



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 4, 2021 – 12:05 PM EDT

PDB ID : 7M72
Title : MHC-like protein complex structure
Authors : Thirunavukkarasu, P.; Le Nours, J.; Rossjohn, J.
Deposited on : 2021-03-26
Resolution : 2.40 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.23.2
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.23.2

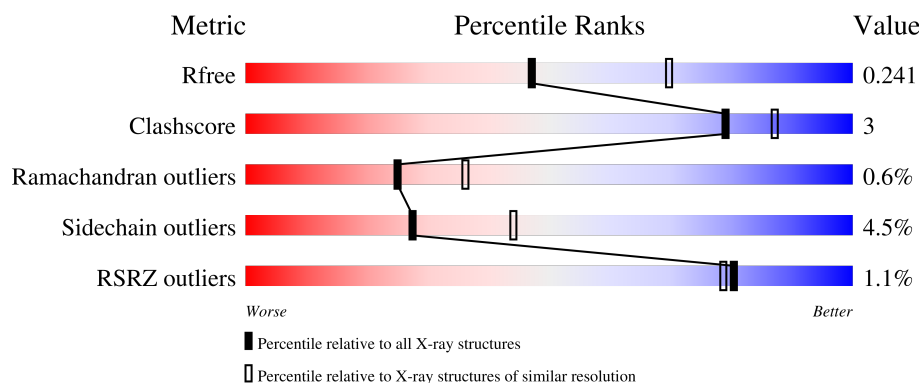
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



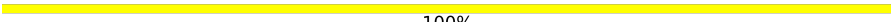
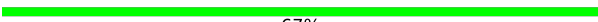
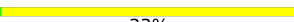
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	302	85% 12% ..
2	B	99	89% 9% .
3	C	207	88% 11% .
4	D	242	89% 9% .
5	E	2	100%

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Mol	Chain	Length	Quality of chain
5	G	2	 100%
6	F	3	 67%  33%

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 6942 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 Antigen-presenting glycoprotein CD1d1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	296	Total	C	N	O	S	0	0	0
			2362	1502	415	431	14			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	201	HIS	ASP	conflict	UNP P11609
A	280	GLY	-	expression tag	UNP P11609
A	281	SER	-	expression tag	UNP P11609
A	282	LEU	-	expression tag	UNP P11609
A	283	HIS	-	expression tag	UNP P11609
A	284	HIS	-	expression tag	UNP P11609
A	285	ILE	-	expression tag	UNP P11609
A	286	LEU	-	expression tag	UNP P11609
A	287	ASP	-	expression tag	UNP P11609
A	288	ALA	-	expression tag	UNP P11609
A	289	GLN	-	expression tag	UNP P11609
A	290	LYS	-	expression tag	UNP P11609
A	291	MET	-	expression tag	UNP P11609
A	292	VAL	-	expression tag	UNP P11609
A	293	TRP	-	expression tag	UNP P11609
A	294	ASN	-	expression tag	UNP P11609
A	295	HIS	-	expression tag	UNP P11609
A	296	ARG	-	expression tag	UNP P11609
A	297	HIS	-	expression tag	UNP P11609
A	298	HIS	-	expression tag	UNP P11609
A	299	HIS	-	expression tag	UNP P11609
A	300	HIS	-	expression tag	UNP P11609
A	301	HIS	-	expression tag	UNP P11609
A	302	HIS	-	expression tag	UNP P11609

- Molecule 2 is a protein called Beta-2-microglobulin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	99	Total	C	N	O	S	0	0	0
			789	505	134	143	7			

- Molecule 3 is a protein called NKT Valpha14 (Mouse)-2C12 TCR,Human T-cell receptor sp3.4 alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	204	Total	C	N	O	S	0	0	0
			1555	965	265	318	7			

- Molecule 4 is a protein called NKT Vbeta8.2 (Mouse)-2C12 TCR,Human nkt tcr beta chain.

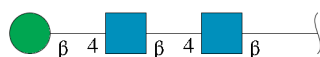
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	241	Total	C	N	O	S	0	0	0
			1878	1183	332	357	6			

- 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				ZeroOcc	AltConf	Trace
5	E	2	Total	C	N	O	0	0	0
			28	16	2	10			
5	G	2	Total	C	N	O	0	0	0
			28	16	2	10			

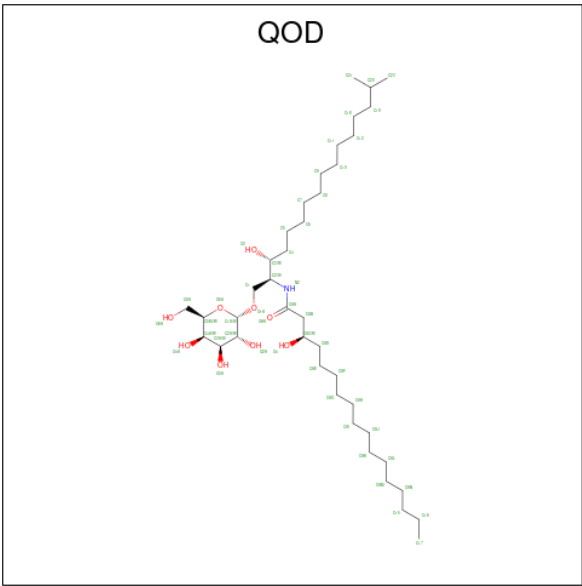
- Molecule 6 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
6	F	3	Total	C	N	O	0	0	0
			39	22	2	15			

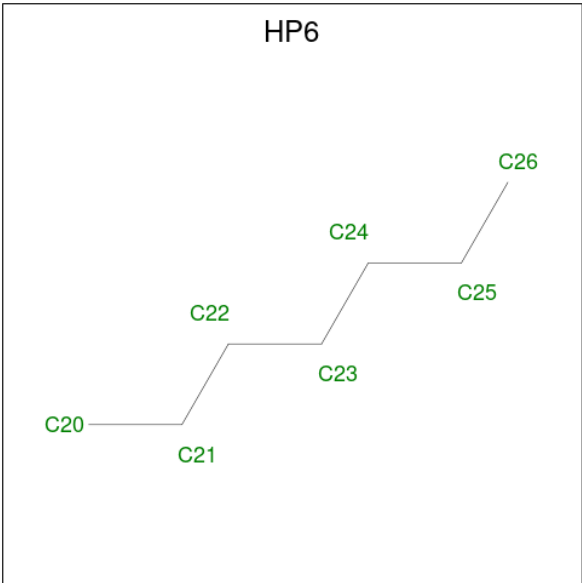
- Molecule 7 is (3R)-N-[(2S,3R)-1-(alpha-D-galactopyranosyloxy)-3-hydroxy-15-methylhexadecan-2-yl]-3-hydroxyheptadecanamide (three-letter code: QOD) (formula: C₄₀H₇₉NO₉)

(labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
7	A	1	Total	C	N	O	0	0
			50	40	1	9		

- Molecule 8 is HEPTANE (three-letter code: HP6) (formula: C₇H₁₆).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	1	Total	C	0	0
			7	7		

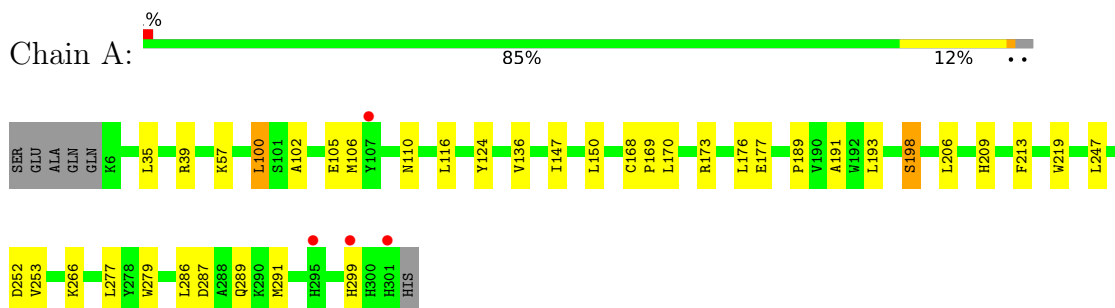
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	66	Total 66	O 66	0	0
9	B	31	Total 31	O 31	0	0
9	C	60	Total 60	O 60	0	0
9	D	49	Total 49	O 49	0	0

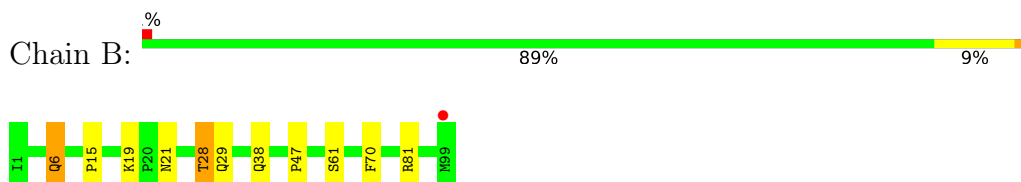
3 Residue-property plots

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 and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

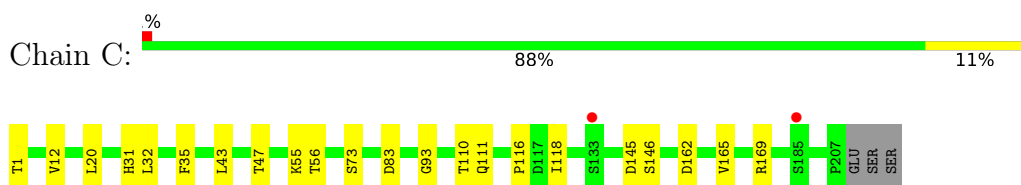
- Molecule 1: Antigen-presenting glycoprotein CD1d1



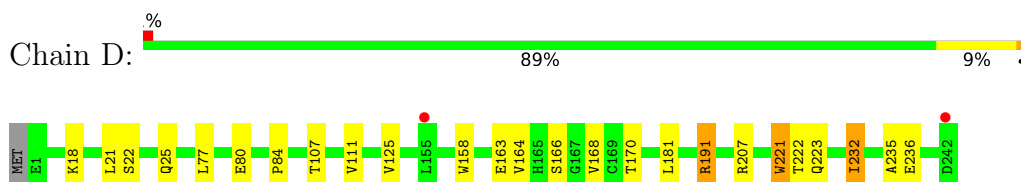
- Molecule 2: Beta-2-microglobulin



- Molecule 3: NKT Valpha14 (Mouse)-2C12 TCR, Human T-cell receptor sp3.4 alpha chain



- Molecule 4: NKT Vbeta8.2 (Mouse)-2C12 TCR, Human nkt tcr beta chain



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



NAG1
NAG2

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

Chain G:  100%

NAG1
NAG2

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

Chain F:  67% 33%

NAG1
NAG2
BMA3

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	58.57Å 80.92Å 243.35Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	33.97 – 2.40 76.79 – 2.40	Depositor EDS
% Data completeness (in resolution range)	99.9 (33.97-2.40) 99.9 (76.79-2.40)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.80 (at 2.40Å)	Xtriage
Refinement program	BUSTER 2.10.3	Depositor
R, R_{free}	0.184 , 0.227 0.197 , 0.241	Depositor DCC
R_{free} test set	2357 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å ²)	52.6	Xtriage
Anisotropy	0.584	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 49.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	6942	wwPDB-VP
Average B, all atoms (Å ²)	65.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.67% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, QOD, BMA, HP6

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	0.51	0/2435	0.67	0/3315
2	B	0.50	0/815	0.69	0/1113
3	C	0.53	0/1584	0.72	0/2157
4	D	0.51	0/1930	0.72	0/2633
All	All	0.51	0/6764	0.70	0/9218

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [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	2362	0	2223	15	0
2	B	789	0	741	6	0
3	C	1555	0	1482	6	0
4	D	1878	0	1772	10	0
5	E	28	0	25	0	0
5	G	28	0	25	0	0
6	F	39	0	34	0	0
7	A	50	0	0	0	0
8	A	7	0	16	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
9	A	66	0	0	0	0
9	B	31	0	0	0	0
9	C	60	0	0	0	0
9	D	49	0	0	0	0
All	All	6942	0	6318	36	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 (36) 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)
2:B:28:THR:HG23	2:B:29:GLN:HG2	1.60	0.83
3:C:20:LEU:HD12	3:C:110:THR:HG21	1.63	0.79
2:B:6:GLN:HB3	2:B:28:THR:HG22	1.86	0.57
1:A:191:ALA:HA	1:A:209:HIS:O	2.06	0.55
4:D:21:LEU:HD22	4:D:107:THR:HG21	1.89	0.53
4:D:207:ARG:HG3	4:D:236:GLU:HB3	1.90	0.53
1:A:219:TRP:HB3	1:A:266:LYS:HB2	1.89	0.53
2:B:38:GLN:HE21	2:B:81:ARG:HD2	1.76	0.50
1:A:124:TYR:CZ	1:A:136:VAL:HG11	2.45	0.50
1:A:189:PRO:HB3	1:A:213:PHE:HB3	1.94	0.50
1:A:102:ALA:HB2	1:A:116:LEU:HD13	1.93	0.49
4:D:125:VAL:HG13	4:D:235:ALA:HB3	1.94	0.49
1:A:168:CYS:HB3	1:A:169:PRO:HD3	1.95	0.49
1:A:106:MET:HG3	1:A:176:LEU:HD11	1.94	0.48
1:A:147:ILE:HD13	1:A:150:LEU:HD12	1.95	0.48
4:D:18:LYS:HG3	4:D:80:GLU:HA	1.96	0.48
3:C:32:LEU:HD13	3:C:73:SER:HB2	1.95	0.47
4:D:221:TRP:CZ3	4:D:223:GLN:HB2	2.51	0.46
1:A:193:LEU:HG	1:A:277:LEU:HD13	1.98	0.46
1:A:100:LEU:HD21	1:A:116:LEU:HD11	1.99	0.45
3:C:31:HIS:CE1	3:C:93:GLY:HA3	2.52	0.45
4:D:84:PRO:HA	4:D:111:VAL:HB	2.00	0.44
1:A:286:LEU:O	1:A:289:GLN:HG2	2.18	0.44
2:B:21:ASN:HB3	2:B:70:PHE:CE1	2.53	0.44
4:D:158:TRP:HA	4:D:163:GLU:HA	2.00	0.42
1:A:291:MET:HB3	2:B:15:PRO:O	2.20	0.42
2:B:29:GLN:HA	2:B:61:SER:HB2	2.01	0.42
3:C:116:PRO:HG2	3:C:165:VAL:HG21	2.00	0.42
1:A:206:LEU:HD13	1:A:253:VAL:HG22	2.00	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:47:THR:OG1	3:C:56:THR:HG21	2.19	0.42
3:C:35:PHE:CD1	3:C:43:LEU:HB3	2.55	0.41
4:D:168:VAL:HA	4:D:191:ARG:O	2.20	0.41
1:A:110:ASN:HA	1:A:173:ARG:HH22	1.85	0.41
4:D:221:TRP:CH2	4:D:223:GLN:HB2	2.56	0.41
1:A:198:SER:HB2	1:A:252:ASP:OD2	2.21	0.41
4:D:232:ILE:O	4:D:232:ILE:HG13	2.21	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	294/302 (97%)	287 (98%)	5 (2%)	2 (1%)	22	32
2	B	97/99 (98%)	95 (98%)	1 (1%)	1 (1%)	15	23
3	C	202/207 (98%)	192 (95%)	8 (4%)	2 (1%)	15	23
4	D	239/242 (99%)	231 (97%)	8 (3%)	0	100	100
All	All	832/850 (98%)	805 (97%)	22 (3%)	5 (1%)	25	36

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	279	TRP
1	A	299	HIS
3	C	169	ARG
3	C	118	ILE
2	B	47	PRO

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	252/264 (96%)	242 (96%)	10 (4%)	31	49
2	B	86/93 (92%)	83 (96%)	3 (4%)	36	55
3	C	178/186 (96%)	170 (96%)	8 (4%)	27	44
4	D	199/207 (96%)	188 (94%)	11 (6%)	21	35
All	All	715/750 (95%)	683 (96%)	32 (4%)	27	44

All (32) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	35	LEU
1	A	39	ARG
1	A	57	LYS
1	A	100	LEU
1	A	105	GLU
1	A	170	LEU
1	A	177	GLU
1	A	198	SER
1	A	247	LEU
1	A	287	ASP
2	B	6	GLN
2	B	19	LYS
2	B	28	THR
3	C	1	THR
3	C	12	VAL
3	C	55	LYS
3	C	83	ASP
3	C	111	GLN
3	C	145	ASP
3	C	146	SER
3	C	162	ASP
4	D	22	SER
4	D	25	GLN
4	D	77	LEU

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Mol	Chain	Res	Type
4	D	164	VAL
4	D	166	SER
4	D	170	THR
4	D	181	LEU
4	D	191	ARG
4	D	221	TRP
4	D	222	THR
4	D	232	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	38	GLN
3	C	30	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

7 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	5,1	14,14,15	0.32	0	17,19,21	0.84	1 (5%)
5	NAG	E	2	5	14,14,15	0.36	0	17,19,21	0.93	3 (17%)
6	NAG	F	1	6,1	14,14,15	0.28	0	17,19,21	0.63	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	NAG	F	2	6	14,14,15	0.28	0	17,19,21	1.05	2 (11%)
6	BMA	F	3	6	11,11,12	0.35	0	15,15,17	0.45	0
5	NAG	G	1	5,1	14,14,15	0.36	0	17,19,21	0.79	1 (5%)
5	NAG	G	2	5	14,14,15	0.39	0	17,19,21	0.94	2 (11%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	E	1	5,1	-	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	-	0/6/23/26	0/1/1/1
6	NAG	F	2	6	-	1/6/23/26	0/1/1/1
6	BMA	F	3	6	-	0/2/19/22	0/1/1/1
5	NAG	G	1	5,1	-	0/6/23/26	0/1/1/1
5	NAG	G	2	5	-	1/6/23/26	0/1/1/1

There are no bond length outliers.

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	F	2	NAG	O5-C1-C2	-3.36	105.99	111.29
5	E	1	NAG	C1-O5-C5	2.81	115.99	112.19
6	F	2	NAG	C1-O5-C5	2.52	115.61	112.19
5	G	2	NAG	C1-C2-N2	2.39	114.57	110.49
5	G	1	NAG	C1-O5-C5	2.36	115.39	112.19
5	G	2	NAG	C1-O5-C5	2.21	115.18	112.19
5	E	2	NAG	C2-N2-C7	2.16	125.98	122.90
5	E	2	NAG	C1-C2-N2	2.02	113.93	110.49
5	E	2	NAG	C1-O5-C5	2.01	114.92	112.19

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	E	2	NAG	C4-C5-C6-O6
5	G	2	NAG	O5-C5-C6-O6
5	E	2	NAG	O5-C5-C6-O6

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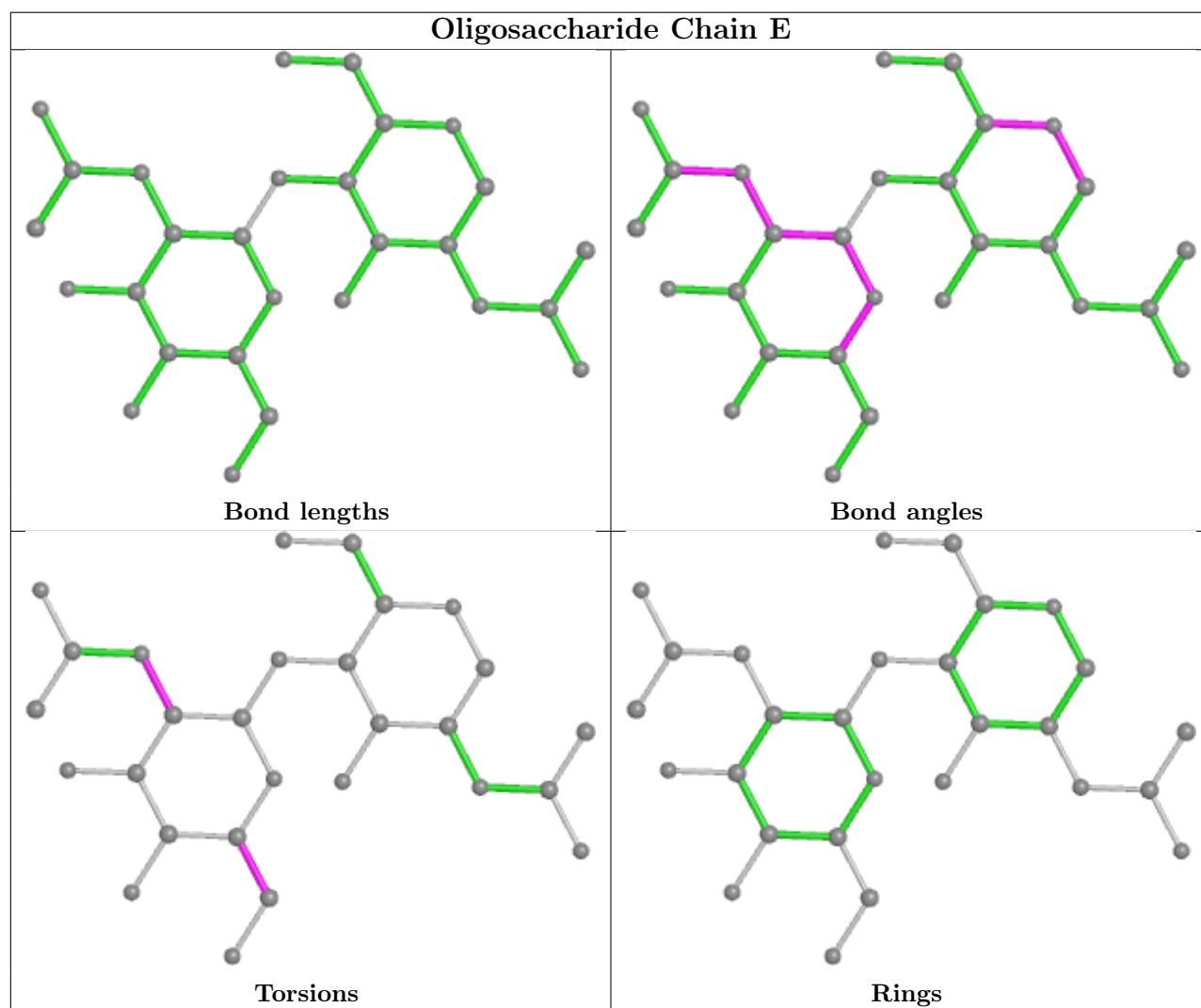
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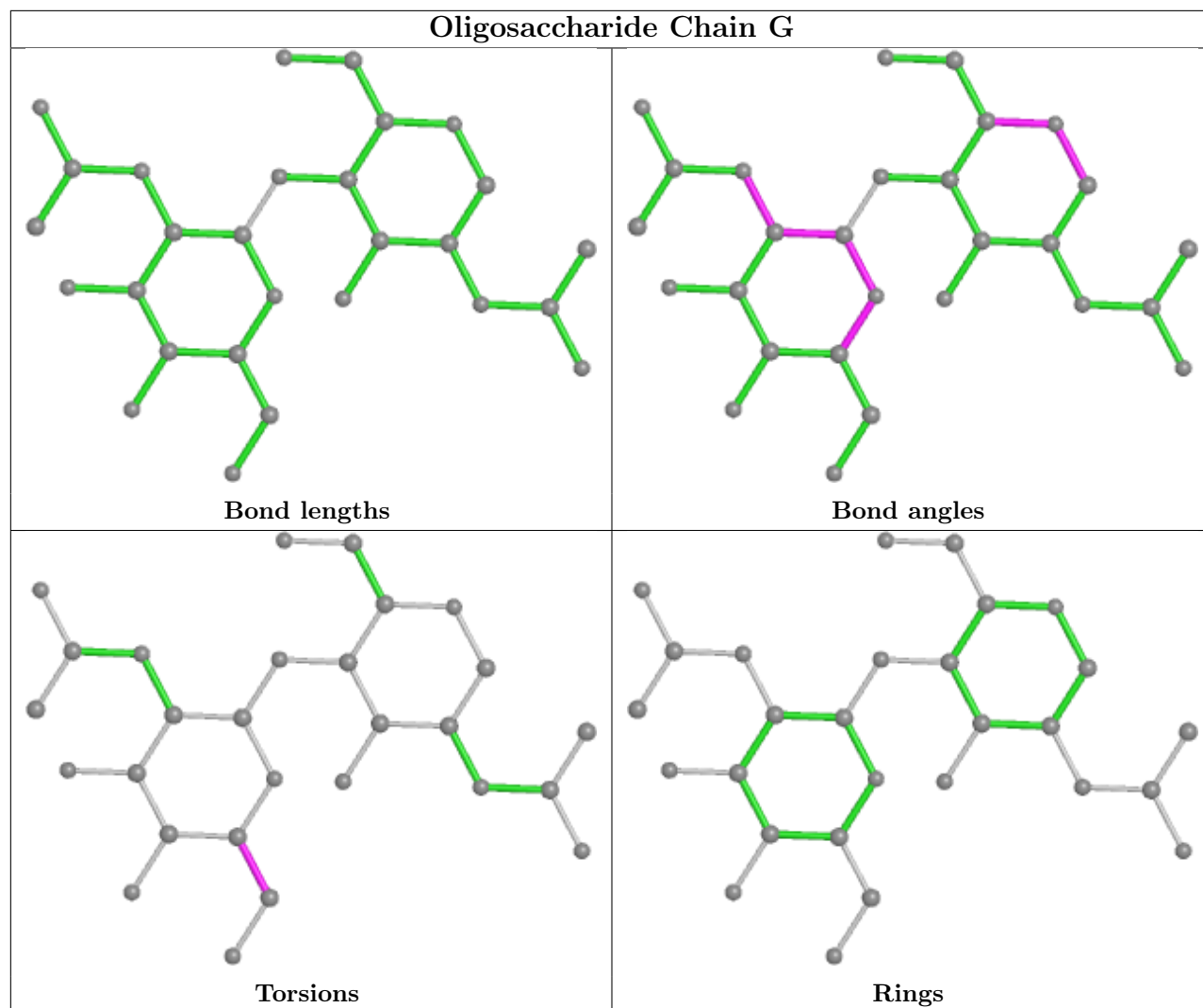
Mol	Chain	Res	Type	Atoms
5	E	2	NAG	C1-C2-N2-C7
5	E	2	NAG	C3-C2-N2-C7
6	F	2	NAG	O5-C5-C6-O6

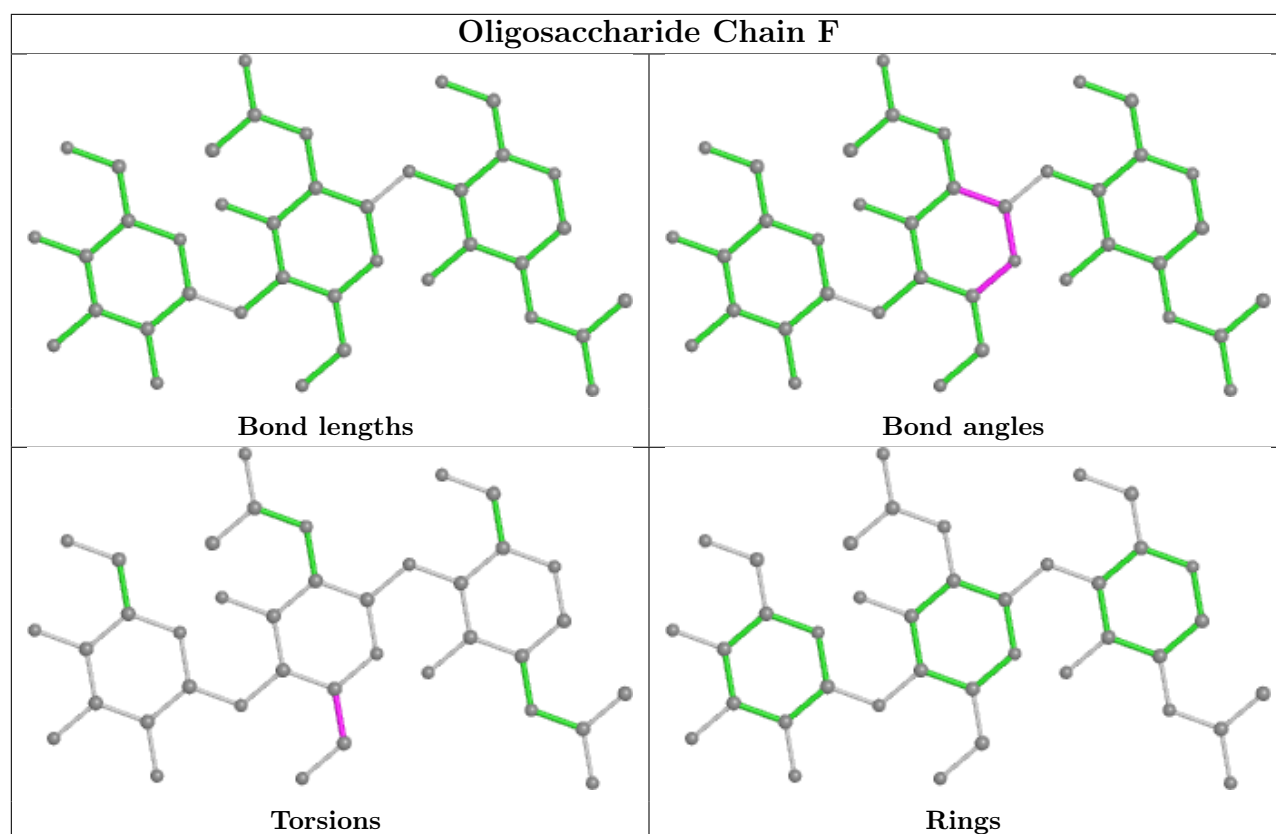
There are no ring outliers.

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](#)

2 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	$\# Z > 2$
8	HP6	A	402	-	6,6,6	0.47	0	5,5,5	0.56	0
7	QOD	A	401	-	50,50,50	0.62	0	56,60,60	1.07	3 (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
8	HP6	A	402	-	-	2/4/4/4	-
7	QOD	A	401	-	-	28/47/67/67	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	A	401	QOD	O5A-C5M-C6A	3.15	114.26	106.44
7	A	401	QOD	C5-C4-C3	-2.93	109.37	114.18
7	A	401	QOD	CAB-CAA-N2	-2.34	113.26	116.33

There are no chirality outliers.

All (30) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	401	QOD	C1-C2-C3-C4
7	A	401	QOD	C1-C2-C3-O3
7	A	401	QOD	N2-C2-C3-C4
7	A	401	QOD	N2-C2-C3-O3
7	A	401	QOD	O5A-C5M-C6A-O6A
7	A	401	QOD	C12-C18-C19-C20
7	A	401	QOD	CAE-CAF-CAG-CAH
7	A	401	QOD	C11-C12-C18-C19
7	A	401	QOD	CAJ-CAK-CAL-CAM
7	A	401	QOD	CAD-CAE-CAF-CAG
7	A	401	QOD	CAF-CAG-CAH-CAI
7	A	401	QOD	C18-C19-C20-C21
7	A	401	QOD	C16-C15-CAN-CAM
7	A	401	QOD	C18-C19-C20-C23
7	A	401	QOD	CAL-CAM-CAN-C15
8	A	402	HP6	C22-C23-C24-C25
8	A	402	HP6	C21-C22-C23-C24
7	A	401	QOD	C11-C10-C9-C8
7	A	401	QOD	C6-C7-C8-C9
7	A	401	QOD	C4A-C5M-C6A-O6A
7	A	401	QOD	C9-C10-C11-C12
7	A	401	QOD	C10-C11-C12-C18
7	A	401	QOD	C5-C6-C7-C8
7	A	401	QOD	CAI-CAJ-CAK-CAL
7	A	401	QOD	C3-C4-C5-C6
7	A	401	QOD	C4-C5-C6-C7
7	A	401	QOD	CAC-CAD-CAE-CAF

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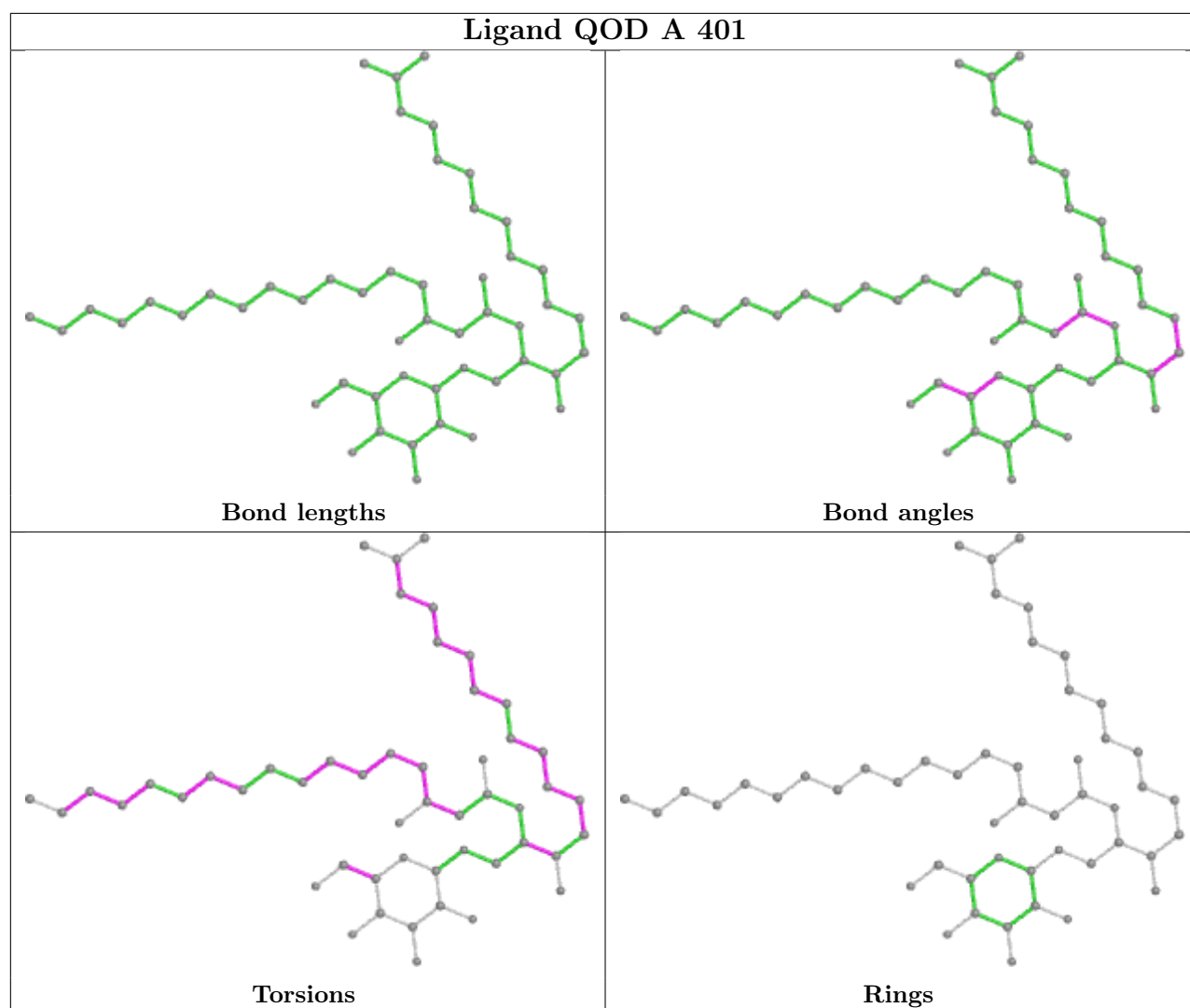
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Mol	Chain	Res	Type	Atoms
7	A	401	QOD	CAN-C15-C16-C17
7	A	401	QOD	O4-CAC-CAD-CAE
7	A	401	QOD	CAA-CAB-CAC-CAD

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 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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	296/302 (98%)	0.15	4 (1%) 75 73	39, 62, 96, 120	0
2	B	99/99 (100%)	-0.12	1 (1%) 82 80	47, 65, 92, 101	0
3	C	204/207 (98%)	-0.00	2 (0%) 82 80	34, 58, 84, 94	0
4	D	241/242 (99%)	0.05	2 (0%) 86 84	40, 64, 107, 130	0
All	All	840/850 (98%)	0.05	9 (1%) 80 79	34, 63, 95, 130	0

All (9) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	301	HIS	4.5
3	C	185	SER	4.4
4	D	242	ASP	4.1
1	A	299	HIS	2.5
2	B	99	MET	2.3
1	A	107	TYR	2.3
1	A	295	HIS	2.1
3	C	133	SER	2.1
4	D	155	LEU	2.1

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

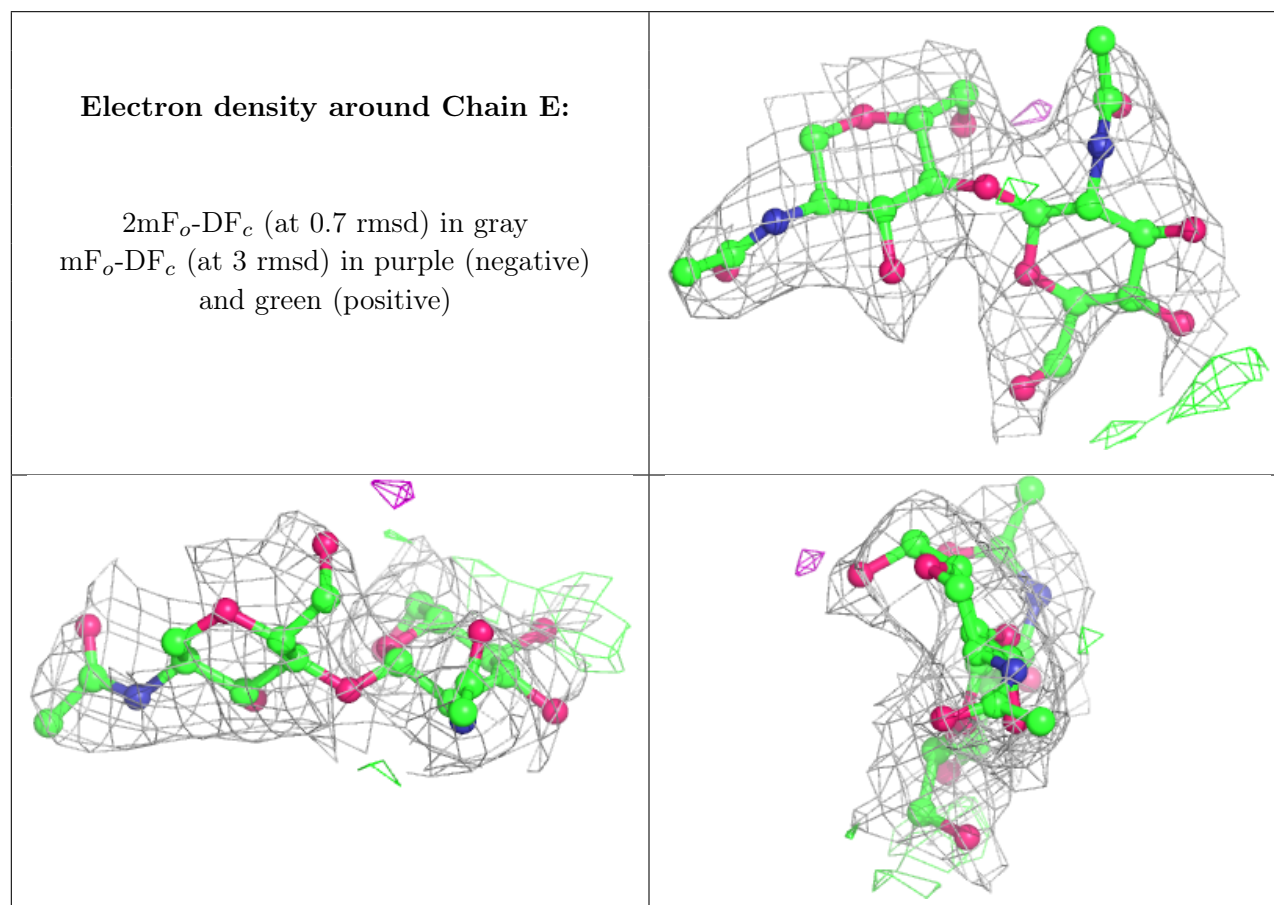
There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

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

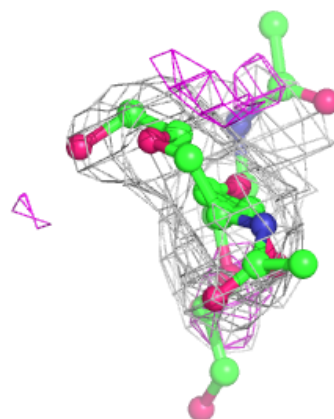
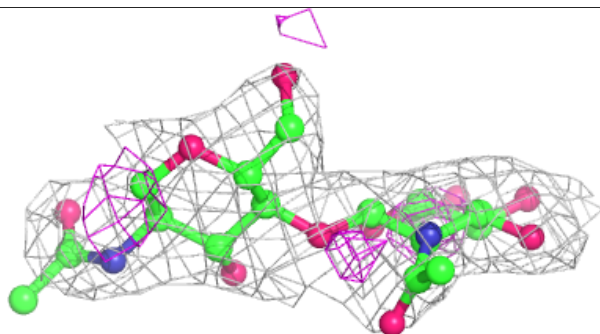
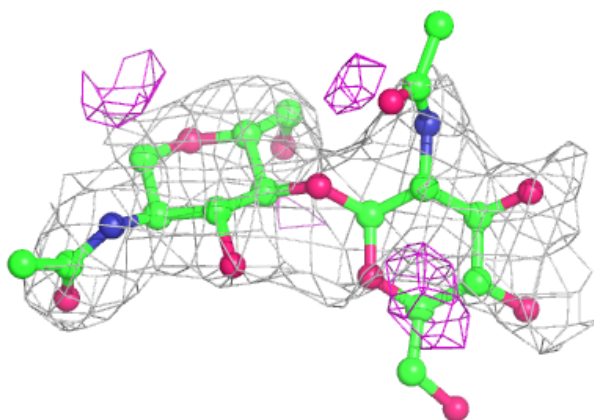
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
5	NAG	G	2	14/15	0.68	0.31	122,127,132,133	0
6	BMA	F	3	11/12	0.71	0.20	119,122,125,127	0
5	NAG	E	2	14/15	0.84	0.14	102,106,111,112	0
5	NAG	G	1	14/15	0.91	0.16	91,98,106,114	0
6	NAG	F	2	14/15	0.92	0.16	90,93,103,112	0
5	NAG	E	1	14/15	0.93	0.11	74,82,89,96	0
6	NAG	F	1	14/15	0.95	0.13	78,80,82,86	0

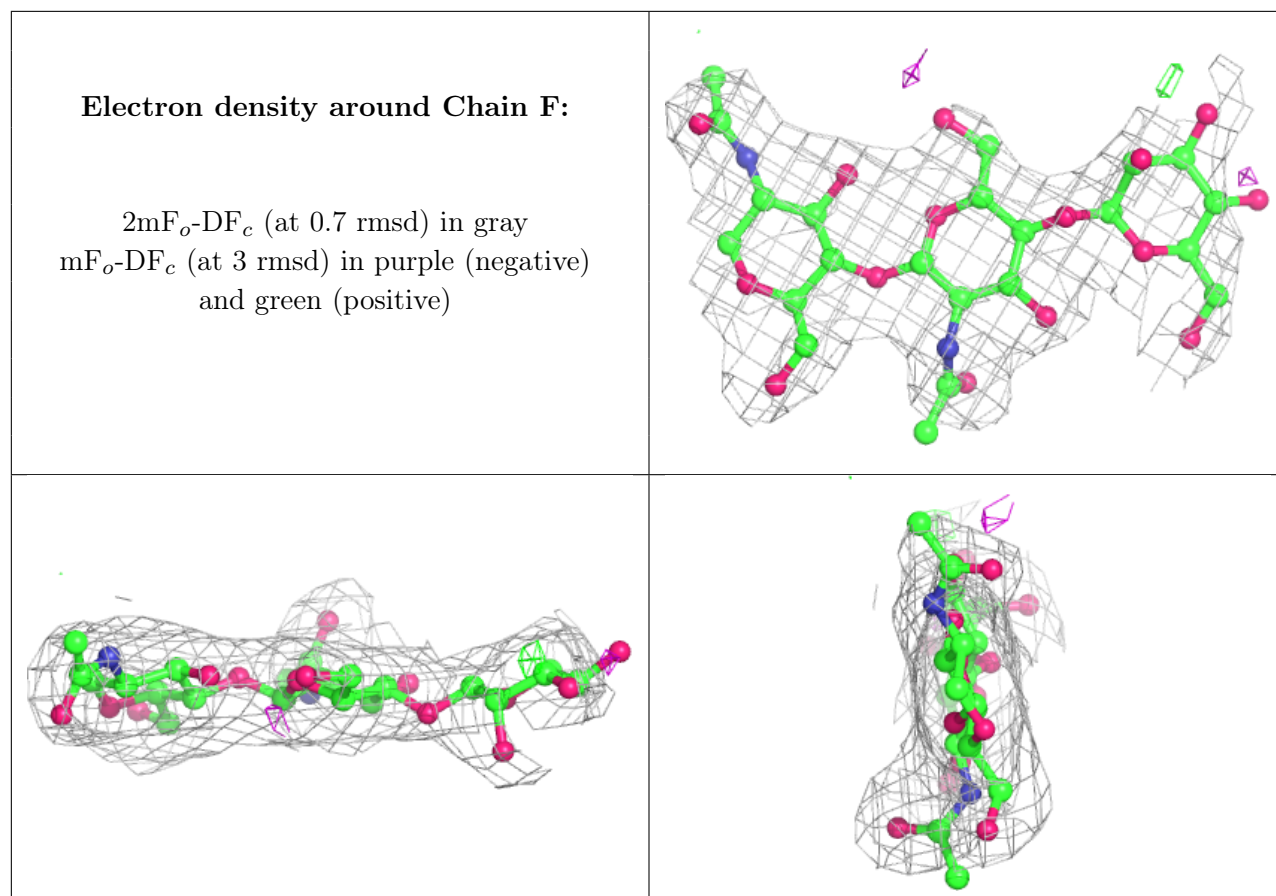
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.



Electron density around Chain G:

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





6.4 Ligands [i](#)

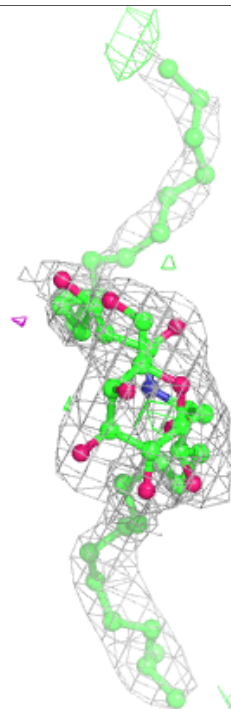
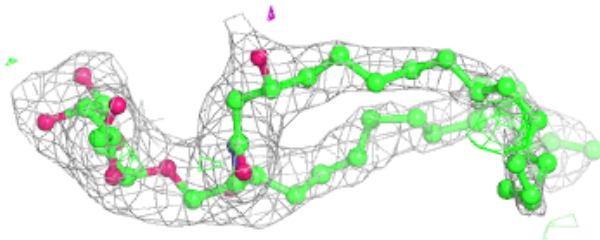
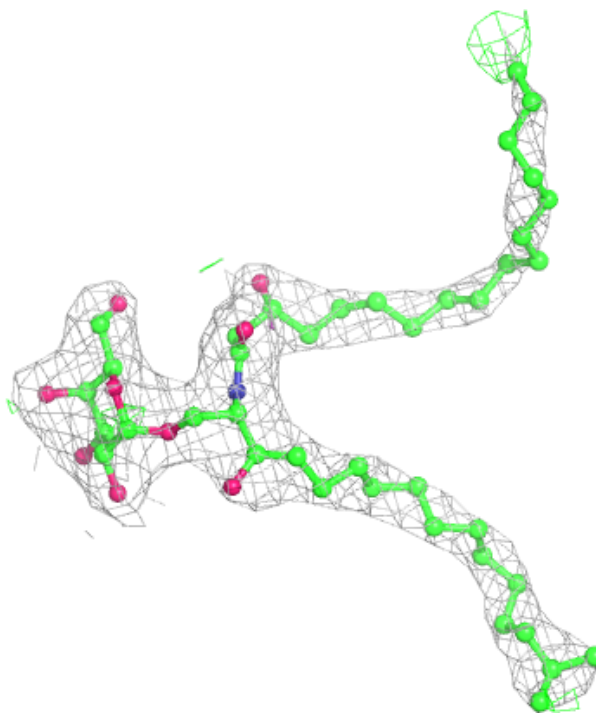
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q < 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
8	HP6	A	402	7/7	0.85	0.42	57,65,72,73	0
7	QOD	A	401	50/50	0.96	0.25	55,68,86,88	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around QOD A 401:

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



6.5 Other polymers [i](#)

There are no such residues in this entry.