



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 6, 2024 – 06:52 am BST

PDB ID : 2BUC
Title : Crystal Structure Of Porcine Dipeptidyl Peptidase IV (CD26) in Complex with a Tetrahydroisoquinoline Inhibitor
Authors : Nordhoff, S.; Cerezo-Galvez, S.; Feurer, A.; Hill, O.; Matassa, V.G.; Metz, G.; Rummey, C.; Thiemann, M.; Edwards, P.J.
Deposited on : 2005-06-09
Resolution : 2.50 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 : 1.8.4, CSD as541be (2020)
Xtrriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.39

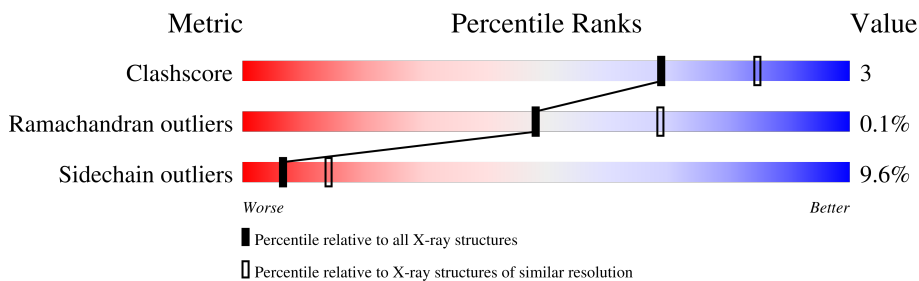
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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)	Similar resolution (#Entries, resolution range(Å))
Clashscore	180529	6282 (2.50-2.50)
Ramachandran outliers	177936	6191 (2.50-2.50)
Sidechain outliers	177891	6193 (2.50-2.50)

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 $\leq 5\%$

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	728	
1	B	728	
1	C	728	
1	D	728	
2	E	2	
2	F	2	
2	G	2	
2	H	2	

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	I	2	 100%
2	J	2	 100%
2	K	2	 100%
2	L	2	 100%
2	M	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
2	NAG	F	1	X	-	-	-
2	NAG	F	2	X	-	-	-
2	NAG	I	2	X	-	-	-
2	NAG	J	1	X	-	-	-
2	NAG	K	1	X	-	-	-
2	NAG	L	2	X	-	-	-
3	NAG	A	1092	X	-	-	-
3	NAG	C	1092	X	-	-	-
3	NAG	D	1085	X	-	-	-

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 25421 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 DIPEPTIDYL PEPTIDASE IV.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	728	5966	3825	986	1132	23	0	0	0
1	B	728	5966	3825	986	1132	23	0	0	0
1	C	728	5966	3825	986	1132	23	0	0	0
1	D	728	5966	3825	986	1132	23	0	0	0

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



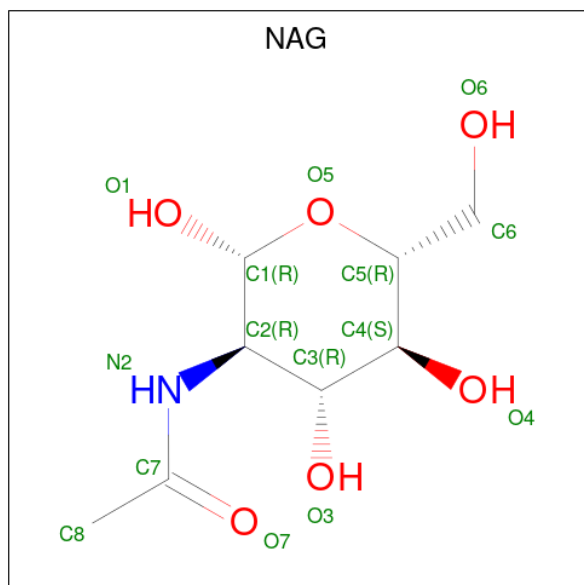
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	E	2	28	16	2	10	0	0	0
2	F	2	28	16	2	10	0	0	0
2	G	2	28	16	2	10	0	0	0
2	H	2	28	16	2	10	0	0	0
2	I	2	28	16	2	10	0	0	0
2	J	2	28	16	2	10	0	0	0
2	K	2	28	16	2	10	0	0	0
2	L	2	28	16	2	10	0	0	0

Continued on next page...

Continued from previous page...

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

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



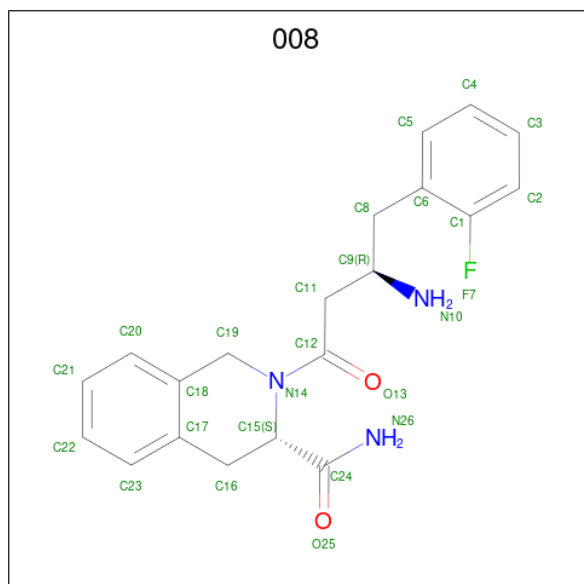
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	14	8	1	5	0	0
3	A	1	14	8	1	5	0	0
3	A	1	14	8	1	5	0	0
3	A	1	14	8	1	5	0	0
3	B	1	14	8	1	5	0	0
3	B	1	14	8	1	5	0	0
3	B	1	14	8	1	5	0	0
3	B	1	14	8	1	5	0	0
3	C	1	14	8	1	5	0	0
3	C	1	14	8	1	5	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	C	1	Total	C	N	O	0	0
			14	8	1	5		
3	C	1	Total	C	N	O	0	0
			14	8	1	5		
3	C	1	Total	C	N	O	0	0
			14	8	1	5		
3	D	1	Total	C	N	O	0	0
			14	8	1	5		
3	D	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 4 is (S)-2-[(R)-3-AMINO-4-(2-FLUORO-PHENYL)-BUTYRYL]-1,2,3,4-TETRAHYDRO-ISOQUINOLINE-3-CARBOXYLIC ACID AMIDE (three-letter code: 008) (formula: C₂₀H₂₂FN₃O₂).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	F	N	O	0	0
			26	20	1	3	2		
4	B	1	Total	C	F	N	O	0	0
			26	20	1	3	2		
4	C	1	Total	C	F	N	O	0	0
			26	20	1	3	2		
4	D	1	Total	C	F	N	O	0	0
			26	20	1	3	2		

- Molecule 5 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	O	S	0	0
			5	4	1		
5	A	1	Total	O	S	0	0
			5	4	1		
5	B	1	Total	O	S	0	0
			5	4	1		
5	B	1	Total	O	S	0	0
			5	4	1		
5	C	1	Total	O	S	0	0
			5	4	1		
5	C	1	Total	O	S	0	0
			5	4	1		
5	D	1	Total	O	S	0	0
			5	4	1		
5	D	1	Total	O	S	0	0
			5	4	1		

- Molecule 6 is water.

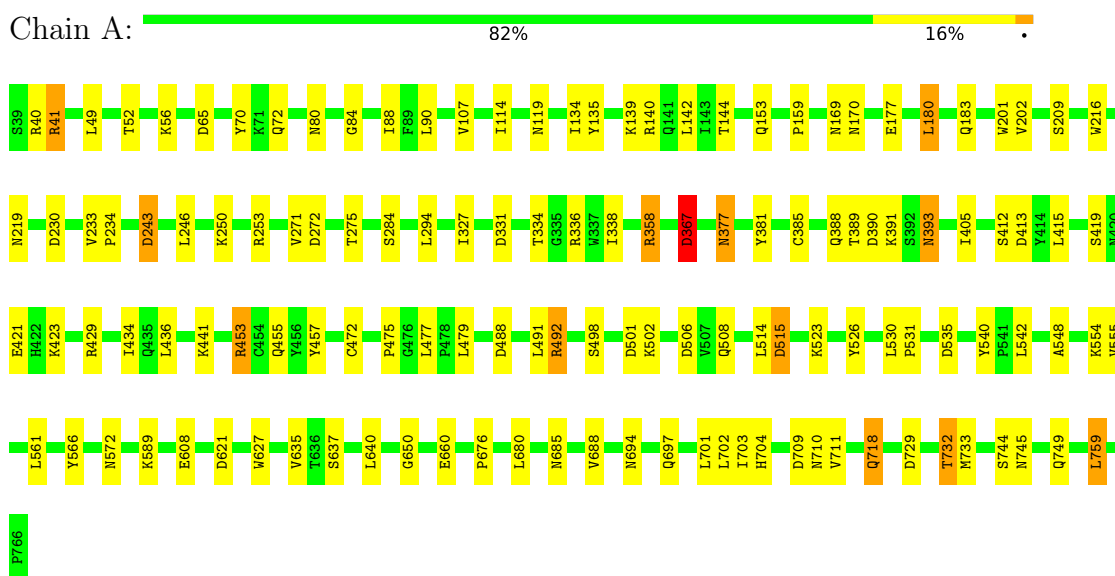
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	242	Total	O	0	0
			242	242		
6	B	248	Total	O	0	0
			248	248		
6	C	228	Total	O	0	0
			228	228		
6	D	233	Total	O	0	0
			233	233		

3 Residue-property plots

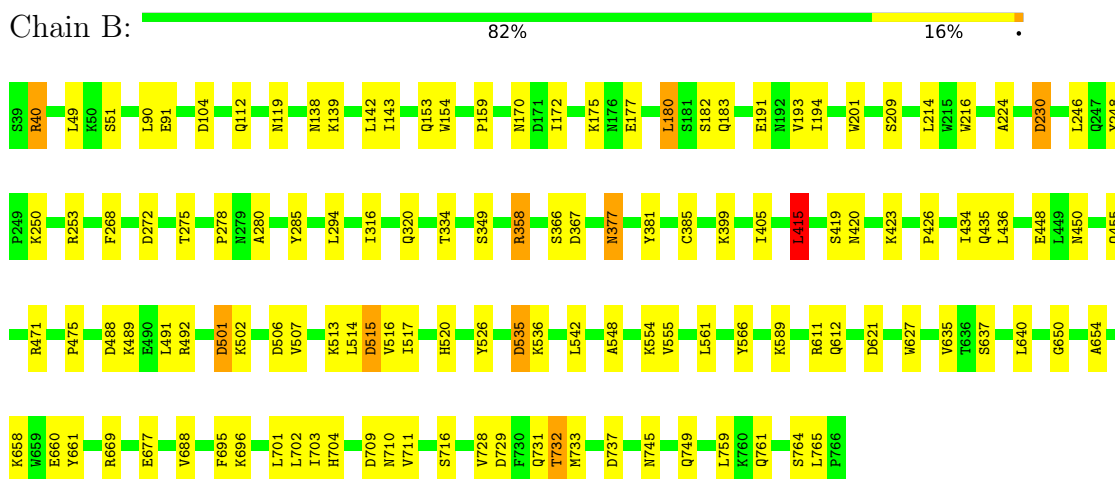
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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.

Note EDS was not executed.

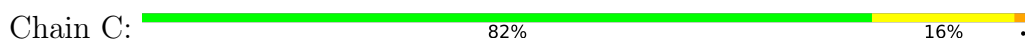
- Molecule 1: DIPEPTIDYL PEPTIDASE IV

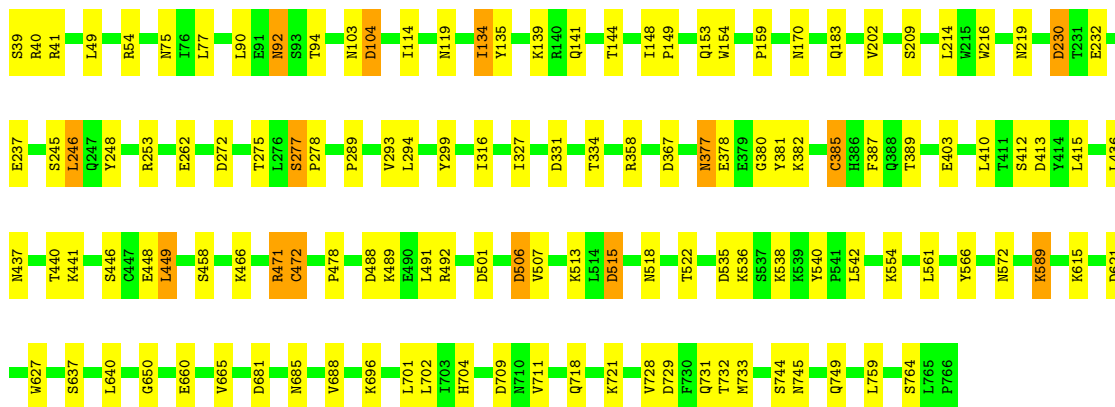


- Molecule 1: DIPEPTIDYL PEPTIDASE IV



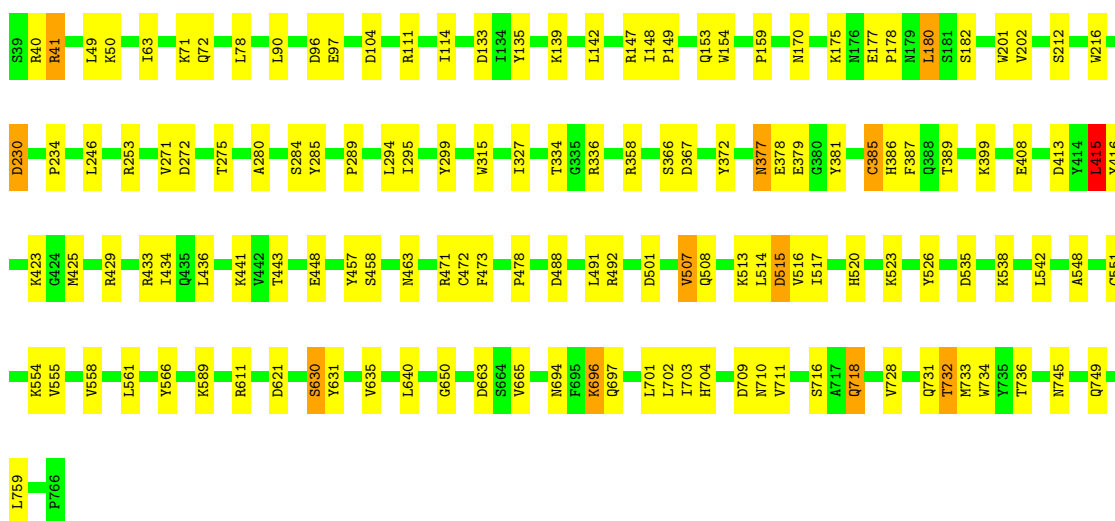
- Molecule 1: DIPEPTIDYL PEPTIDASE IV





- Molecule 1: DIPEPTIDYL PEPTIDASE IV

Chain D: 81% 18%



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

Chain E: 100%

MAG1
MAG2

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

Chain F: 100%

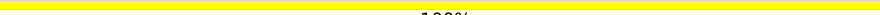
MAG1
MAG2

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

Chain G:  50% 50%


MAG1
MAG2

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

Chain H:  100%

MAG1
MAG2

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

Chain I:  100%


MAG1
MAG2

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

Chain J:  100%


MAG1
MAG2

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

Chain K:  100%

MAG1
MAG2

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

Chain L:  100%

MAG1
MAG2

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

Chain M:  100%

MAG1
MAG2

4 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	61.64Å 117.49Å 133.06Å 112.44° 94.72° 91.30°	Depositor
Resolution (Å)	19.28 – 2.50	Depositor
% Data completeness (in resolution range)	100.0 (19.28-2.50)	Depositor
R_{merge}	0.20	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	REFMAC 5.1.24	Depositor
R, R_{free}	0.221 , 0.279	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	25421	wwPDB-VP
Average B, all atoms (Å ²)	54.0	wwPDB-VP

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: SO4, NAG, 008

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	0.31	0/6141	0.65	14/8353 (0.2%)
1	B	0.31	0/6141	0.65	14/8353 (0.2%)
1	C	0.32	0/6141	0.64	15/8353 (0.2%)
1	D	0.31	0/6141	0.64	14/8353 (0.2%)
All	All	0.31	0/24564	0.65	57/33412 (0.2%)

There are no bond length outliers.

All (57) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	272	ASP	CB-CG-OD2	6.49	124.14	118.30
1	A	390	ASP	CB-CG-OD2	6.35	124.02	118.30
1	D	535	ASP	CB-CG-OD2	6.15	123.83	118.30
1	A	535	ASP	CB-CG-OD2	6.07	123.76	118.30
1	A	272	ASP	CB-CG-OD2	6.05	123.74	118.30
1	C	535	ASP	CB-CG-OD2	5.98	123.68	118.30
1	A	515	ASP	CB-CG-OD2	5.88	123.59	118.30
1	A	243	ASP	CB-CG-OD2	5.85	123.57	118.30
1	B	415	LEU	CA-CB-CG	5.78	128.59	115.30
1	D	272	ASP	CB-CG-OD2	5.76	123.48	118.30
1	B	506	ASP	CB-CG-OD2	5.71	123.44	118.30
1	B	729	ASP	CB-CG-OD2	5.67	123.40	118.30
1	D	96	ASP	CB-CG-OD2	5.67	123.40	118.30
1	B	515	ASP	CB-CG-OD2	5.67	123.40	118.30
1	B	488	ASP	CB-CG-OD2	5.64	123.37	118.30
1	B	535	ASP	CB-CG-OD2	5.63	123.37	118.30
1	C	104	ASP	CB-CG-OD2	5.61	123.35	118.30
1	C	729	ASP	CB-CG-OD2	5.60	123.34	118.30
1	A	413	ASP	CB-CG-OD2	5.58	123.33	118.30
1	C	488	ASP	CB-CG-OD2	5.58	123.32	118.30

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	367	ASP	CB-CG-OD2	5.57	123.31	118.30
1	C	272	ASP	CB-CG-OD2	5.55	123.29	118.30
1	C	621	ASP	CB-CG-OD2	5.49	123.24	118.30
1	C	515	ASP	CB-CG-OD2	5.49	123.24	118.30
1	A	488	ASP	CB-CG-OD2	5.48	123.23	118.30
1	B	367	ASP	CB-CG-OD2	5.48	123.23	118.30
1	B	501	ASP	CB-CG-OD2	5.45	123.20	118.30
1	A	501	ASP	CB-CG-OD2	5.42	123.18	118.30
1	A	621	ASP	CB-CG-OD2	5.37	123.13	118.30
1	C	230	ASP	CB-CG-OD2	5.36	123.12	118.30
1	C	501	ASP	CB-CG-OD2	5.34	123.11	118.30
1	D	709	ASP	CB-CG-OD2	5.34	123.11	118.30
1	B	737	ASP	CB-CG-OD2	5.28	123.06	118.30
1	D	621	ASP	CB-CG-OD2	5.25	123.03	118.30
1	B	621	ASP	CB-CG-OD2	5.25	123.03	118.30
1	B	104	ASP	CB-CG-OD2	5.25	123.03	118.30
1	A	729	ASP	CB-CG-OD2	5.25	123.02	118.30
1	C	709	ASP	CB-CG-OD2	5.25	123.02	118.30
1	A	506	ASP	CB-CG-OD2	5.24	123.02	118.30
1	C	331	ASP	CB-CG-OD2	5.24	123.02	118.30
1	C	506	ASP	CB-CG-OD2	5.24	123.02	118.30
1	D	415	LEU	CA-CB-CG	5.24	127.35	115.30
1	D	515	ASP	CB-CG-OD2	5.22	123.00	118.30
1	B	709	ASP	CB-CG-OD2	5.22	123.00	118.30
1	A	367	ASP	CB-CG-OD2	5.22	123.00	118.30
1	D	413	ASP	CB-CG-OD2	5.17	122.96	118.30
1	D	230	ASP	CB-CG-OD2	5.16	122.95	118.30
1	A	709	ASP	CB-CG-OD2	5.16	122.94	118.30
1	D	367	ASP	CB-CG-OD2	5.16	122.94	118.30
1	D	488	ASP	CB-CG-OD2	5.16	122.94	118.30
1	D	501	ASP	CB-CG-OD2	5.14	122.93	118.30
1	A	65	ASP	CB-CG-OD2	5.10	122.89	118.30
1	B	230	ASP	CB-CG-OD2	5.08	122.87	118.30
1	D	104	ASP	CB-CG-OD2	5.04	122.83	118.30
1	C	681	ASP	CB-CG-OD2	5.02	122.82	118.30
1	C	413	ASP	CB-CG-OD2	5.00	122.80	118.30
1	D	663	ASP	CB-CG-OD2	5.00	122.80	118.30

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	5966	0	5661	47	0
1	B	5966	0	5662	44	0
1	C	5966	0	5662	41	0
1	D	5966	0	5660	48	0
2	E	28	0	25	0	0
2	F	28	0	25	0	0
2	G	28	0	25	0	0
2	H	28	0	25	0	0
2	I	28	0	25	0	0
2	J	28	0	25	0	0
2	K	28	0	25	0	0
2	L	28	0	25	0	0
2	M	28	0	25	0	0
3	A	56	0	52	0	0
3	B	56	0	52	0	0
3	C	70	0	65	0	0
3	D	28	0	26	0	0
4	A	26	0	22	1	0
4	B	26	0	22	1	0
4	C	26	0	22	0	0
4	D	26	0	22	0	0
5	A	10	0	0	0	0
5	B	10	0	0	0	0
5	C	10	0	0	0	0
5	D	10	0	0	0	0
6	A	242	0	0	1	0
6	B	248	0	0	1	0
6	C	228	0	0	0	0
6	D	233	0	0	1	0
All	All	25421	0	23153	162	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 3.

All (162) 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:D:551:CYS:SG	6:D:2188:HOH:O	2.41	0.78
1:A:253:ARG:HH21	1:B:253:ARG:HH21	1.37	0.73
1:C:640:LEU:HD11	1:C:650:GLY:HA3	1.71	0.70
1:C:410:LEU:HD13	1:C:415:LEU:HD23	1.75	0.68
1:C:253:ARG:HH21	1:D:253:ARG:HH21	1.42	0.67
1:D:153:GLN:HE22	1:D:170:ASN:ND2	1.91	0.66
1:A:718:GLN:HE21	1:A:718:GLN:HA	1.61	0.65
1:A:453:ARG:HH21	1:A:477:LEU:HB2	1.62	0.64
1:D:114:ILE:HG23	1:D:135:TYR:HB3	1.80	0.63
1:B:640:LEU:HD11	1:B:650:GLY:HA3	1.81	0.62
1:D:640:LEU:HD11	1:D:650:GLY:HA3	1.80	0.61
1:B:285:TYR:HD1	1:D:280:ALA:HB2	1.67	0.58
1:B:377:ASN:ND2	1:B:381:TYR:H	2.01	0.58
1:A:331:ASP:HB2	1:A:338:ILE:HD11	1.86	0.57
1:C:377:ASN:ND2	1:C:381:TYR:H	2.03	0.57
1:B:358:ARG:HG2	4:B:1767:008:H22	1.86	0.57
1:B:49:LEU:HD22	1:B:749:GLN:HA	1.86	0.57
1:A:377:ASN:ND2	1:A:381:TYR:H	2.03	0.56
1:B:377:ASN:C	1:B:377:ASN:HD22	2.07	0.56
1:A:733:MET:HA	1:B:732:THR:HG22	1.87	0.56
1:A:275:THR:HA	1:C:334:THR:O	2.06	0.56
1:C:114:ILE:HG23	1:C:135:TYR:HB3	1.88	0.55
1:A:159:PRO:HD3	1:A:216:TRP:HB3	1.89	0.55
1:A:153:GLN:HE22	1:A:170:ASN:ND2	2.06	0.54
1:B:637:SER:HB3	1:B:688:VAL:HG11	1.89	0.54
1:C:237:GLU:HG2	1:C:253:ARG:HG2	1.89	0.54
1:C:327:ILE:HD13	1:C:389:THR:HG23	1.90	0.54
1:B:704:HIS:HD2	1:B:716:SER:OG	1.90	0.54
1:D:694:ASN:HD22	1:D:697:GLN:HE22	1.54	0.53
1:A:703:ILE:HG12	1:A:733:MET:HB3	1.90	0.53
1:A:540:TYR:HE2	1:A:572:ASN:HD22	1.55	0.53
1:A:429:ARG:HB2	1:A:457:TYR:H	1.74	0.53
1:D:377:ASN:HD22	1:D:377:ASN:C	2.12	0.52
1:C:446:SER:HA	1:C:449:LEU:HD12	1.92	0.52
1:A:107:VAL:HG22	1:A:114:ILE:HD12	1.92	0.52
1:A:201:TRP:CZ2	1:A:710:ASN:HA	2.45	0.52
1:B:703:ILE:HG12	1:B:733:MET:HB3	1.91	0.52
1:A:415:LEU:HB3	1:A:434:ILE:HG23	1.92	0.52
1:A:526:TYR:HA	1:A:555:VAL:HG21	1.93	0.51
1:B:183:GLN:HE22	1:B:278:PRO:HA	1.76	0.51
1:C:153:GLN:HE22	1:C:170:ASN:ND2	2.09	0.51
1:D:177:GLU:HB2	1:D:180:LEU:HD23	1.93	0.51

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:695:PHE:HB3	1:B:728:VAL:HG11	1.93	0.51
1:A:640:LEU:HD11	1:A:650:GLY:HA3	1.93	0.51
1:D:696:LYS:HG2	1:D:728:VAL:HG22	1.93	0.51
1:A:327:ILE:HD13	1:A:389:THR:HG23	1.93	0.50
1:A:336:ARG:HD3	1:C:277:SER:OG	2.11	0.50
1:B:696:LYS:HG2	1:B:728:VAL:HG22	1.93	0.50
1:C:49:LEU:HD22	1:C:749:GLN:HA	1.92	0.50
1:C:377:ASN:HD21	1:C:381:TYR:H	1.59	0.50
1:B:193:VAL:HG12	1:B:194:ILE:HG12	1.94	0.50
1:B:415:LEU:HB3	1:B:434:ILE:HG23	1.94	0.49
1:D:429:ARG:HB2	1:D:457:TYR:H	1.78	0.49
1:D:703:ILE:HG12	1:D:733:MET:HB3	1.94	0.49
1:D:718:GLN:HE21	1:D:718:GLN:HA	1.77	0.49
1:A:732:THR:HG22	1:B:733:MET:HA	1.95	0.49
1:D:416:TYR:CE2	1:D:433:ARG:HD3	2.48	0.49
1:D:299:TYR:CZ	1:D:665:VAL:HG22	2.48	0.49
1:A:271:VAL:HG22	1:A:284:SER:HB3	1.96	0.48
1:D:41:ARG:HD3	1:D:507:VAL:HG23	1.95	0.48
1:B:280:ALA:HB2	1:D:285:TYR:HD1	1.79	0.48
1:C:75:ASN:OD1	1:C:92:ASN:HB3	2.14	0.48
1:D:548:ALA:HB3	1:D:635:VAL:HG21	1.95	0.48
1:A:548:ALA:HB3	1:A:635:VAL:HG21	1.96	0.47
1:B:159:PRO:HD3	1:B:216:TRP:HB3	1.96	0.47
1:D:175:LYS:HG3	1:D:182:SER:HB3	1.95	0.47
1:A:377:ASN:HD22	1:A:377:ASN:C	2.18	0.47
1:D:704:HIS:HD2	1:D:716:SER:OG	1.97	0.47
1:D:201:TRP:CZ2	1:D:710:ASN:HA	2.49	0.47
1:A:114:ILE:HG23	1:A:135:TYR:HB3	1.97	0.46
1:A:455:GLN:HB2	1:A:475:PRO:HD3	1.97	0.46
1:A:393:ASN:HD22	1:A:393:ASN:H	1.61	0.46
1:A:334:THR:O	1:C:275:THR:HA	2.15	0.46
1:B:320:GLN:OE1	1:B:669:ARG:HD3	2.15	0.46
1:C:733:MET:HA	1:D:732:THR:HG22	1.98	0.46
1:C:232:GLU:HB3	1:C:262:GLU:HG2	1.97	0.46
1:C:380:GLY:HA3	1:C:589:LYS:HE2	1.96	0.46
1:D:289:PRO:HB3	1:D:315:TRP:CD2	2.51	0.46
1:C:134:ILE:HD11	1:C:148:ILE:HD12	1.97	0.46
1:C:382:LYS:H	1:C:403:GLU:HG2	1.81	0.46
1:B:658:LYS:HB3	1:B:661:TYR:CD2	2.51	0.46
1:B:704:HIS:CD2	1:B:716:SER:OG	2.69	0.46
1:B:704:HIS:HE1	1:B:711:VAL:O	1.98	0.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:183:GLN:HE22	1:C:278:PRO:HA	1.81	0.45
1:B:172:ILE:HG12	1:B:214:LEU:HD21	1.97	0.45
1:C:159:PRO:HD3	1:C:216:TRP:HB3	1.98	0.45
1:D:49:LEU:HD22	1:D:749:GLN:HA	1.98	0.45
1:D:271:VAL:HG22	1:D:284:SER:HB3	1.97	0.45
1:A:759:LEU:HD23	1:A:759:LEU:HA	1.86	0.45
1:B:405:ILE:HG12	1:B:419:SER:HA	1.99	0.45
1:C:377:ASN:C	1:C:377:ASN:HD22	2.20	0.45
1:C:704:HIS:HE1	1:C:711:VAL:O	1.99	0.45
1:A:694:ASN:HD22	1:A:697:GLN:HE22	1.63	0.45
1:B:526:TYR:HA	1:B:555:VAL:HG21	1.99	0.44
1:D:377:ASN:ND2	1:D:381:TYR:H	2.15	0.44
1:A:367:ASP:HB2	6:A:2125:HOH:O	2.16	0.44
1:B:455:GLN:HB2	1:B:475:PRO:HD3	1.98	0.44
1:D:154:TRP:CD2	1:D:212:SER:HB3	2.52	0.44
1:D:154:TRP:CE2	1:D:212:SER:HB3	2.53	0.44
1:D:148:ILE:HA	1:D:149:PRO:HD3	1.90	0.44
1:D:114:ILE:CG2	1:D:135:TYR:HB3	2.48	0.44
1:D:704:HIS:HE1	1:D:711:VAL:O	2.00	0.44
1:C:299:TYR:CZ	1:C:665:VAL:HG22	2.53	0.44
1:C:540:TYR:HE2	1:C:572:ASN:HD22	1.66	0.44
1:A:377:ASN:HD21	1:A:381:TYR:H	1.64	0.44
1:B:154:TRP:HD1	1:B:214:LEU:HD12	1.83	0.43
1:D:159:PRO:HD3	1:D:216:TRP:HB3	2.00	0.43
1:C:289:PRO:HG2	1:C:294:LEU:HG	2.00	0.43
1:B:112:GLN:HG2	1:B:138:ASN:HD21	1.83	0.43
1:C:472:CYS:O	1:C:478:PRO:HA	2.19	0.43
1:D:526:TYR:HA	1:D:555:VAL:HG21	2.00	0.43
1:A:732:THR:CG2	1:B:733:MET:HA	2.48	0.43
1:B:420:ASN:HB2	1:B:426:PRO:HA	2.00	0.43
1:A:405:ILE:HG12	1:A:419:SER:HA	1.99	0.43
1:B:177:GLU:HB2	1:B:180:LEU:HB2	2.01	0.43
1:A:733:MET:HA	1:B:732:THR:CG2	2.48	0.43
1:B:377:ASN:HD21	1:B:381:TYR:H	1.66	0.42
1:D:372:TYR:CZ	1:D:386:HIS:HD2	2.37	0.42
1:C:41:ARG:HB3	1:C:507:VAL:HG23	2.00	0.42
1:D:153:GLN:HE22	1:D:170:ASN:HD22	1.67	0.42
1:C:248:TYR:CZ	1:D:234:PRO:HB2	2.55	0.42
1:A:70:TYR:CE2	1:A:72:GLN:HB2	2.54	0.42
1:A:177:GLU:HB2	1:A:180:LEU:HB2	2.01	0.42
1:A:637:SER:HB3	1:A:688:VAL:HG11	2.02	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:224:ALA:HB1	1:B:268:PHE:CZ	2.54	0.42
1:C:385:CYS:HB3	1:C:387:PHE:CE1	2.55	0.42
1:C:704:HIS:CE1	1:C:711:VAL:O	2.73	0.42
1:A:41:ARG:H	1:A:41:ARG:HG3	1.57	0.42
1:A:358:ARG:HG2	4:A:1767:008:H22	2.01	0.42
1:A:84:GLY:HA2	1:A:492:ARG:HH12	1.84	0.42
1:B:654:ALA:HA	1:B:704:HIS:CD2	2.54	0.42
1:D:415:LEU:HB3	1:D:434:ILE:HG23	2.01	0.42
1:C:148:ILE:HA	1:C:149:PRO:HD3	1.92	0.41
1:D:630:SER:HB2	1:D:631:TYR:H	1.64	0.41
1:B:275:THR:HA	1:D:334:THR:O	2.19	0.41
1:D:133:ASP:HB3	1:D:142:LEU:HD21	2.02	0.41
1:A:233:VAL:HA	1:A:234:PRO:HD3	1.94	0.41
1:B:316:ILE:HG12	1:B:320:GLN:HA	2.01	0.41
1:B:492:ARG:HD2	6:B:2178:HOH:O	2.19	0.41
1:C:246:LEU:HD13	1:C:248:TYR:O	2.20	0.41
1:D:473:PHE:HB3	1:D:558:VAL:HG13	2.03	0.41
1:A:234:PRO:HB2	1:B:248:TYR:CZ	2.56	0.41
1:A:388:GLN:HB3	1:A:391:LYS:HB2	2.02	0.41
1:C:696:LYS:HG3	1:C:728:VAL:HG22	2.02	0.41
1:D:472:CYS:O	1:D:478:PRO:HA	2.21	0.41
1:B:201:TRP:CZ2	1:B:710:ASN:HA	2.55	0.41
1:C:154:TRP:HD1	1:C:214:LEU:HD12	1.86	0.41
1:A:49:LEU:HD22	1:A:749:GLN:HA	2.03	0.41
1:A:676:PRO:HD3	1:A:680:LEU:HD22	2.03	0.41
1:A:704:HIS:HE1	1:A:711:VAL:O	2.03	0.41
1:C:637:SER:HB3	1:C:688:VAL:HG11	2.02	0.41
1:B:548:ALA:HB3	1:B:635:VAL:HG21	2.03	0.41
1:C:721:LYS:HB2	1:D:736:THR:HB	2.03	0.41
1:C:733:MET:HA	1:D:732:THR:CG2	2.51	0.41
1:D:385:CYS:HB3	1:D:387:PHE:CE1	2.56	0.41
1:A:530:LEU:HA	1:A:531:PRO:HD3	1.94	0.40
1:C:458:SER:HB3	1:C:471:ARG:HB2	2.02	0.40
1:D:177:GLU:HA	1:D:178:PRO:HD3	1.93	0.40
1:B:153:GLN:HE22	1:B:170:ASN:ND2	2.19	0.40
1:C:589:LYS:N	1:C:589:LYS:HD3	2.36	0.40
1:D:327:ILE:HD13	1:D:389:THR:HG23	2.02	0.40
1:B:334:THR:O	1:D:275:THR:HA	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 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	726/728 (100%)	693 (96%)	32 (4%)	1 (0%)	48	69
1	B	726/728 (100%)	697 (96%)	28 (4%)	1 (0%)	48	69
1	C	726/728 (100%)	696 (96%)	29 (4%)	1 (0%)	48	69
1	D	726/728 (100%)	696 (96%)	29 (4%)	1 (0%)	48	69
All	All	2904/2912 (100%)	2782 (96%)	118 (4%)	4 (0%)	48	69

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	40	ARG
1	B	40	ARG
1	D	40	ARG
1	C	40	ARG

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	652/652 (100%)	592 (91%)	60 (9%)	7	15
1	B	652/652 (100%)	590 (90%)	62 (10%)	7	14
1	C	652/652 (100%)	588 (90%)	64 (10%)	6	13
1	D	652/652 (100%)	588 (90%)	64 (10%)	6	13
All	All	2608/2608 (100%)	2358 (90%)	250 (10%)	7	14

All (250) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	41	ARG
1	A	52	THR
1	A	56	LYS
1	A	80	ASN
1	A	88	ILE
1	A	90	LEU
1	A	119	ASN
1	A	134	ILE
1	A	139	LYS
1	A	140	ARG
1	A	142	LEU
1	A	144	THR
1	A	169	ASN
1	A	180	LEU
1	A	183	GLN
1	A	202	VAL
1	A	209	SER
1	A	219	ASN
1	A	230	ASP
1	A	243	ASP
1	A	246	LEU
1	A	250	LYS
1	A	294	LEU
1	A	358	ARG
1	A	367	ASP
1	A	377	ASN
1	A	385	CYS
1	A	393	ASN
1	A	412	SER
1	A	421	GLU
1	A	423	LYS
1	A	436	LEU
1	A	441	LYS
1	A	453	ARG
1	A	472	CYS
1	A	479	LEU
1	A	491	LEU
1	A	492	ARG
1	A	498	SER
1	A	502	LYS
1	A	508	GLN
1	A	514	LEU

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	515	ASP
1	A	523	LYS
1	A	542	LEU
1	A	554	LYS
1	A	561	LEU
1	A	566	TYR
1	A	589	LYS
1	A	608	GLU
1	A	627	TRP
1	A	660	GLU
1	A	685	ASN
1	A	701	LEU
1	A	702	LEU
1	A	718	GLN
1	A	732	THR
1	A	744	SER
1	A	745	ASN
1	A	759	LEU
1	B	40	ARG
1	B	51	SER
1	B	90	LEU
1	B	91	GLU
1	B	119	ASN
1	B	139	LYS
1	B	142	LEU
1	B	143	ILE
1	B	175	LYS
1	B	180	LEU
1	B	182	SER
1	B	191	GLU
1	B	209	SER
1	B	230	ASP
1	B	246	LEU
1	B	250	LYS
1	B	294	LEU
1	B	349	SER
1	B	358	ARG
1	B	366	SER
1	B	377	ASN
1	B	385	CYS
1	B	399	LYS
1	B	415	LEU

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	423	LYS
1	B	435	GLN
1	B	436	LEU
1	B	448	GLU
1	B	450	ASN
1	B	471	ARG
1	B	489	LYS
1	B	491	LEU
1	B	501	ASP
1	B	502	LYS
1	B	507	VAL
1	B	513	LYS
1	B	514	LEU
1	B	515	ASP
1	B	516	VAL
1	B	517	ILE
1	B	520	HIS
1	B	535	ASP
1	B	536	LYS
1	B	542	LEU
1	B	554	LYS
1	B	561	LEU
1	B	566	TYR
1	B	589	LYS
1	B	611	ARG
1	B	612	GLN
1	B	627	TRP
1	B	660	GLU
1	B	677	GLU
1	B	701	LEU
1	B	702	LEU
1	B	731	GLN
1	B	732	THR
1	B	745	ASN
1	B	759	LEU
1	B	761	GLN
1	B	764	SER
1	B	765	LEU
1	C	39	SER
1	C	54	ARG
1	C	77	LEU
1	C	90	LEU

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	C	92	ASN
1	C	94	THR
1	C	103	ASN
1	C	104	ASP
1	C	119	ASN
1	C	134	ILE
1	C	139	LYS
1	C	141	GLN
1	C	144	THR
1	C	202	VAL
1	C	209	SER
1	C	219	ASN
1	C	230	ASP
1	C	245	SER
1	C	246	LEU
1	C	277	SER
1	C	293	VAL
1	C	316	ILE
1	C	358	ARG
1	C	377	ASN
1	C	378	GLU
1	C	385	CYS
1	C	412	SER
1	C	436	LEU
1	C	437	ASN
1	C	440	THR
1	C	441	LYS
1	C	448	GLU
1	C	449	LEU
1	C	466	LYS
1	C	471	ARG
1	C	472	CYS
1	C	489	LYS
1	C	491	LEU
1	C	492	ARG
1	C	506	ASP
1	C	513	LYS
1	C	515	ASP
1	C	518	ASN
1	C	522	THR
1	C	536	LYS
1	C	538	LYS

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	C	542	LEU
1	C	554	LYS
1	C	561	LEU
1	C	566	TYR
1	C	589	LYS
1	C	615	LYS
1	C	627	TRP
1	C	660	GLU
1	C	685	ASN
1	C	701	LEU
1	C	702	LEU
1	C	718	GLN
1	C	731	GLN
1	C	732	THR
1	C	744	SER
1	C	745	ASN
1	C	759	LEU
1	C	764	SER
1	D	41	ARG
1	D	50	LYS
1	D	63	ILE
1	D	71	LYS
1	D	72	GLN
1	D	78	LEU
1	D	90	LEU
1	D	97	GLU
1	D	111	ARG
1	D	139	LYS
1	D	147	ARG
1	D	180	LEU
1	D	202	VAL
1	D	230	ASP
1	D	246	LEU
1	D	294	LEU
1	D	295	ILE
1	D	336	ARG
1	D	358	ARG
1	D	366	SER
1	D	377	ASN
1	D	378	GLU
1	D	379	GLU
1	D	385	CYS

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	D	399	LYS
1	D	408	GLU
1	D	415	LEU
1	D	423	LYS
1	D	425	MET
1	D	436	LEU
1	D	441	LYS
1	D	443	THR
1	D	448	GLU
1	D	458	SER
1	D	463	ASN
1	D	471	ARG
1	D	491	LEU
1	D	492	ARG
1	D	507	VAL
1	D	508	GLN
1	D	513	LYS
1	D	514	LEU
1	D	515	ASP
1	D	516	VAL
1	D	517	ILE
1	D	520	HIS
1	D	523	LYS
1	D	538	LYS
1	D	542	LEU
1	D	554	LYS
1	D	561	LEU
1	D	566	TYR
1	D	589	LYS
1	D	611	ARG
1	D	630	SER
1	D	696	LYS
1	D	701	LEU
1	D	702	LEU
1	D	718	GLN
1	D	731	GLN
1	D	732	THR
1	D	734	TRP
1	D	745	ASN
1	D	759	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (59) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	141	GLN
1	A	169	ASN
1	A	170	ASN
1	A	176	ASN
1	A	192	ASN
1	A	369	ASN
1	A	377	ASN
1	A	393	ASN
1	A	483	HIS
1	A	572	ASN
1	A	586	GLN
1	A	694	ASN
1	A	704	HIS
1	A	718	GLN
1	B	75	ASN
1	B	138	ASN
1	B	170	ASN
1	B	183	GLN
1	B	192	ASN
1	B	247	GLN
1	B	377	ASN
1	B	393	ASN
1	B	435	GLN
1	B	483	HIS
1	B	679	ASN
1	B	704	HIS
1	B	718	GLN
1	C	169	ASN
1	C	170	ASN
1	C	183	GLN
1	C	192	ASN
1	C	219	ASN
1	C	247	GLN
1	C	377	ASN
1	C	430	ASN
1	C	463	ASN
1	C	483	HIS
1	C	572	ASN
1	C	679	ASN
1	C	694	ASN
1	C	704	HIS
1	C	718	GLN
1	D	75	ASN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	D	138	ASN
1	D	170	ASN
1	D	176	ASN
1	D	192	ASN
1	D	247	GLN
1	D	369	ASN
1	D	377	ASN
1	D	386	HIS
1	D	463	ASN
1	D	483	HIS
1	D	679	ASN
1	D	694	ASN
1	D	697	GLN
1	D	704	HIS
1	D	718	GLN
1	D	754	HIS

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](#)

18 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	E	1	1,2	14,14,15	0.51	0	17,19,21	0.99	2 (11%)
2	NAG	E	2	2	14,14,15	0.56	0	17,19,21	1.10	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	NAG	F	1	1,2	14,14,15	0.56	0	17,19,21	1.62	3 (17%)
2	NAG	F	2	2	14,14,15	0.61	0	17,19,21	1.11	1 (5%)
2	NAG	G	1	1,2	14,14,15	0.60	0	17,19,21	0.98	2 (11%)
2	NAG	G	2	2	14,14,15	0.52	0	17,19,21	0.88	0
2	NAG	H	1	1,2	14,14,15	0.48	0	17,19,21	0.93	1 (5%)
2	NAG	H	2	2	14,14,15	0.51	0	17,19,21	0.97	1 (5%)
2	NAG	I	1	1,2	14,14,15	0.49	0	17,19,21	0.92	1 (5%)
2	NAG	I	2	2	14,14,15	0.48	0	17,19,21	1.20	2 (11%)
2	NAG	J	1	1,2	14,14,15	0.51	0	17,19,21	1.14	2 (11%)
2	NAG	J	2	2	14,14,15	0.50	0	17,19,21	1.08	2 (11%)
2	NAG	K	1	1,2	14,14,15	0.37	0	17,19,21	1.53	2 (11%)
2	NAG	K	2	2	14,14,15	0.54	0	17,19,21	0.95	1 (5%)
2	NAG	L	1	1,2	14,14,15	0.52	0	17,19,21	1.03	1 (5%)
2	NAG	L	2	2	14,14,15	0.63	0	17,19,21	1.40	3 (17%)
2	NAG	M	1	1,2	14,14,15	0.51	0	17,19,21	0.77	0
2	NAG	M	2	2	14,14,15	0.51	0	17,19,21	0.87	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
2	NAG	E	1	1,2	-	1/6/23/26	0/1/1/1
2	NAG	E	2	2	-	2/6/23/26	0/1/1/1
2	NAG	F	1	1,2	1/1/5/7	2/6/23/26	0/1/1/1
2	NAG	F	2	2	1/1/5/7	4/6/23/26	0/1/1/1
2	NAG	G	1	1,2	-	4/6/23/26	0/1/1/1
2	NAG	G	2	2	-	2/6/23/26	0/1/1/1
2	NAG	H	1	1,2	-	1/6/23/26	0/1/1/1
2	NAG	H	2	2	-	2/6/23/26	0/1/1/1
2	NAG	I	1	1,2	-	2/6/23/26	0/1/1/1
2	NAG	I	2	2	1/1/5/7	2/6/23/26	0/1/1/1
2	NAG	J	1	1,2	1/1/5/7	2/6/23/26	0/1/1/1
2	NAG	J	2	2	-	5/6/23/26	0/1/1/1
2	NAG	K	1	1,2	1/1/5/7	4/6/23/26	0/1/1/1
2	NAG	K	2	2	-	2/6/23/26	0/1/1/1

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	L	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	L	2	2	1/1/5/7	3/6/23/26	0/1/1/1
2	NAG	M	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	M	2	2	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	K	1	NAG	C1-O5-C5	5.16	119.18	112.19
2	F	1	NAG	O4-C4-C3	4.01	119.63	110.35
2	L	2	NAG	C1-O5-C5	4.00	117.61	112.19
2	I	2	NAG	C1-O5-C5	3.73	117.24	112.19
2	F	2	NAG	C1-O5-C5	3.51	116.95	112.19
2	F	1	NAG	C1-O5-C5	3.20	116.52	112.19
2	J	1	NAG	O5-C1-C2	-2.89	106.72	111.29
2	J	1	NAG	C1-O5-C5	2.86	116.07	112.19
2	E	2	NAG	C4-C3-C2	2.79	115.11	111.02
2	K	1	NAG	O5-C1-C2	2.79	115.70	111.29
2	J	2	NAG	C2-N2-C7	2.64	126.66	122.90
2	H	1	NAG	O5-C5-C6	2.61	111.30	107.20
2	H	2	NAG	C1-O5-C5	2.52	115.61	112.19
2	F	1	NAG	O5-C5-C6	2.45	111.04	107.20
2	K	2	NAG	C4-C3-C2	2.35	114.46	111.02
2	L	1	NAG	O5-C5-C6	2.34	110.87	107.20
2	L	2	NAG	C4-C3-C2	2.32	114.42	111.02
2	I	2	NAG	O5-C5-C6	2.31	110.82	107.20
2	G	1	NAG	O5-C1-C2	-2.25	107.74	111.29
2	L	2	NAG	O5-C1-C2	2.24	114.83	111.29
2	J	2	NAG	C1-O5-C5	2.14	115.10	112.19
2	E	1	NAG	O5-C1-C2	-2.12	107.95	111.29
2	G	1	NAG	C1-O5-C5	2.11	115.05	112.19
2	E	1	NAG	C1-O5-C5	2.10	115.04	112.19
2	I	1	NAG	O5-C5-C6	2.05	110.42	107.20

All (6) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	F	1	NAG	C1
2	F	2	NAG	C1
2	I	2	NAG	C1

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atom
2	J	1	NAG	C1
2	K	1	NAG	C1
2	L	2	NAG	C1

All (40) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	F	2	NAG	C8-C7-N2-C2
2	F	2	NAG	O7-C7-N2-C2
2	I	2	NAG	C8-C7-N2-C2
2	I	2	NAG	O7-C7-N2-C2
2	J	1	NAG	C8-C7-N2-C2
2	J	1	NAG	O7-C7-N2-C2
2	J	2	NAG	C3-C2-N2-C7
2	J	2	NAG	C8-C7-N2-C2
2	J	2	NAG	O7-C7-N2-C2
2	L	2	NAG	C8-C7-N2-C2
2	L	2	NAG	O7-C7-N2-C2
2	M	2	NAG	C8-C7-N2-C2
2	M	2	NAG	O7-C7-N2-C2
2	G	1	NAG	C8-C7-N2-C2
2	G	1	NAG	O7-C7-N2-C2
2	G	2	NAG	C8-C7-N2-C2
2	G	2	NAG	O7-C7-N2-C2
2	K	2	NAG	C8-C7-N2-C2
2	F	2	NAG	O5-C5-C6-O6
2	H	2	NAG	O5-C5-C6-O6
2	F	1	NAG	O5-C5-C6-O6
2	H	2	NAG	C4-C5-C6-O6
2	K	2	NAG	O7-C7-N2-C2
2	K	1	NAG	C4-C5-C6-O6
2	E	2	NAG	C8-C7-N2-C2
2	E	2	NAG	O7-C7-N2-C2
2	F	2	NAG	C4-C5-C6-O6
2	K	1	NAG	O5-C5-C6-O6
2	K	1	NAG	C8-C7-N2-C2
2	G	1	NAG	C4-C5-C6-O6
2	L	2	NAG	O5-C5-C6-O6
2	F	1	NAG	C4-C5-C6-O6
2	I	1	NAG	C4-C5-C6-O6
2	K	1	NAG	O7-C7-N2-C2
2	E	1	NAG	C4-C5-C6-O6

Continued on next page...

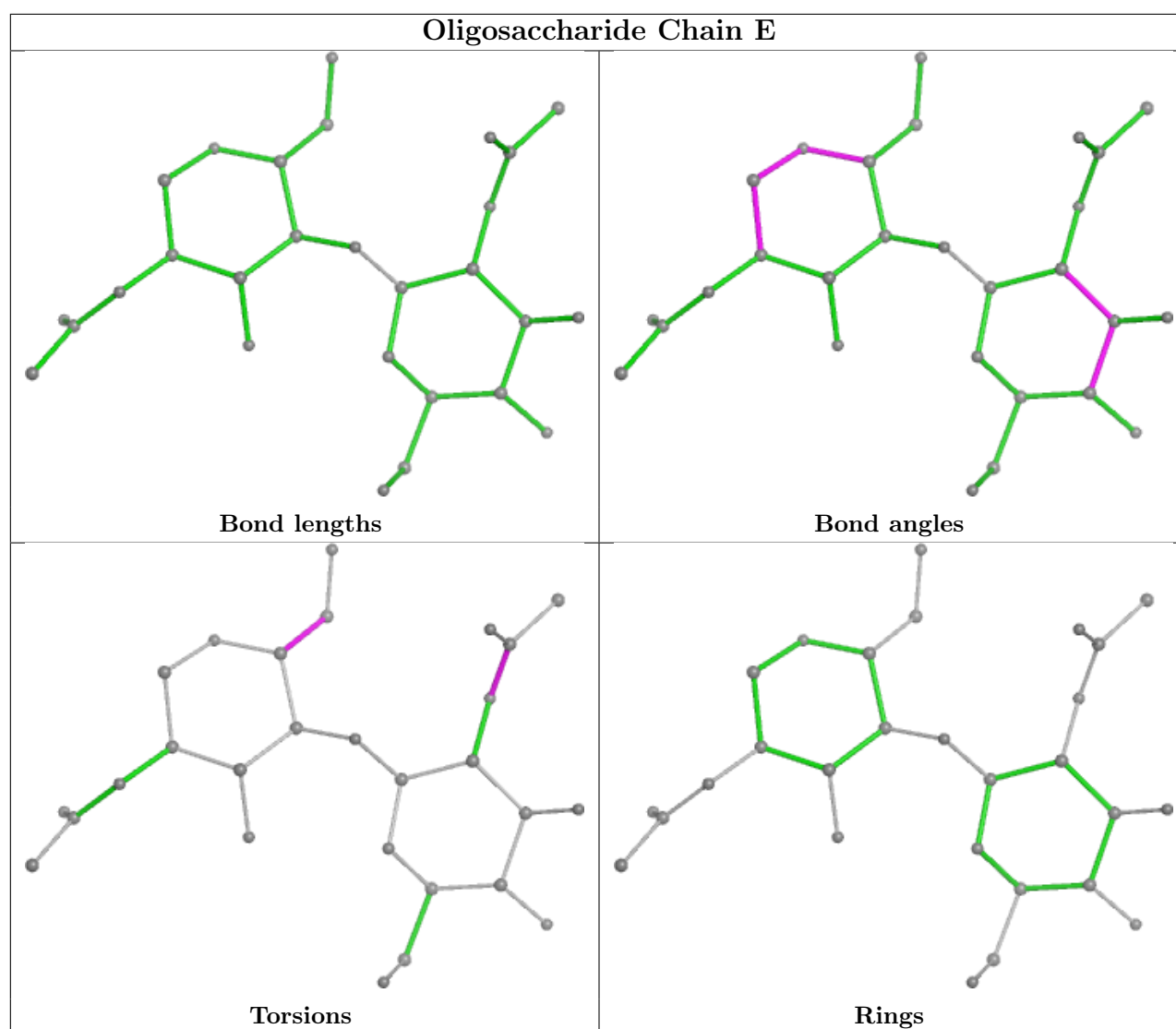
Continued from previous page...

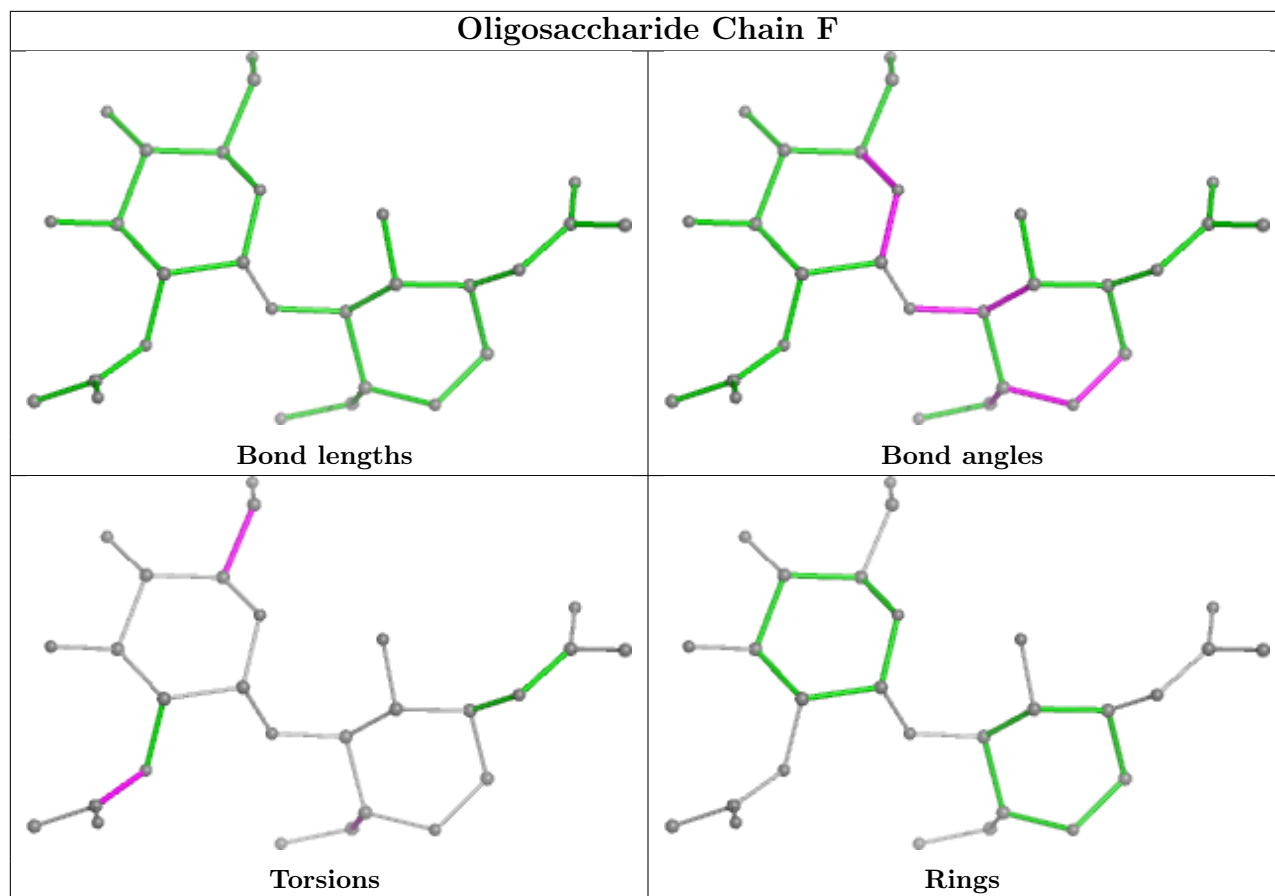
Mol	Chain	Res	Type	Atoms
2	J	2	NAG	C4-C5-C6-O6
2	G	1	NAG	O5-C5-C6-O6
2	J	2	NAG	O5-C5-C6-O6
2	H	1	NAG	C4-C5-C6-O6
2	I	1	NAG	O5-C5-C6-O6

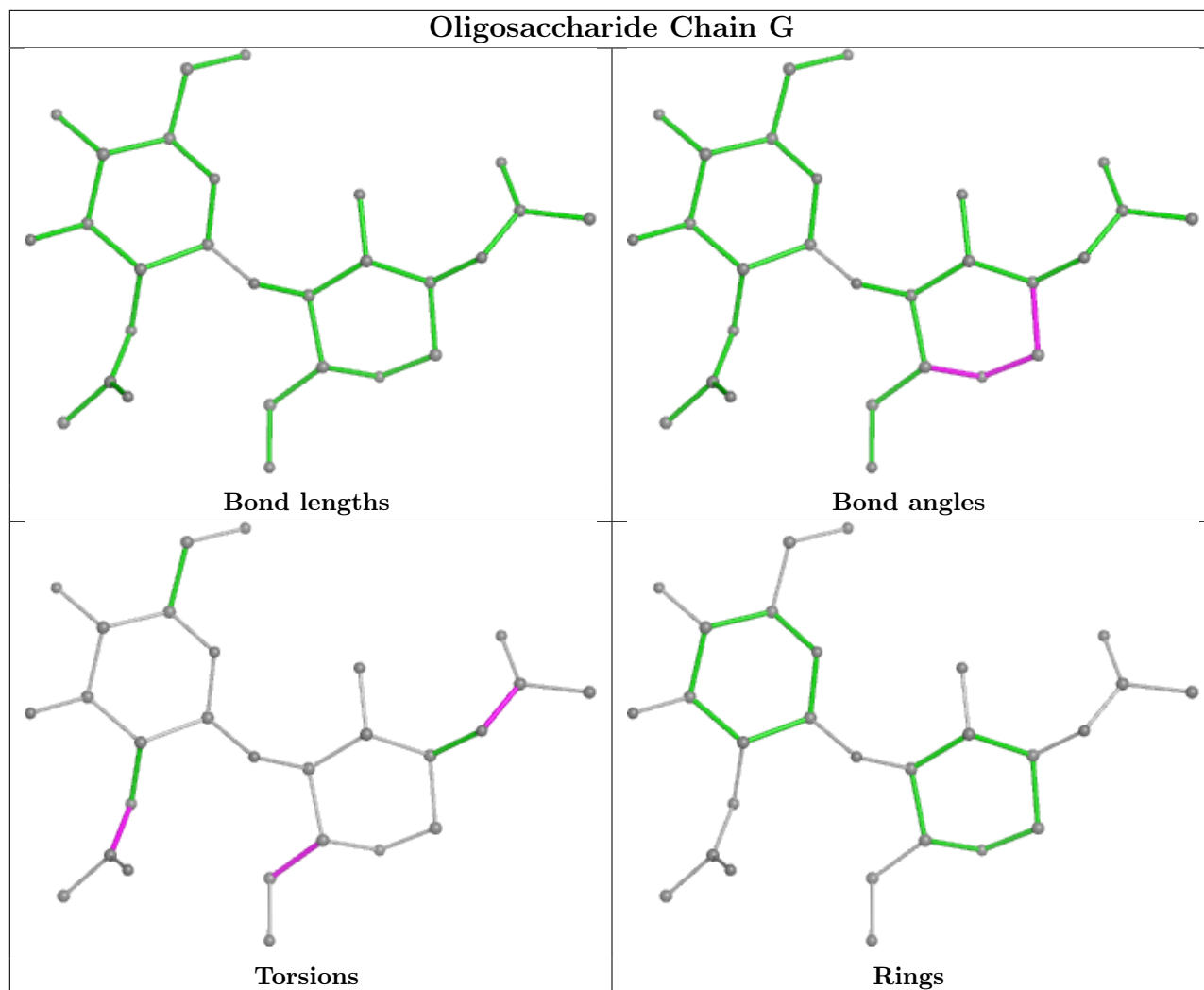
There are no ring outliers.

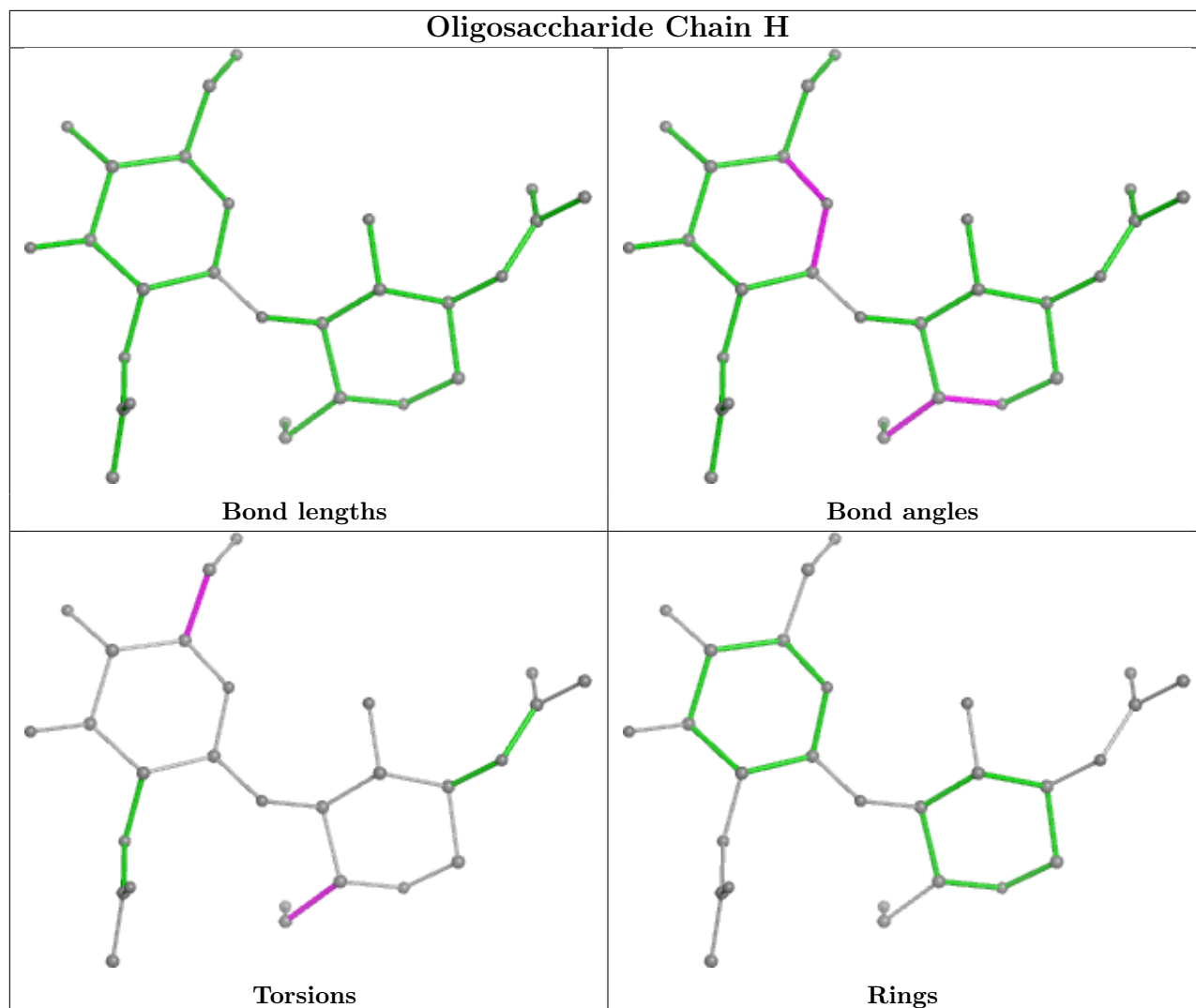
No monomer is involved in short contacts.

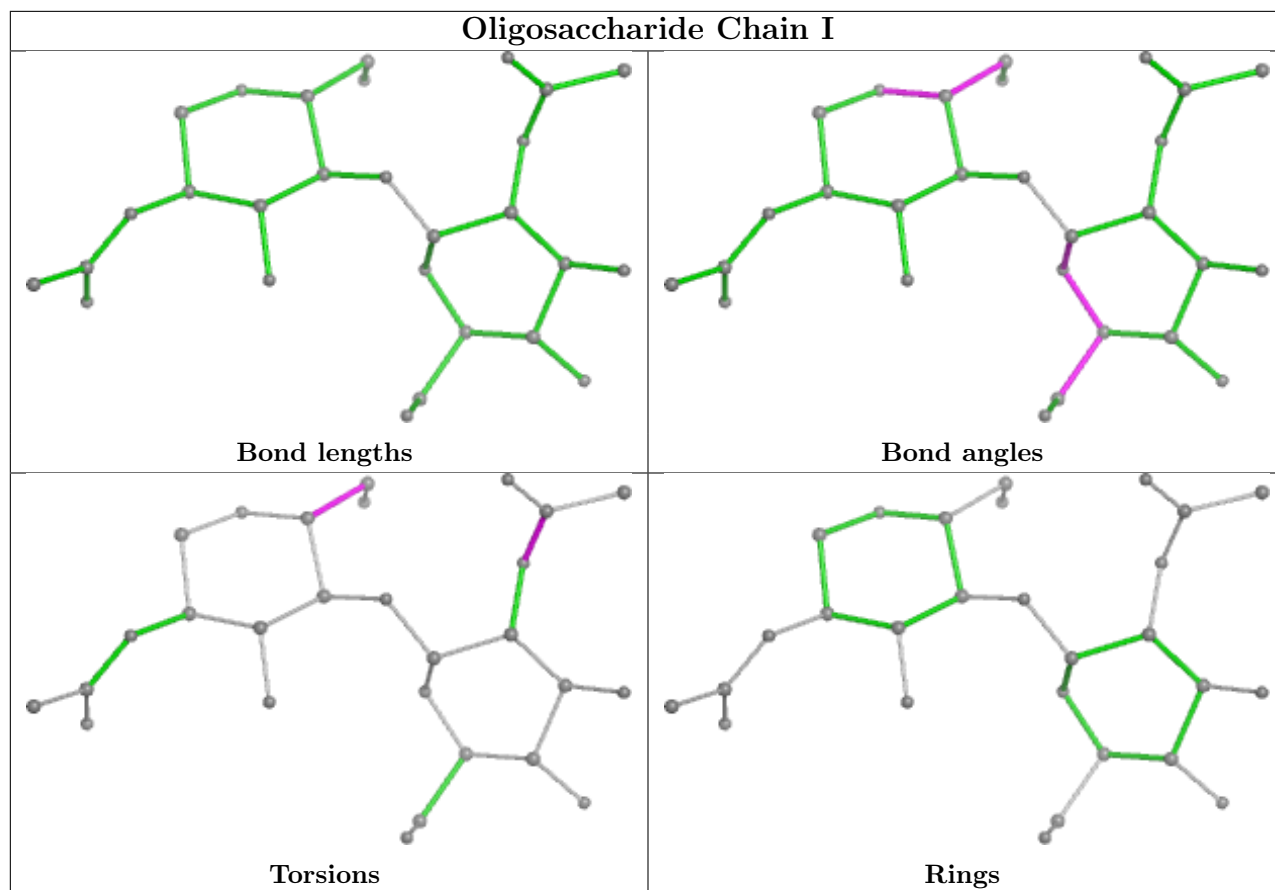
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

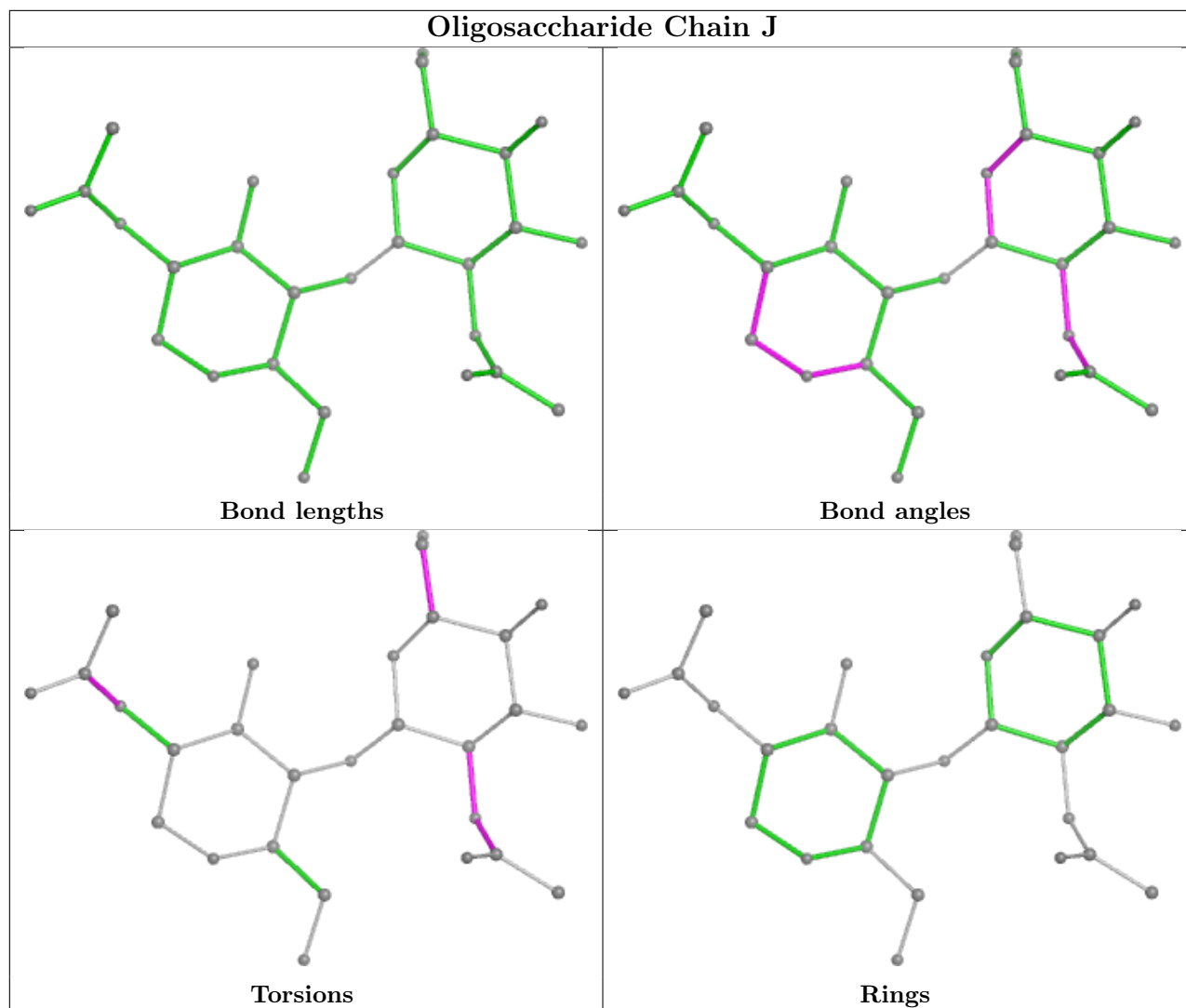


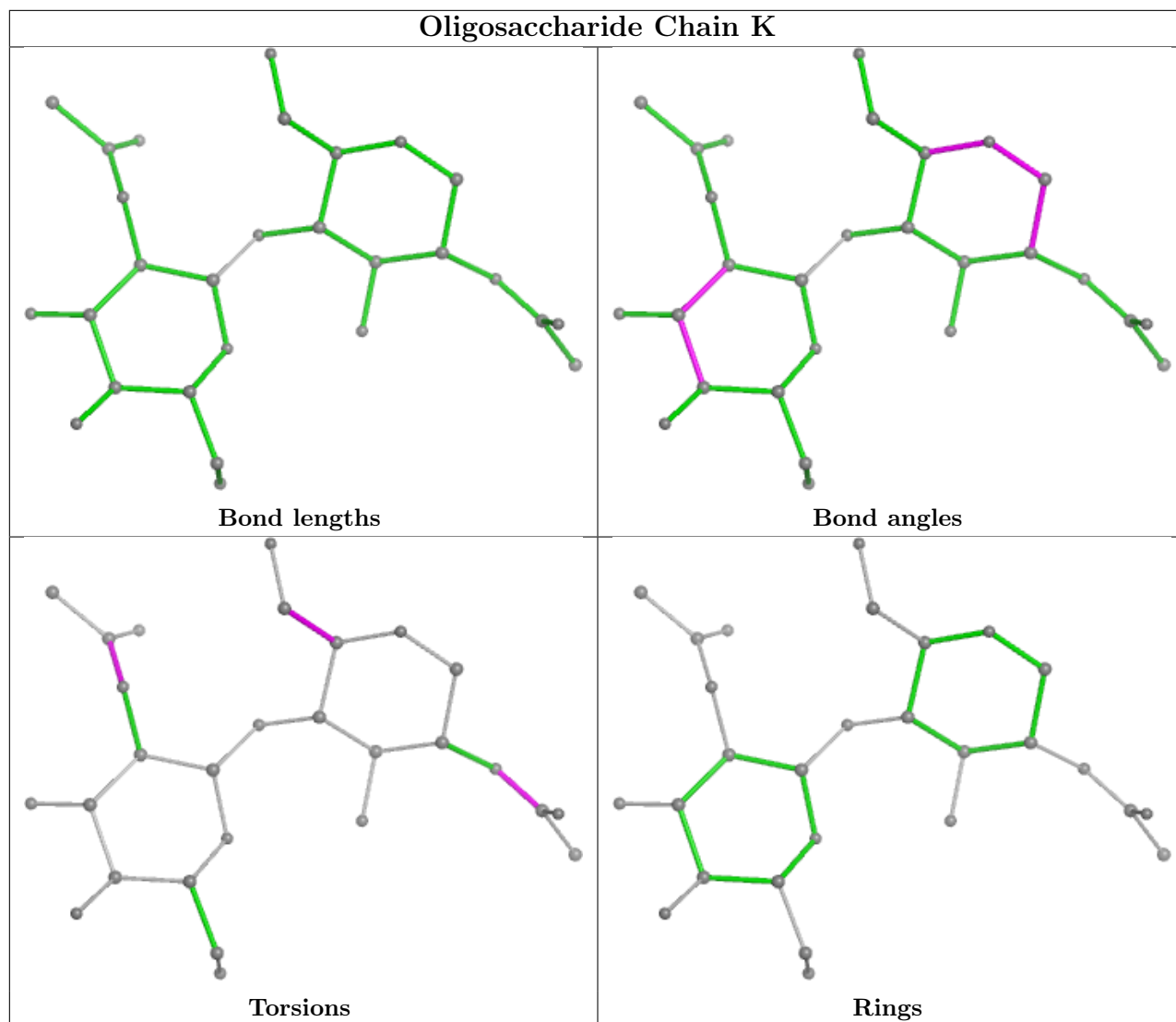


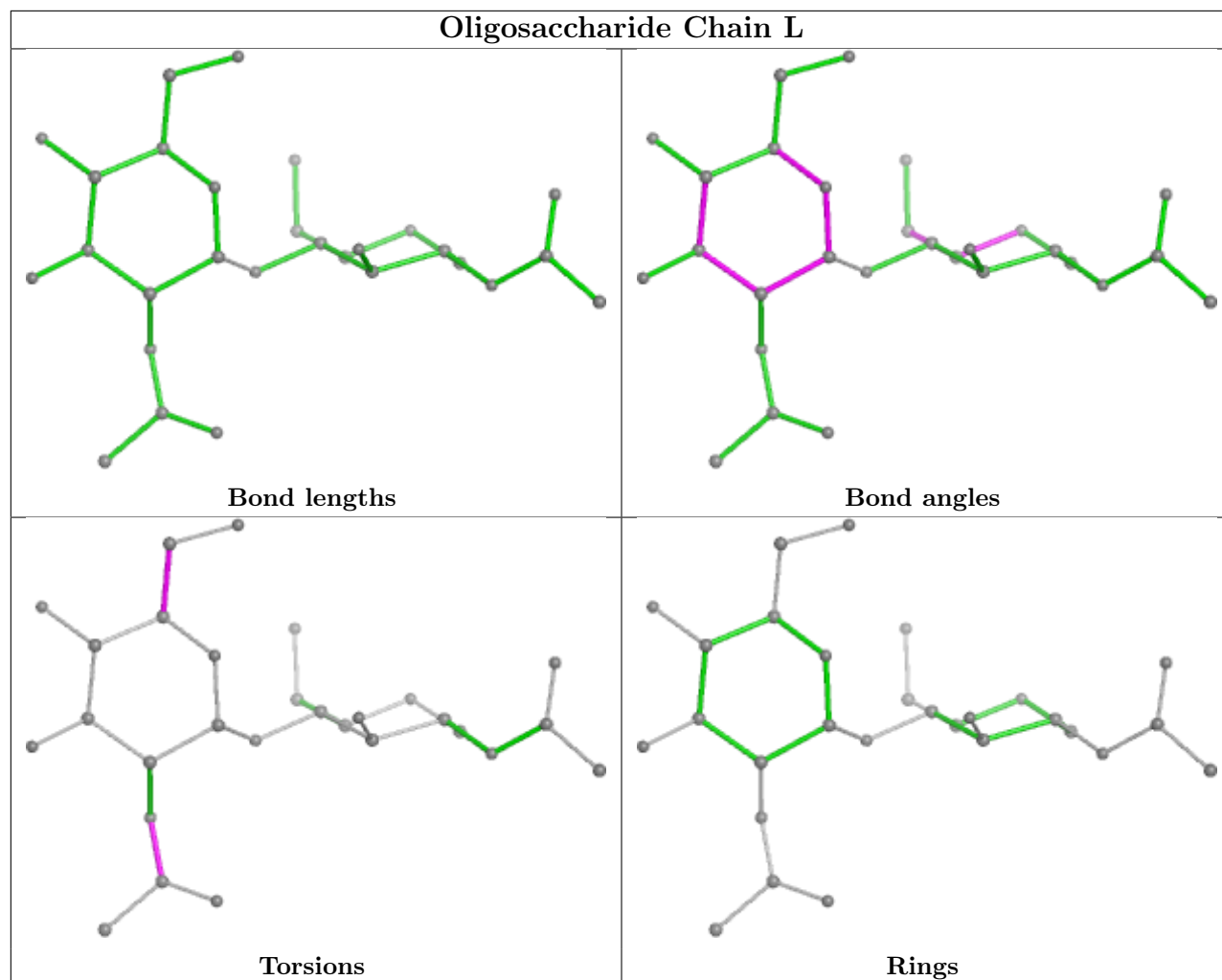


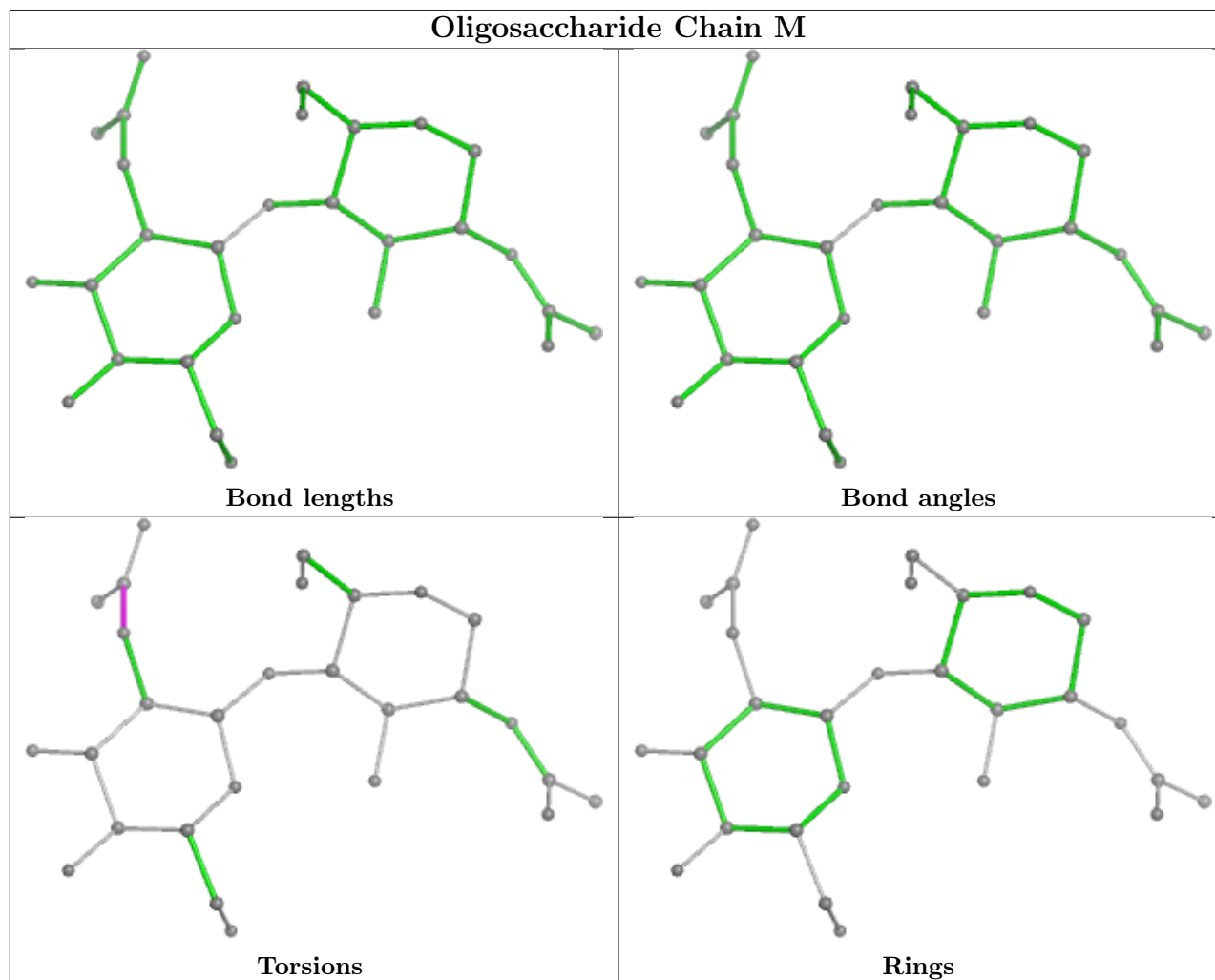












5.6 Ligand geometry [i](#)

27 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	$\# Z > 2$
3	NAG	B	1085	1	14,14,15	0.47	0	17,19,21	0.78	1 (5%)
3	NAG	D	1085	1	14,14,15	0.54	0	17,19,21	1.47	4 (23%)
3	NAG	A	1085	1	14,14,15	0.53	0	17,19,21	0.72	0
3	NAG	A	1279	1	14,14,15	0.52	0	17,19,21	0.91	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	NAG	B	1279	1	14,14,15	0.51	0	17,19,21	0.86	1 (5%)
3	NAG	B	1229	1	14,14,15	0.49	0	17,19,21	0.84	1 (5%)
3	NAG	A	1092	1	14,14,15	0.60	0	17,19,21	1.03	1 (5%)
3	NAG	C	1229	1	14,14,15	0.48	0	17,19,21	1.13	1 (5%)
5	SO4	B	1769	-	4,4,4	0.14	0	6,6,6	0.11	0
4	008	C	1767	-	28,28,28	0.55	0	30,39,39	1.18	1 (3%)
5	SO4	A	1768	-	4,4,4	0.14	0	6,6,6	0.06	0
3	NAG	A	1321	1	14,14,15	0.49	0	17,19,21	0.89	0
4	008	A	1767	-	28,28,28	0.59	0	30,39,39	1.31	1 (3%)
4	008	D	1767	-	28,28,28	0.58	0	30,39,39	1.27	4 (13%)
5	SO4	D	1768	-	4,4,4	0.15	0	6,6,6	0.06	0
5	SO4	C	1769	-	4,4,4	0.13	0	6,6,6	0.06	0
5	SO4	A	1769	-	4,4,4	0.14	0	6,6,6	0.08	0
3	NAG	C	1085	1	14,14,15	0.51	0	17,19,21	0.82	1 (5%)
3	NAG	D	1279	1	14,14,15	0.50	0	17,19,21	0.74	0
3	NAG	C	1092	1	14,14,15	0.50	0	17,19,21	0.77	0
3	NAG	C	1279	1	14,14,15	0.44	0	17,19,21	1.10	1 (5%)
3	NAG	B	1321	1	14,14,15	0.51	0	17,19,21	0.84	1 (5%)
3	NAG	C	1321	1	14,14,15	0.51	0	17,19,21	0.70	0
5	SO4	D	1769	-	4,4,4	0.13	0	6,6,6	0.07	0
4	008	B	1767	-	28,28,28	0.58	0	30,39,39	1.31	2 (6%)
5	SO4	C	1768	-	4,4,4	0.15	0	6,6,6	0.16	0
5	SO4	B	1768	-	4,4,4	0.15	0	6,6,6	0.11	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
3	NAG	B	1085	1	-	4/6/23/26	0/1/1/1
3	NAG	D	1085	1	1/1/5/7	2/6/23/26	0/1/1/1
3	NAG	A	1085	1	-	4/6/23/26	0/1/1/1
3	NAG	A	1279	1	-	2/6/23/26	0/1/1/1
3	NAG	B	1279	1	-	2/6/23/26	0/1/1/1
3	NAG	B	1229	1	-	0/6/23/26	0/1/1/1
3	NAG	A	1092	1	1/1/5/7	2/6/23/26	0/1/1/1
3	NAG	C	1229	1	-	2/6/23/26	0/1/1/1

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	008	C	1767	-	-	0/15/28/28	0/3/3/3
3	NAG	A	1321	1	-	0/6/23/26	0/1/1/1
4	008	A	1767	-	-	0/15/28/28	0/3/3/3
4	008	D	1767	-	-	0/15/28/28	0/3/3/3
3	NAG	C	1085	1	-	2/6/23/26	0/1/1/1
3	NAG	D	1279	1	-	4/6/23/26	0/1/1/1
3	NAG	C	1092	1	1/1/5/7	3/6/23/26	0/1/1/1
3	NAG	C	1279	1	-	0/6/23/26	0/1/1/1
3	NAG	B	1321	1	-	0/6/23/26	0/1/1/1
3	NAG	C	1321	1	-	4/6/23/26	0/1/1/1
4	008	B	1767	-	-	0/15/28/28	0/3/3/3

There are no bond length outliers.

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1767	008	C16-C15-N14	4.33	114.21	109.91
4	B	1767	008	C16-C15-N14	3.76	113.65	109.91
4	C	1767	008	C16-C15-N14	3.35	113.23	109.91
3	D	1085	NAG	C1-O5-C5	3.16	116.48	112.19
3	D	1085	NAG	C3-C4-C5	2.99	115.58	110.24
4	D	1767	008	C16-C15-N14	2.94	112.83	109.91
3	C	1229	NAG	C1-O5-C5	2.81	116.00	112.19
3	A	1279	NAG	O5-C5-C6	2.63	111.33	107.20
3	D	1085	NAG	O5-C5-C6	2.49	111.10	107.20
3	D	1085	NAG	C4-C3-C2	2.34	114.45	111.02
4	D	1767	008	C19-C18-C17	-2.23	116.07	120.61
3	A	1092	NAG	O5-C1-C2	-2.20	107.81	111.29
4	B	1767	008	C16-C15-C24	-2.20	107.15	110.63
3	B	1085	NAG	C1-O5-C5	2.19	115.16	112.19
4	D	1767	008	C18-C19-N14	-2.17	108.38	111.88
3	B	1279	NAG	O5-C5-C6	2.14	110.55	107.20
3	C	1279	NAG	C3-C4-C5	2.11	114.01	110.24
4	D	1767	008	C16-C15-C24	-2.09	107.33	110.63
3	C	1085	NAG	O5-C5-C6	2.08	110.46	107.20
3	B	1321	NAG	O5-C5-C6	2.03	110.39	107.20
3	B	1229	NAG	C1-O5-C5	2.00	114.91	112.19

All (3) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
3	A	1092	NAG	C1
3	C	1092	NAG	C1
3	D	1085	NAG	C1

All (31) torsion outliers are listed below:

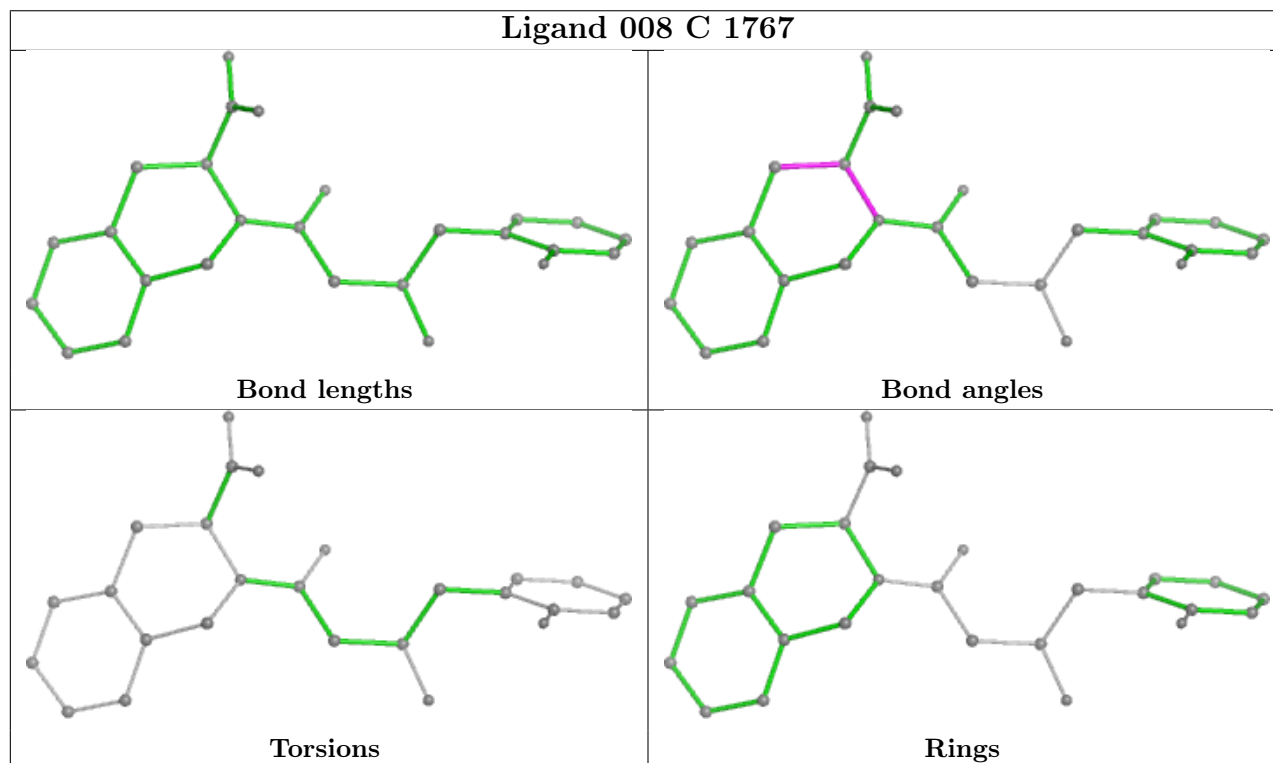
Mol	Chain	Res	Type	Atoms
3	A	1085	NAG	C8-C7-N2-C2
3	A	1085	NAG	O7-C7-N2-C2
3	A	1092	NAG	C8-C7-N2-C2
3	A	1092	NAG	O7-C7-N2-C2
3	B	1085	NAG	C8-C7-N2-C2
3	B	1085	NAG	O7-C7-N2-C2
3	C	1085	NAG	C8-C7-N2-C2
3	C	1085	NAG	O7-C7-N2-C2
3	C	1092	NAG	C8-C7-N2-C2
3	C	1092	NAG	O7-C7-N2-C2
3	C	1321	NAG	C8-C7-N2-C2
3	C	1321	NAG	O7-C7-N2-C2
3	D	1085	NAG	C8-C7-N2-C2
3	D	1085	NAG	O7-C7-N2-C2
3	D	1279	NAG	C8-C7-N2-C2
3	D	1279	NAG	O7-C7-N2-C2
3	A	1085	NAG	O5-C5-C6-O6
3	A	1279	NAG	O5-C5-C6-O6
3	B	1085	NAG	O5-C5-C6-O6
3	A	1279	NAG	C4-C5-C6-O6
3	C	1321	NAG	O5-C5-C6-O6
3	D	1279	NAG	O5-C5-C6-O6
3	A	1085	NAG	C4-C5-C6-O6
3	B	1279	NAG	C4-C5-C6-O6
3	B	1279	NAG	O5-C5-C6-O6
3	C	1321	NAG	C4-C5-C6-O6
3	B	1085	NAG	C4-C5-C6-O6
3	C	1229	NAG	C8-C7-N2-C2
3	C	1092	NAG	C4-C5-C6-O6
3	D	1279	NAG	C4-C5-C6-O6
3	C	1229	NAG	O7-C7-N2-C2

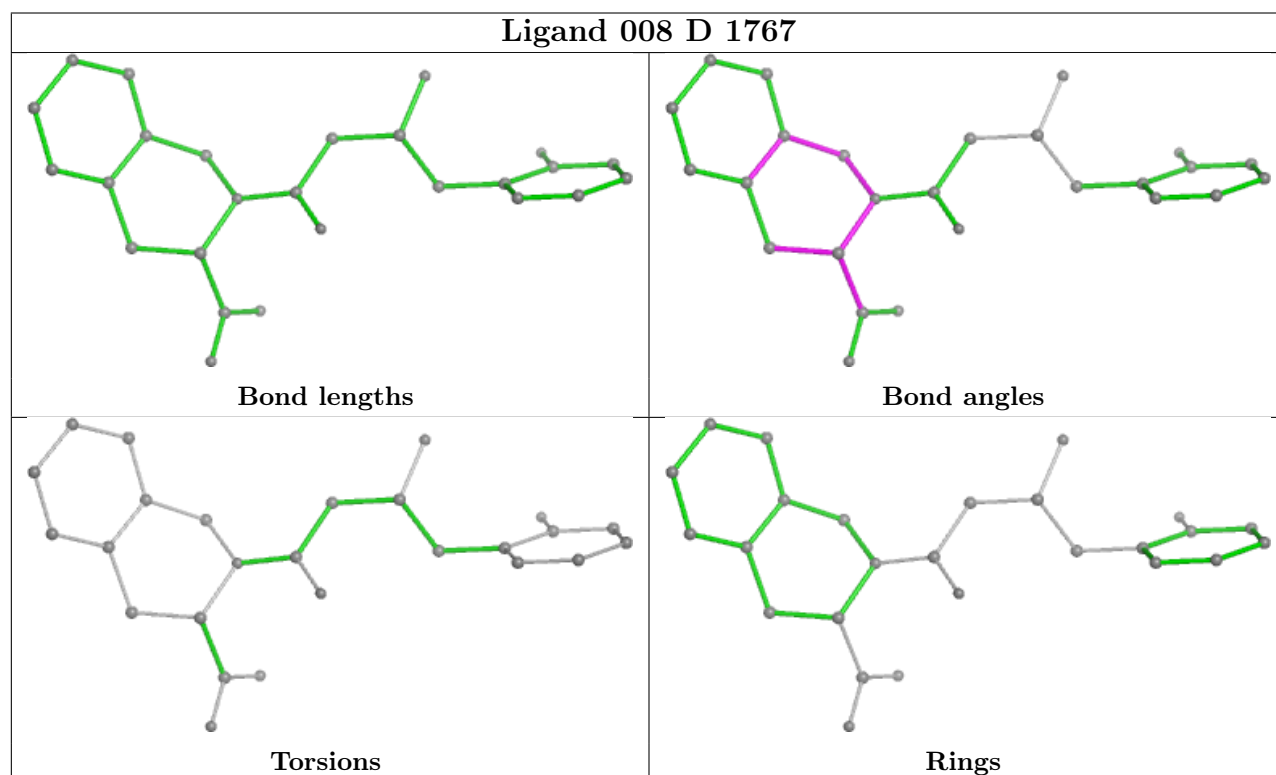
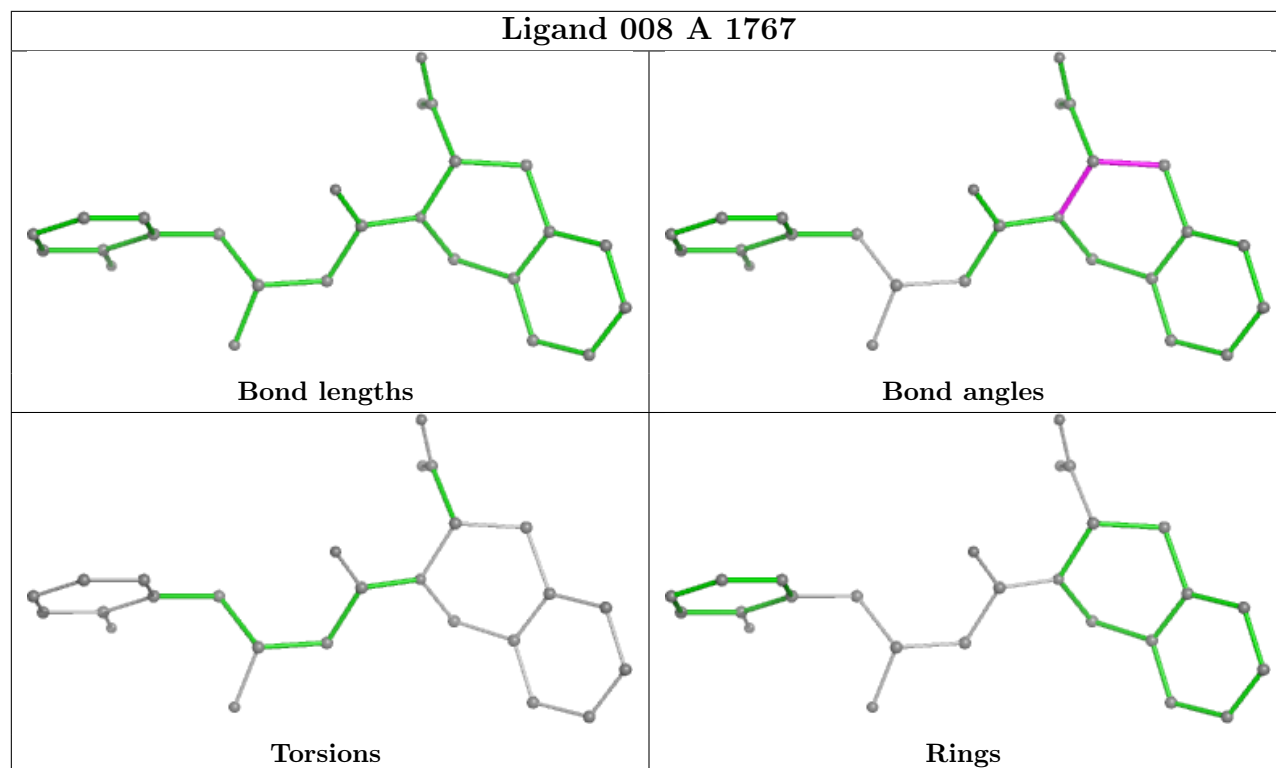
There are no ring outliers.

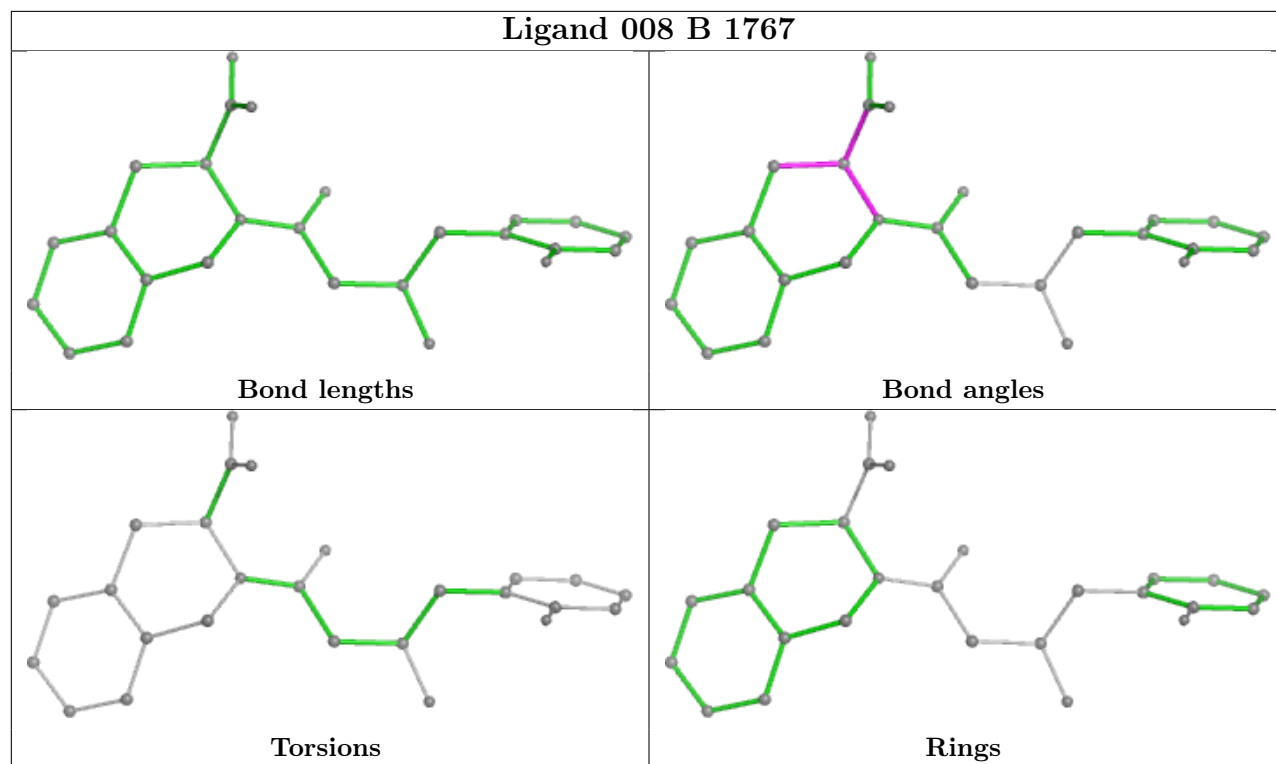
2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	1767	008	1	0
4	B	1767	008	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

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.