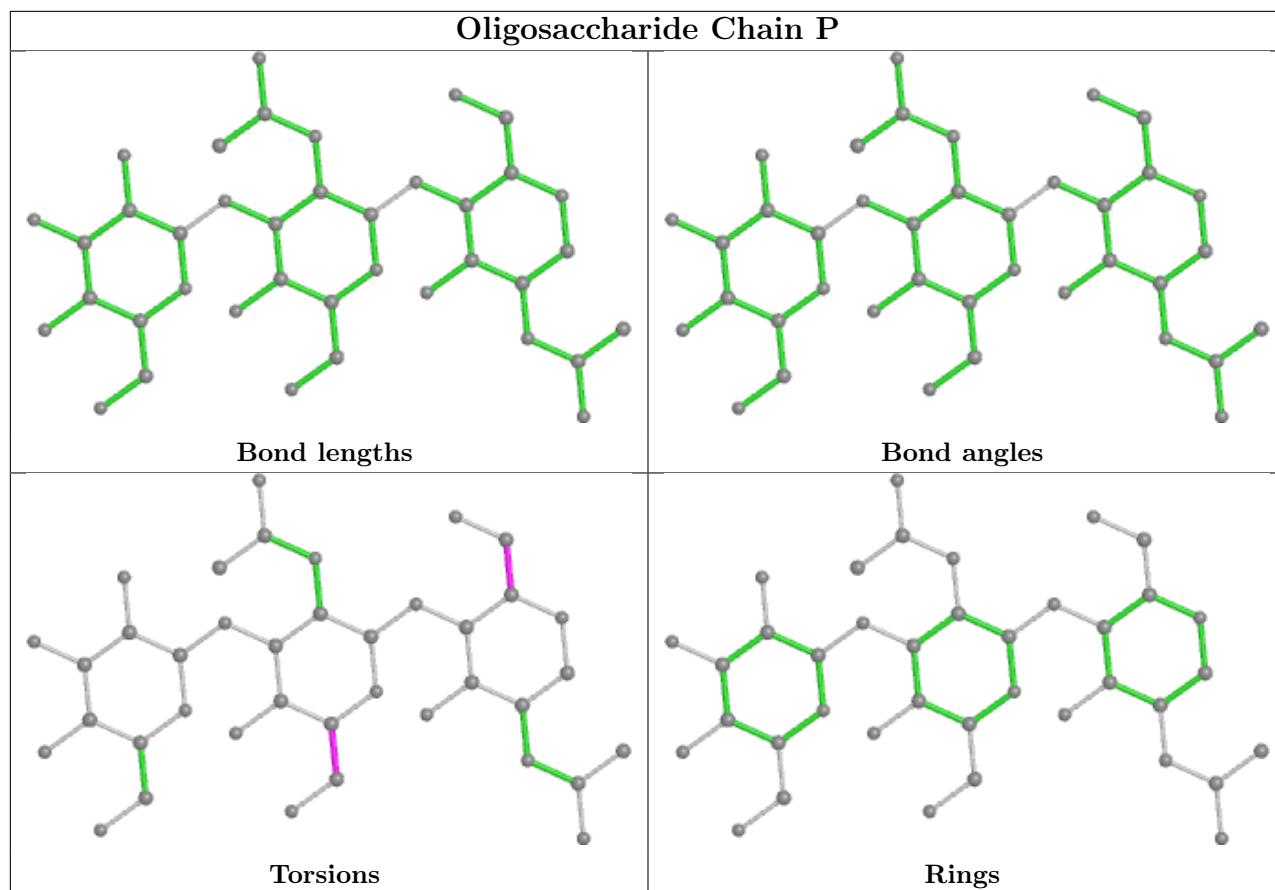












5.6 Ligand geometry [i](#)

Of 9 ligands modelled in this entry, 2 are monoatomic - leaving 7 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
15	CLR	S	301	-	31,31,31	0.40	0	48,48,48	0.72	0
14	NAG	A	401	1	14,14,15	0.38	0	17,19,21	0.43	0
15	CLR	D	301	-	31,31,31	0.36	0	48,48,48	0.48	0
15	CLR	D	302	-	31,31,31	0.37	0	48,48,48	0.50	0
14	NAG	A	402	1	14,14,15	0.22	0	17,19,21	0.38	0
17	P5S	G	301	-	31,32,53	0.51	0	35,39,60	0.49	0
14	NAG	O	801	8	14,14,15	0.20	0	17,19,21	0.37	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
15	CLR	S	301	-	-	5/10/68/68	0/4/4/4
14	NAG	A	401	1	-	2/6/23/26	0/1/1/1
15	CLR	D	301	-	-	5/10/68/68	0/4/4/4
15	CLR	D	302	-	-	4/10/68/68	0/4/4/4
14	NAG	A	402	1	-	2/6/23/26	0/1/1/1
17	P5S	G	301	-	-	19/38/38/59	-
14	NAG	O	801	8	-	1/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (38) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
17	G	301	P5S	O-C-CA-N
17	G	301	P5S	C-CA-CB-OG
17	G	301	P5S	N-CA-CB-OG
17	G	301	P5S	CB-OG-P12-O16
17	G	301	P5S	C3-O16-P12-OG
17	G	301	P5S	C3-O16-P12-O13
17	G	301	P5S	C3-O16-P12-O15
17	G	301	P5S	C20-C17-O19-C1
17	G	301	P5S	O18-C17-O19-C1
14	A	401	NAG	O5-C5-C6-O6
14	A	402	NAG	O5-C5-C6-O6
14	A	401	NAG	C4-C5-C6-O6
14	A	402	NAG	C4-C5-C6-O6
15	S	301	CLR	C20-C22-C23-C24
17	G	301	P5S	OXT-C-CA-N
15	D	301	CLR	C13-C17-C20-C22
17	G	301	P5S	C42-C43-C44-C45
15	D	301	CLR	C13-C17-C20-C21
17	G	301	P5S	C41-C42-C43-C44
17	G	301	P5S	O19-C1-C2-O37
14	O	801	NAG	O5-C5-C6-O6
15	D	301	CLR	C16-C17-C20-C21

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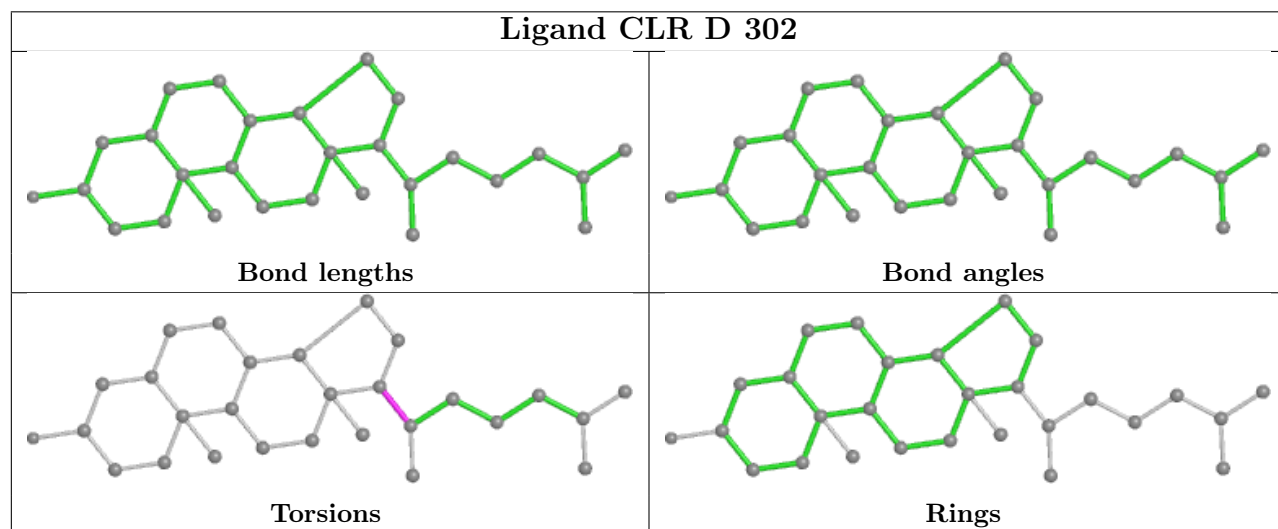
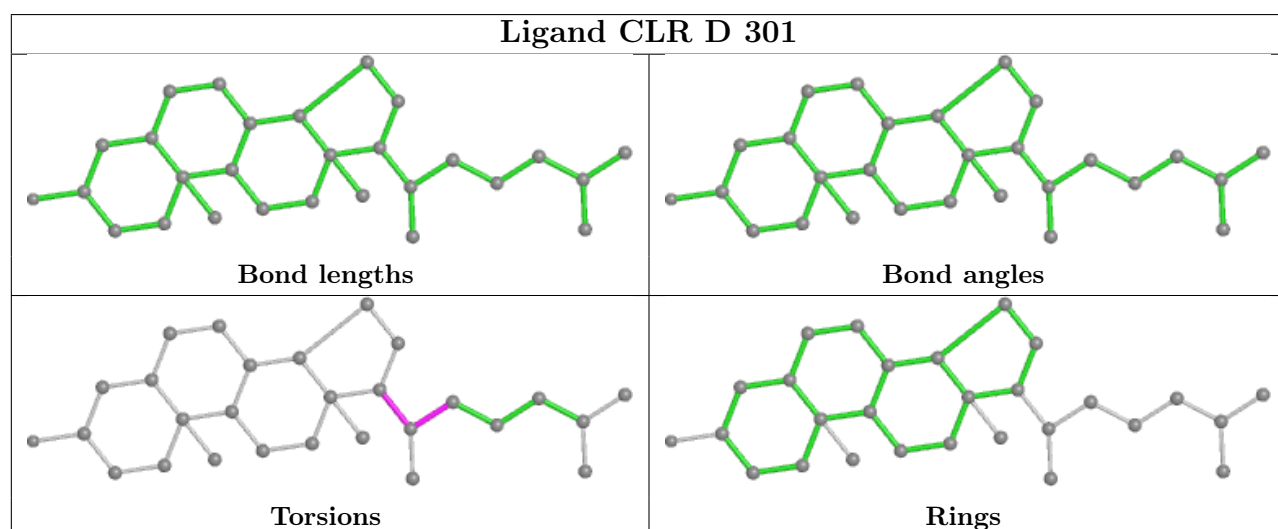
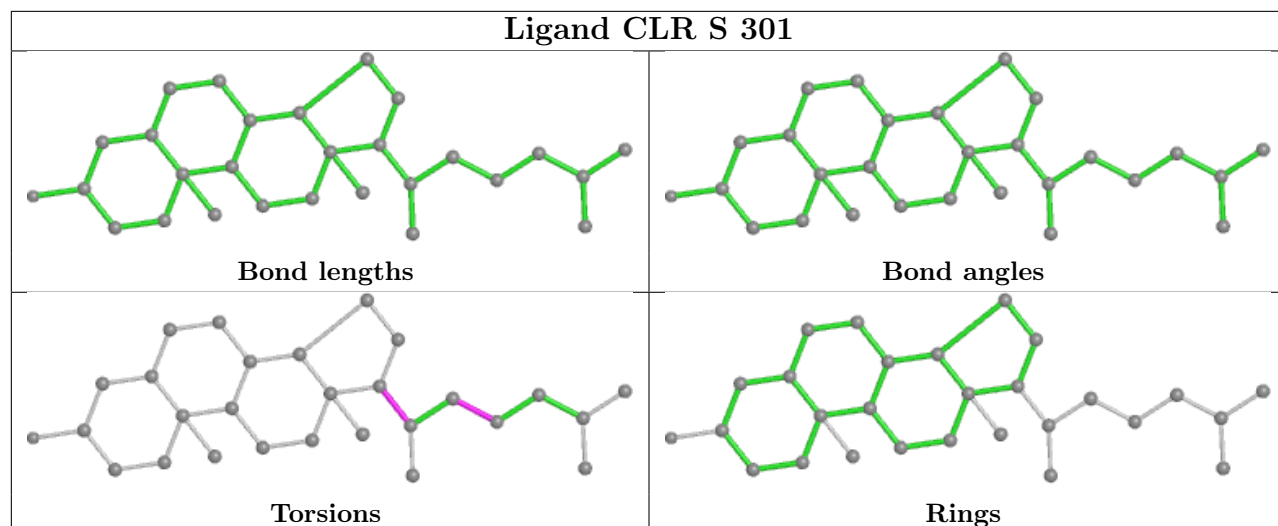
Mol	Chain	Res	Type	Atoms
15	S	301	CLR	C16-C17-C20-C21
15	S	301	CLR	C13-C17-C20-C21
15	D	301	CLR	C16-C17-C20-C22
15	S	301	CLR	C13-C17-C20-C22
17	G	301	P5S	C17-C20-C21-C22
17	G	301	P5S	O19-C1-C2-C3
15	D	301	CLR	C21-C20-C22-C23
15	S	301	CLR	C16-C17-C20-C22
15	D	302	CLR	C13-C17-C20-C22
15	D	302	CLR	C16-C17-C20-C22
15	D	302	CLR	C13-C17-C20-C21
15	D	302	CLR	C16-C17-C20-C21
17	G	301	P5S	CB-OG-P12-O15
17	G	301	P5S	O37-C2-C3-O16
17	G	301	P5S	C1-C2-C3-O16
17	G	301	P5S	C2-C3-O16-P12

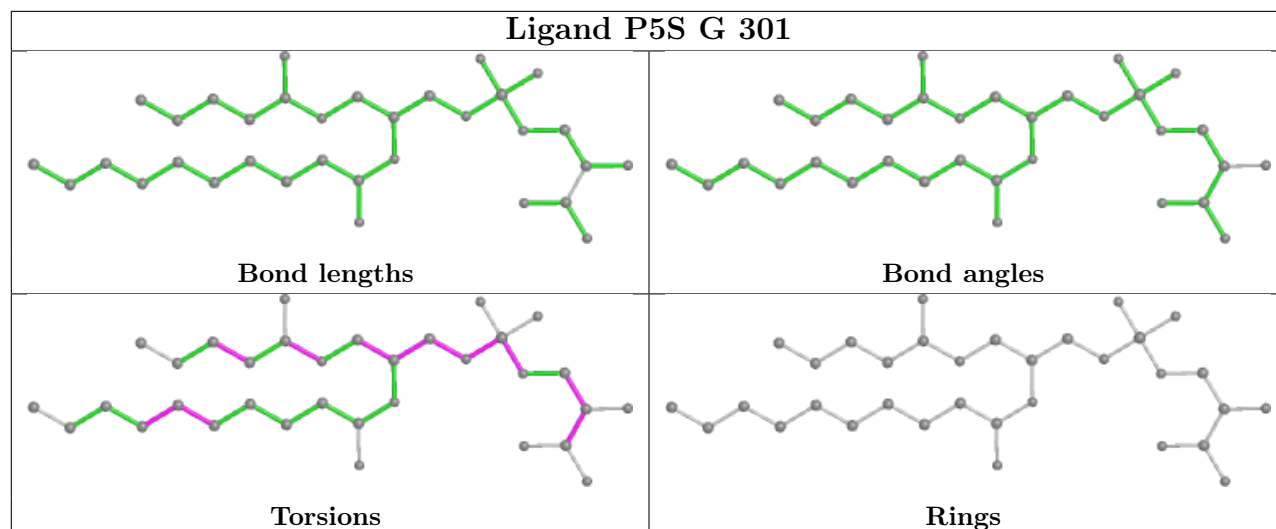
There are no ring outliers.

6 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
15	S	301	CLR	4	0
14	A	401	NAG	2	0
15	D	301	CLR	1	0
15	D	302	CLR	3	0
17	G	301	P5S	3	0
14	O	801	NAG	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.