



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 16, 2023 – 05:17 PM EDT

PDB ID : 1V2I
Title : Structure of the hemagglutinin-neuraminidase from human parainfluenza virus type III
Authors : Lawrence, M.C.; Borg, N.A.; Streltsov, V.A.; Pilling, P.A.; Epa, V.C.; Varghese, J.N.; McKimm-Breschkin, J.L.; Colman, P.M.
Deposited on : 2003-10-16
Resolution : 2.20 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

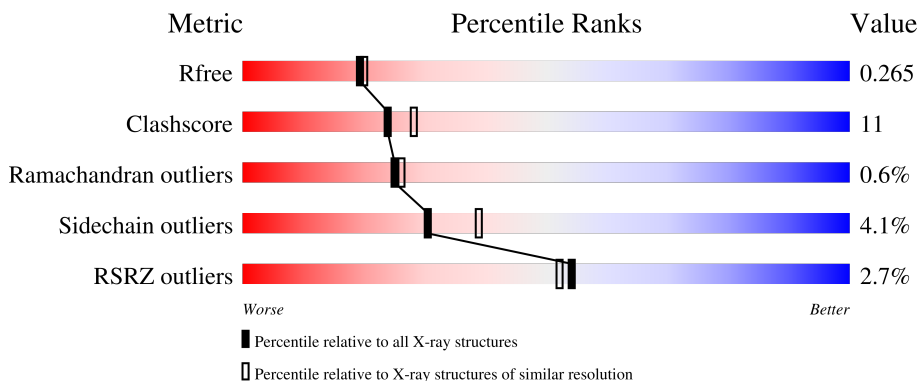
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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	4898 (2.20-2.20)
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)
RSRZ outliers	127900	4800 (2.20-2.20)

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	431	 2% 78% 19%
1	B	431	 3% 76% 22%
2	C	5	 20% 60% 20%
3	D	2	 50% 50%
3	E	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
4	NAG	A	3081	X	-	-	-

2 Entry composition i

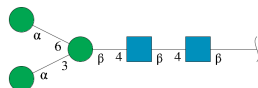
There are 7 unique types of molecules in this entry. The entry contains 7301 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 hemagglutinin-neuraminidase glycoprotein.

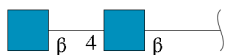
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	431	Total 3382	C 2142	N 581	O 639	S 20	0	1	0
1	B	431	Total 3376	C 2138	N 579	O 639	S 20	0	0	0

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



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

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



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

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C₈H₁₅NO₆).



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

- Molecule 5 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Ca		
5	A	1	1	1	0	0
5	B	1	1	1	0	0

- Molecule 6 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total O P 5 4 1	0	0
6	B	1	Total O P 5 4 1	0	0

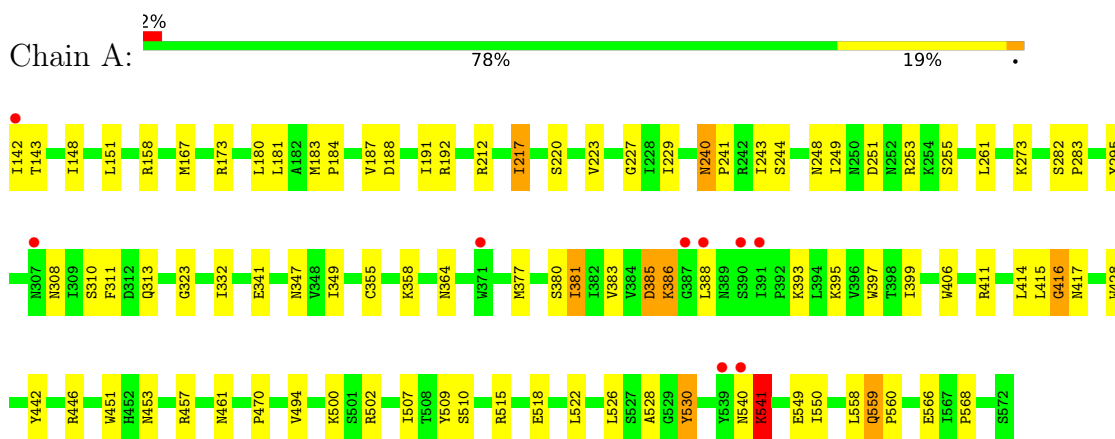
- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	172	Total O 172 172	0	0
7	B	200	Total O 200 200	0	0

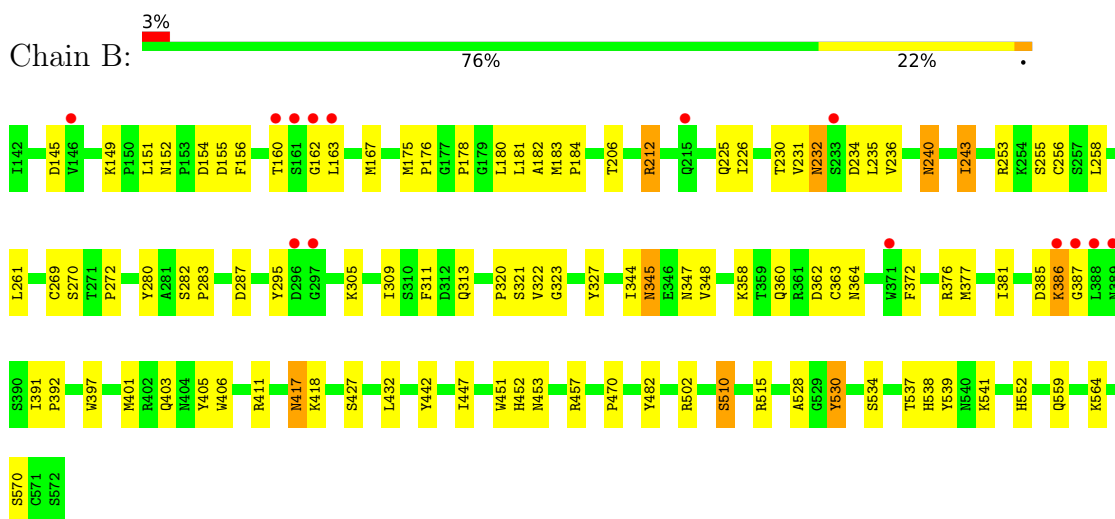
3 Residue-property plots

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: hemagglutinin-neuraminidase glycoprotein



- Molecule 1: hemagglutinin-neuraminidase glycoprotein



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





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

Chain D:  50% 50%



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

Chain E:  100%



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	83.50Å 93.78Å 105.20Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	18.30 – 2.20 18.30 – 2.20	Depositor EDS
% Data completeness (in resolution range)	94.5 (18.30-2.20) 94.4 (18.30-2.20)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	0.15	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.06 (at 2.21Å)	Xtrriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.185 , 0.259 0.192 , 0.265	Depositor DCC
R_{free} test set	4020 reflections (9.99%)	wwPDB-VP
Wilson B-factor (Å ²)	31.6	Xtrriage
Anisotropy	0.394	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 49.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	7301	wwPDB-VP
Average B, all atoms (Å ²)	34.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.71% 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: BMA, PO4, CA, MAN, NAG

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	0.52	0/3468	0.81	2/4730 (0.0%)
1	B	0.52	0/3457	0.82	0/4715
All	All	0.52	0/6925	0.81	2/9445 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	541	LYS	N-CA-C	-6.52	93.39	111.00
1	A	509	TYR	N-CA-C	-5.00	97.50	111.00

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	3382	0	3349	67	0
1	B	3376	0	3345	88	0
2	C	61	0	52	2	0
3	D	28	0	25	1	0
3	E	28	0	25	0	0
4	A	28	0	26	1	0
4	B	14	0	13	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	1	0	0	0	0
5	B	1	0	0	0	0
6	A	5	0	0	0	0
6	B	5	0	0	0	0
7	A	172	0	0	4	0
7	B	200	0	0	6	0
All	All	7301	0	6835	153	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 11.

All (153) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:417:ASN:HD22	1:B:417:ASN:H	1.15	0.92
1:B:510:SER:HB2	1:B:515:ARG:HA	1.57	0.87
1:B:417:ASN:H	1:B:417:ASN:ND2	1.77	0.81
1:A:142:ILE:HG13	1:A:143:THR:HG23	1.62	0.79
1:A:347:ASN:HD22	1:A:364:ASN:HD21	1.27	0.79
1:A:248:ASN:HB3	1:A:251:ASP:OD2	1.86	0.76
1:B:417:ASN:HD22	1:B:417:ASN:N	1.81	0.76
1:B:403:GLN:HE21	1:B:447:ILE:H	1.31	0.76
1:A:446:ARG:HH11	1:A:446:ARG:HB3	1.52	0.74
1:A:183:MET:HE2	1:B:181:LEU:H	1.52	0.74
1:A:358:LYS:HD2	1:A:470:PRO:HG2	1.72	0.71
1:B:175:MET:HE2	1:B:564:LYS:HB2	1.70	0.70
1:B:360:GLN:HE21	1:B:364:ASN:ND2	1.89	0.70
1:A:241:PRO:HG2	7:B:5308:HOH:O	1.91	0.70
1:A:386:LYS:N	1:A:386:LYS:HD3	2.07	0.69
1:A:310:SER:OG	1:A:395:LYS:HG2	1.93	0.69
1:B:182:ALA:H	1:B:225:GLN:HE22	1.41	0.69
1:B:360:GLN:HE21	1:B:364:ASN:HD21	1.39	0.69
1:A:446:ARG:HB3	1:A:446:ARG:NH1	2.06	0.68
1:A:217:ILE:H	1:A:217:ILE:HD13	1.60	0.67
1:B:231:VAL:CG1	1:B:235:LEU:HA	2.26	0.66
1:B:427:SER:HB3	7:B:5235:HOH:O	1.95	0.66
1:A:541:LYS:HE3	1:A:541:LYS:HA	1.79	0.65
1:B:231:VAL:HG13	1:B:235:LEU:HA	1.78	0.65
1:B:184:PRO:HD3	1:B:559:GLN:OE1	1.97	0.64
1:B:175:MET:HE2	1:B:564:LYS:CB	2.26	0.64
1:A:261:LEU:HB2	1:A:332:ILE:HD11	1.79	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:142:ILE:HG23	1:A:143:THR:H	1.62	0.63
1:B:212:ARG:O	1:B:212:ARG:HG3	2.01	0.61
1:A:212:ARG:HH11	1:A:212:ARG:HG2	1.66	0.61
1:B:231:VAL:HG11	1:B:235:LEU:HD23	1.81	0.61
1:B:451:TRP:CH2	1:B:453:ASN:HB2	2.36	0.61
1:B:149:LYS:HE3	7:B:5353:HOH:O	2.03	0.59
1:B:403:GLN:NE2	1:B:447:ILE:H	1.99	0.59
1:A:243:ILE:HD12	1:A:244:SER:H	1.68	0.59
1:A:323:GLY:HA3	1:A:411:ARG:HB3	1.85	0.59
1:A:349:ILE:HG13	7:A:5289:HOH:O	2.05	0.56
1:A:451:TRP:CZ2	2:C:2:NAG:H5	2.40	0.56
1:B:552:HIS:HE1	7:B:5384:HOH:O	1.88	0.55
1:B:226:ILE:HB	1:B:243:ILE:HD13	1.88	0.55
1:A:173:ARG:NH2	7:A:5329:HOH:O	2.38	0.55
1:A:180:LEU:HD23	1:B:182:ALA:HA	1.89	0.55
1:B:243:ILE:HD12	1:B:243:ILE:N	2.22	0.55
1:A:151:LEU:C	1:A:151:LEU:HD23	2.28	0.55
1:B:386:LYS:CG	1:B:387:GLY:N	2.69	0.55
1:B:386:LYS:HG2	1:B:387:GLY:N	2.21	0.54
1:A:142:ILE:HG23	1:A:143:THR:N	2.22	0.54
1:B:451:TRP:CZ2	1:B:453:ASN:HB2	2.43	0.54
1:A:515:ARG:HD2	1:A:518:GLU:OE1	2.07	0.53
1:A:428:TRP:CD2	1:A:470:PRO:HA	2.44	0.53
1:A:167:MET:HG2	1:A:568:PRO:O	2.10	0.52
1:A:510:SER:HB2	1:A:515:ARG:HA	1.91	0.52
1:B:167:MET:HG2	1:B:570:SER:HB2	1.91	0.52
1:B:162:GLY:C	1:B:163:LEU:HD22	2.30	0.52
1:B:226:ILE:HB	1:B:243:ILE:CD1	2.39	0.52
1:B:323:GLY:HA3	1:B:411:ARG:HB3	1.92	0.51
1:B:152:ASN:ND2	1:B:155:ASP:OD2	2.43	0.51
1:A:386:LYS:N	1:A:386:LYS:CD	2.72	0.50
1:B:175:MET:CE	1:B:564:LYS:HB2	2.40	0.50
1:A:148:ILE:HD13	1:A:229:ILE:HG22	1.94	0.50
1:B:358:LYS:HA	1:B:362:ASP:OD2	2.11	0.50
1:B:348:VAL:HG12	1:B:401:MET:HB3	1.94	0.50
1:A:530:TYR:C	1:A:530:TYR:CD2	2.85	0.50
1:B:386:LYS:CG	1:B:387:GLY:H	2.24	0.49
1:B:417:ASN:ND2	1:B:417:ASN:N	2.46	0.49
1:A:451:TRP:CH2	1:A:453:ASN:HB2	2.47	0.49
4:A:3081:NAG:H83	4:A:3081:NAG:O3	2.13	0.49
1:B:372:PHE:HA	7:B:5267:HOH:O	2.11	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:377:MET:HG3	1:B:406:TRP:CZ2	2.47	0.49
1:B:232:ASN:ND2	1:B:236:VAL:H	2.10	0.49
1:B:385:ASP:O	1:B:392:PRO:HA	2.13	0.49
1:B:386:LYS:HB2	1:B:392:PRO:HB3	1.95	0.49
1:B:311:PHE:HB3	1:B:313:GLN:O	2.13	0.48
1:A:192:ARG:HH11	1:A:192:ARG:HG3	1.77	0.48
1:A:347:ASN:ND2	1:A:364:ASN:HD21	2.02	0.48
1:B:432:LEU:HD23	1:B:452:HIS:CD2	2.49	0.48
1:B:502:ARG:HB3	1:B:528:ALA:O	2.14	0.48
1:B:397:TRP:CD2	1:B:442:TYR:HB3	2.49	0.47
1:B:269:CYS:HA	1:B:320:PRO:HG2	1.96	0.47
1:B:377:MET:HG3	1:B:406:TRP:CE2	2.49	0.47
1:A:383:VAL:HG12	1:A:385:ASP:OD1	2.15	0.47
1:B:255:SER:O	1:B:320:PRO:HB2	2.15	0.47
1:A:184:PRO:HG3	1:A:191:ILE:HG13	1.97	0.47
1:A:526:LEU:HD11	1:A:550:ILE:HG23	1.97	0.47
1:B:261:LEU:HG	1:B:327:TYR:CE1	2.50	0.47
1:B:537:THR:HA	1:B:541:LYS:O	2.15	0.47
1:B:538:HIS:O	1:B:539:TYR:HB2	2.15	0.47
1:B:232:ASN:HD21	1:B:236:VAL:HB	1.79	0.46
1:A:377:MET:HG3	1:A:406:TRP:CZ2	2.51	0.46
1:B:321:SER:O	1:B:322:VAL:HB	2.15	0.46
1:B:151:LEU:HD11	1:B:156:PHE:CD2	2.51	0.46
1:A:283:PRO:HB3	1:A:341:GLU:CD	2.35	0.45
1:A:381:ILE:CD1	1:A:399:ILE:HD11	2.47	0.45
1:A:393:LYS:HG2	7:A:5265:HOH:O	2.16	0.45
1:B:151:LEU:HD23	1:B:151:LEU:C	2.38	0.45
1:A:223:VAL:HG21	1:B:178:PRO:HB3	1.99	0.45
1:A:515:ARG:CD	1:A:518:GLU:OE1	2.64	0.45
1:A:181:LEU:H	1:B:183:MET:CE	2.29	0.45
1:A:397:TRP:CD2	1:A:442:TYR:HB3	2.52	0.45
1:B:391:ILE:HG23	1:B:392:PRO:HD2	1.98	0.45
1:B:175:MET:HG3	1:B:564:LYS:O	2.17	0.44
1:A:415:LEU:O	1:A:416:GLY:C	2.55	0.44
1:A:428:TRP:CG	1:A:470:PRO:HA	2.52	0.44
1:A:451:TRP:CZ2	1:A:453:ASN:HB2	2.53	0.44
1:A:502:ARG:HB3	1:A:528:ALA:O	2.17	0.44
1:B:154:ASP:OD1	1:B:418:LYS:NZ	2.50	0.44
1:B:280:TYR:CD1	1:B:372:PHE:HD2	2.36	0.44
1:B:482:TYR:CD1	1:B:534:SER:HA	2.52	0.44
2:C:1:NAG:O6	2:C:2:NAG:H82	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:145:ASP:OD1	1:B:230:THR:HG22	2.18	0.44
1:A:323:GLY:HA2	7:A:5260:HOH:O	2.17	0.44
1:B:256:CYS:O	1:B:322:VAL:HA	2.18	0.44
1:A:227:GLY:HA3	1:A:240:ASN:O	2.18	0.43
1:B:391:ILE:HD12	1:B:391:ILE:N	2.32	0.43
1:B:167:MET:CG	1:B:570:SER:HB2	2.48	0.43
1:B:182:ALA:H	1:B:225:GLN:NE2	2.14	0.43
1:B:348:VAL:HG22	1:B:364:ASN:HD22	1.82	0.43
1:B:530:TYR:CD2	1:B:530:TYR:C	2.92	0.43
1:B:405:TYR:O	1:B:406:TRP:C	2.57	0.43
1:B:376:ARG:HB3	1:B:401:MET:HE2	2.01	0.43
1:B:381:ILE:HD13	1:B:381:ILE:HA	1.88	0.43
1:A:217:ILE:HG12	1:A:217:ILE:O	2.18	0.43
1:A:273:LYS:HA	1:A:273:LYS:HD3	1.76	0.42
1:B:287:ASP:OD1	1:B:305:LYS:HD2	2.19	0.42
1:A:549:GLU:OE2	1:A:560:PRO:HG3	2.20	0.42
1:B:344:ILE:HG22	1:B:345:ASN:N	2.34	0.42
1:A:251:ASP:OD2	1:A:253:ARG:NH1	2.51	0.42
1:B:391:ILE:HG23	1:B:392:PRO:CD	2.49	0.42
1:A:220:SER:O	1:A:249:ILE:HA	2.20	0.42
1:B:282:SER:HA	1:B:283:PRO:HD3	1.95	0.42
1:B:287:ASP:CG	1:B:305:LYS:HD2	2.40	0.42
1:A:192:ARG:HG3	1:A:192:ARG:NH1	2.35	0.42
1:A:355:CYS:HB3	1:A:358:LYS:HG3	2.01	0.42
1:A:243:ILE:HD12	1:B:240:ASN:ND2	2.34	0.41
1:A:282:SER:HA	1:A:283:PRO:HD3	1.91	0.41
1:A:559:GLN:HA	1:A:560:PRO:HD3	1.75	0.41
3:D:1:NAG:H61	3:D:2:NAG:C8	2.50	0.41
1:A:311:PHE:HB3	1:A:313:GLN:O	2.20	0.41
1:B:253:ARG:HG3	7:B:5314:HOH:O	2.19	0.41
1:A:541:LYS:HE2	1:A:566:GLU:OE1	2.19	0.41
1:A:212:ARG:HG2	1:A:212:ARG:NH1	2.34	0.41
1:B:163:LEU:HD22	1:B:163:LEU:N	2.36	0.41
1:A:187:VAL:O	1:A:188:ASP:HB2	2.21	0.41
1:B:176:PRO:O	1:B:236:VAL:HG11	2.20	0.41
1:B:270:SER:OG	1:B:272:PRO:HD3	2.20	0.41
1:B:344:ILE:CG2	1:B:345:ASN:N	2.84	0.41
1:B:347:ASN:HA	1:B:364:ASN:HD21	1.86	0.41
1:A:446:ARG:HH11	1:A:446:ARG:CB	2.29	0.41
1:B:206:THR:HB	1:B:258:LEU:HD11	2.03	0.41
1:B:309:ILE:HB	1:B:311:PHE:CE1	2.56	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:494:VAL:HG22	1:A:507:ILE:HG12	2.03	0.40
1:B:363:CYS:SG	1:B:470:PRO:HG3	2.61	0.40
1:A:243:ILE:CD1	1:A:244:SER:H	2.34	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	430/431 (100%)	394 (92%)	33 (8%)	3 (1%)	22	22
1	B	429/431 (100%)	396 (92%)	31 (7%)	2 (0%)	29	31
All	All	859/862 (100%)	790 (92%)	64 (8%)	5 (1%)	25	26

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	386	LYS
1	B	234	ASP
1	A	416	GLY
1	A	522	LEU
1	A	540	ASN

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	391/390 (100%)	371 (95%)	20 (5%)	24	29
1	B	390/390 (100%)	378 (97%)	12 (3%)	40	51
All	All	781/780 (100%)	749 (96%)	32 (4%)	30	39

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

Mol	Chain	Res	Type
1	A	158	ARG
1	A	217	ILE
1	A	240	ASN
1	A	255	SER
1	A	295	TYR
1	A	308	ASN
1	A	380	SER
1	A	381	ILE
1	A	385	ASP
1	A	386	LYS
1	A	388	LEU
1	A	414	LEU
1	A	417	ASN
1	A	457	ARG
1	A	461	ASN
1	A	500	LYS
1	A	530	TYR
1	A	541	LYS
1	A	558	LEU
1	A	559	GLN
1	B	160	THR
1	B	180	LEU
1	B	212	ARG
1	B	232	ASN
1	B	240	ASN
1	B	243	ILE
1	B	295	TYR
1	B	345	ASN
1	B	417	ASN
1	B	457	ARG
1	B	510	SER
1	B	530	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	240	ASN
1	A	250	ASN
1	A	262	ASN
1	A	347	ASN
1	A	461	ASN
1	A	504	ASN
1	A	540	ASN
1	B	225	GLN
1	B	232	ASN
1	B	240	ASN
1	B	313	GLN
1	B	345	ASN
1	B	347	ASN
1	B	364	ASN
1	B	403	GLN
1	B	417	ASN
1	B	504	ASN
1	B	552	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](#)

9 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	NAG	C	1	1,2	14,14,15	0.54	0	17,19,21	0.82	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	NAG	C	2	2	14,14,15	0.55	0	17,19,21	0.75	1 (5%)
2	BMA	C	3	2	11,11,12	0.53	0	15,15,17	0.76	0
2	MAN	C	4	2	11,11,12	0.45	0	15,15,17	0.67	1 (6%)
2	MAN	C	5	2	11,11,12	0.70	0	15,15,17	0.87	1 (6%)
3	NAG	D	1	1,3	14,14,15	0.57	0	17,19,21	0.74	1 (5%)
3	NAG	D	2	3	14,14,15	0.55	0	17,19,21	0.69	0
3	NAG	E	1	1,3	14,14,15	0.71	0	17,19,21	1.07	1 (5%)
3	NAG	E	2	3	14,14,15	0.57	0	17,19,21	0.99	1 (5%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	C	1	1,2	-	4/6/23/26	0/1/1/1
2	NAG	C	2	2	-	1/6/23/26	0/1/1/1
2	BMA	C	3	2	-	0/2/19/22	0/1/1/1
2	MAN	C	4	2	-	0/2/19/22	0/1/1/1
2	MAN	C	5	2	-	0/2/19/22	0/1/1/1
3	NAG	D	1	1,3	-	2/6/23/26	0/1/1/1
3	NAG	D	2	3	-	3/6/23/26	0/1/1/1
3	NAG	E	1	1,3	-	4/6/23/26	0/1/1/1
3	NAG	E	2	3	-	4/6/23/26	0/1/1/1

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	5	MAN	C1-O5-C5	2.74	115.91	112.19
3	E	2	NAG	C2-N2-C7	-2.58	119.23	122.90
3	E	1	NAG	C3-C4-C5	2.55	114.78	110.24
2	C	4	MAN	C1-O5-C5	2.20	115.17	112.19
3	D	1	NAG	C2-N2-C7	-2.13	119.88	122.90
2	C	2	NAG	C2-N2-C7	-2.01	120.04	122.90

There are no chirality outliers.

All (18) torsion outliers are listed below:

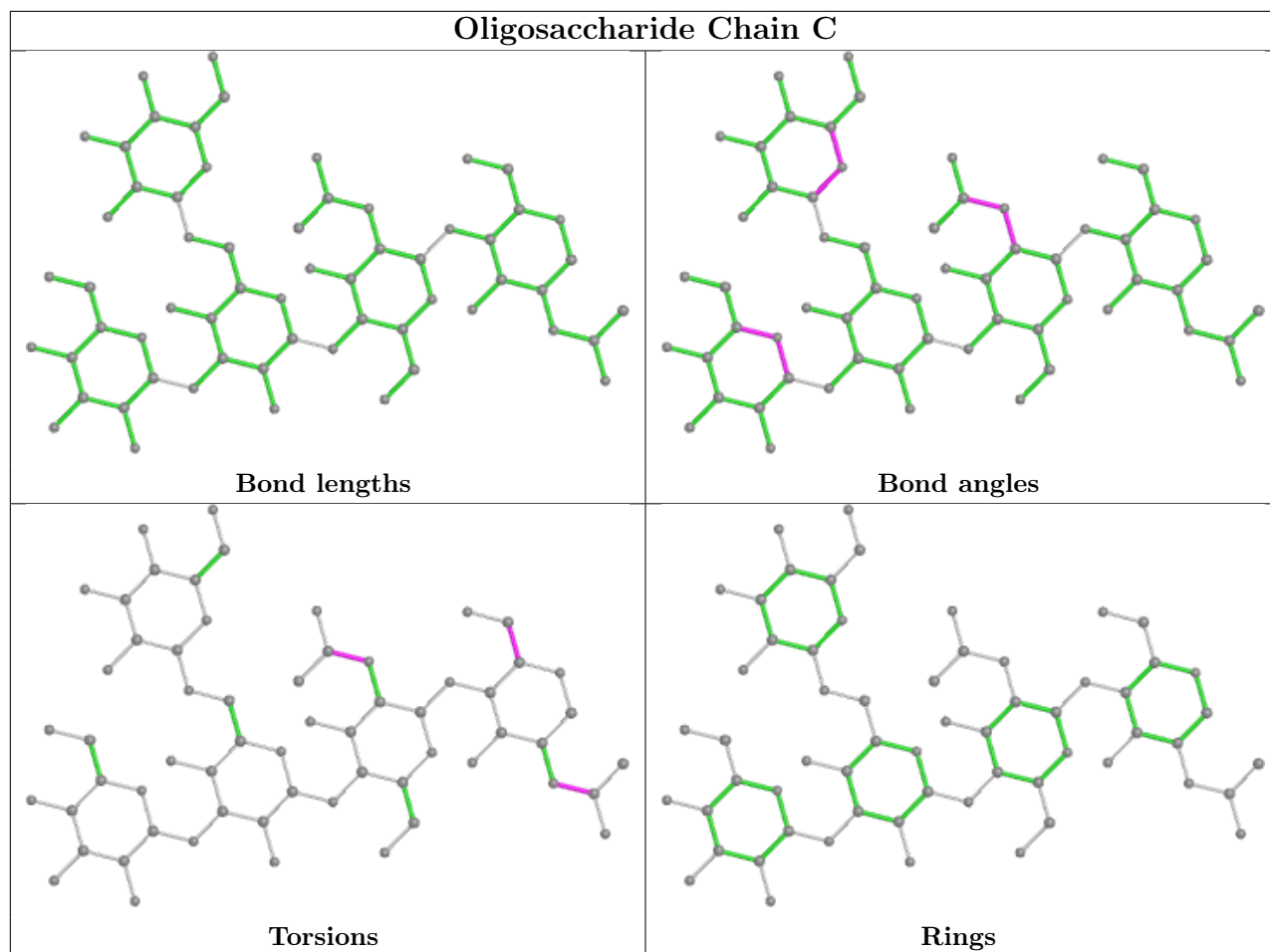
Mol	Chain	Res	Type	Atoms
3	D	1	NAG	C8-C7-N2-C2
3	D	1	NAG	O7-C7-N2-C2
3	E	2	NAG	C8-C7-N2-C2
3	E	2	NAG	O7-C7-N2-C2
3	E	1	NAG	C8-C7-N2-C2
3	E	1	NAG	O7-C7-N2-C2
2	C	1	NAG	O5-C5-C6-O6
3	E	1	NAG	O5-C5-C6-O6
3	E	1	NAG	C4-C5-C6-O6
2	C	1	NAG	C4-C5-C6-O6
3	D	2	NAG	C8-C7-N2-C2
3	D	2	NAG	O5-C5-C6-O6
2	C	1	NAG	C8-C7-N2-C2
3	D	2	NAG	O7-C7-N2-C2
2	C	1	NAG	O7-C7-N2-C2
3	E	2	NAG	C4-C5-C6-O6
3	E	2	NAG	O5-C5-C6-O6
2	C	2	NAG	C8-C7-N2-C2

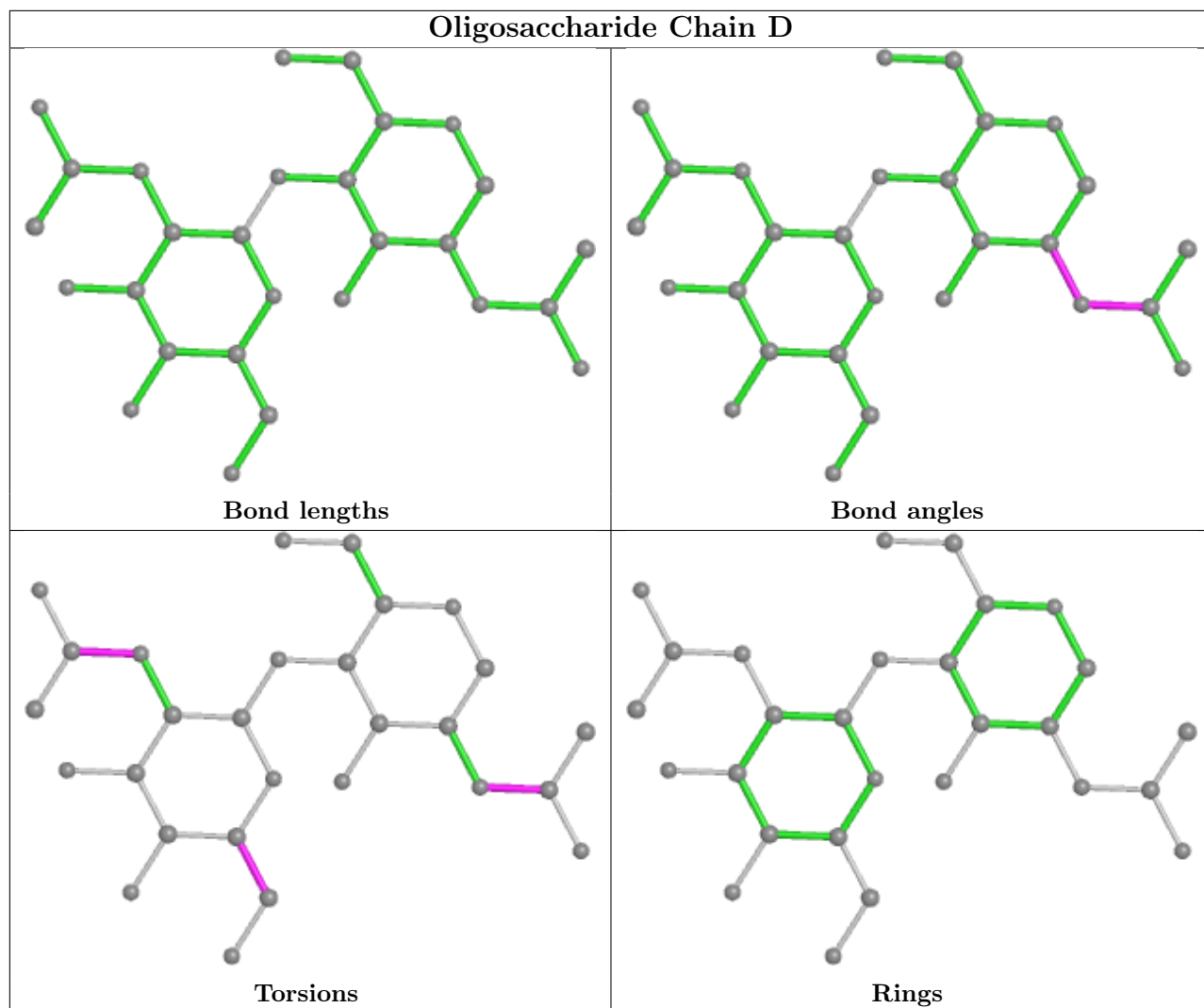
There are no ring outliers.

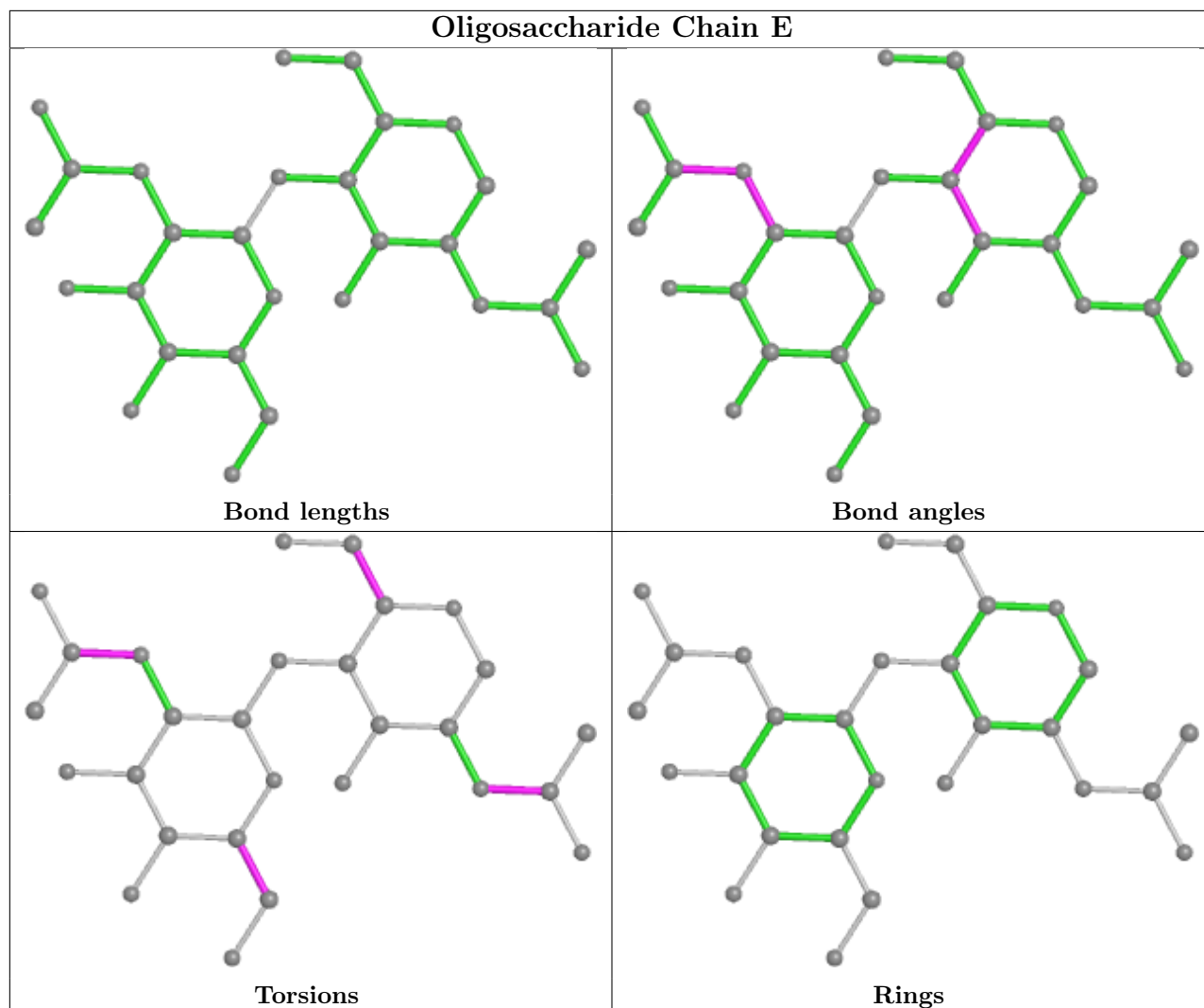
4 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	2	NAG	1	0
2	C	1	NAG	1	0
3	D	1	NAG	1	0
2	C	2	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 7 ligands modelled in this entry, 2 are monoatomic - leaving 5 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	$\# Z > 2$
4	NAG	A	3081	1	14,14,15	0.70	0	17,19,21	0.87	0
6	PO4	A	2001	-	4,4,4	1.58	0	6,6,6	0.50	0
4	NAG	B	3081	1	14,14,15	0.63	0	17,19,21	0.89	2 (11%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	NAG	A	5231	1	14,14,15	0.69	0	17,19,21	0.76	0
6	PO4	B	2002	-	4,4,4	1.49	1 (25%)	6,6,6	0.43	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
4	NAG	B	3081	1	-	2/6/23/26	0/1/1/1
4	NAG	A	3081	1	1/1/5/7	2/6/23/26	0/1/1/1
4	NAG	A	5231	1	-	2/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	2002	PO4	P-O3	-2.03	1.48	1.54

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	3081	NAG	C2-N2-C7	-2.06	119.97	122.90
4	B	3081	NAG	C4-C3-C2	-2.01	108.07	111.02

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
4	A	3081	NAG	C1

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	3081	NAG	C8-C7-N2-C2
4	A	3081	NAG	O7-C7-N2-C2
4	B	3081	NAG	O5-C5-C6-O6
4	A	5231	NAG	C8-C7-N2-C2
4	B	3081	NAG	C4-C5-C6-O6
4	A	5231	NAG	O7-C7-N2-C2

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	3081	NAG	1	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	431/431 (100%)	-0.31	9 (2%) 63 61	16, 29, 53, 85	0
1	B	431/431 (100%)	-0.22	14 (3%) 47 45	18, 31, 60, 99	1 (0%)
All	All	862/862 (100%)	-0.26	23 (2%) 54 52	16, 30, 56, 99	1 (0%)

All (23) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	388	LEU	8.3
1	B	388	LEU	7.7
1	B	389	ASN	6.4
1	B	387	GLY	5.2
1	B	163	LEU	4.4
1	B	161	SER	3.7
1	A	391	ILE	3.6
1	B	160	THR	3.6
1	A	371	TRP	3.6
1	B	215	GLN	3.5
1	B	233	SER	3.3
1	B	371	TRP	3.3
1	A	387	GLY	3.3
1	A	390	SER	2.9
1	B	146	VAL	2.7
1	B	162	GLY	2.6
1	B	386	LYS	2.6
1	A	307	ASN	2.6
1	B	296	ASP	2.4
1	A	540	ASN	2.3
1	B	297	GLY	2.2
1	A	142	ILE	2.2
1	A	539	TYR	2.0

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

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

6.3 Carbohydrates [i](#)

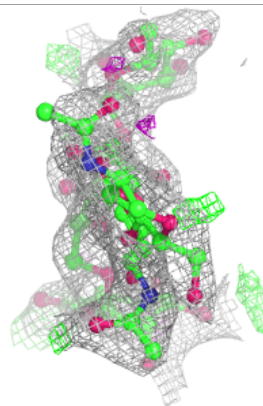
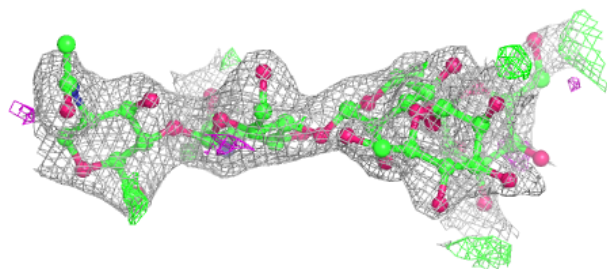
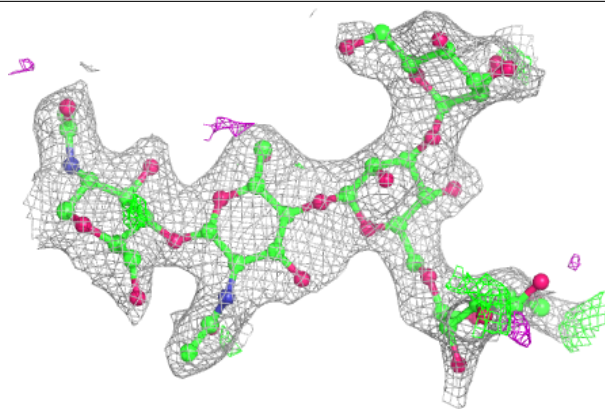
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q<0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	NAG	E	1	14/15	0.64	0.24	54,61,68,72	0
2	MAN	C	5	11/12	0.65	0.36	70,73,75,76	0
3	NAG	E	2	14/15	0.80	0.44	83,87,88,89	0
3	NAG	D	2	14/15	0.82	0.17	60,63,67,68	0
3	NAG	D	1	14/15	0.85	0.19	57,60,64,65	0
2	BMA	C	3	11/12	0.87	0.11	48,52,57,67	0
2	NAG	C	2	14/15	0.91	0.12	41,51,56,59	0
2	MAN	C	4	11/12	0.92	0.21	54,58,60,61	0
2	NAG	C	1	14/15	0.94	0.11	45,50,54,57	0

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

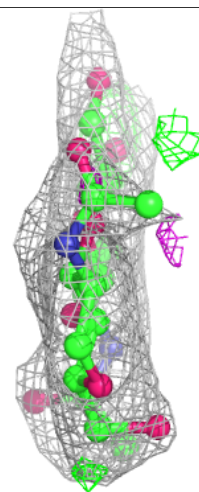
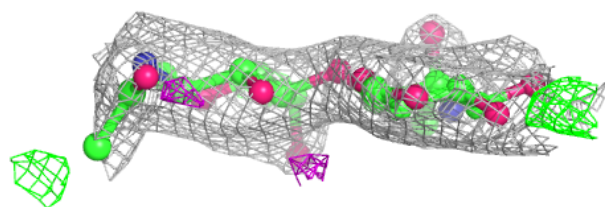
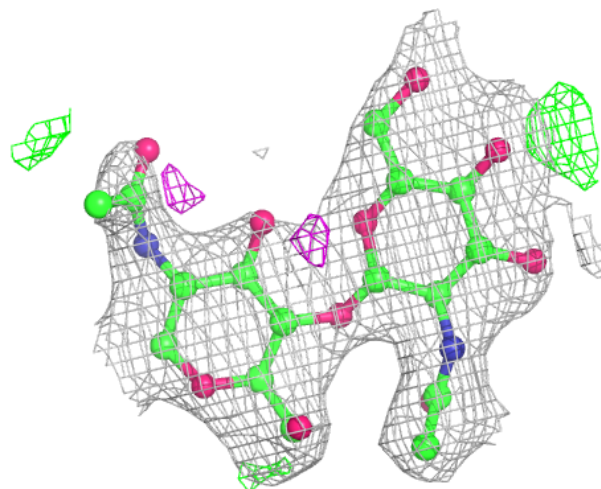
Electron density around Chain C:

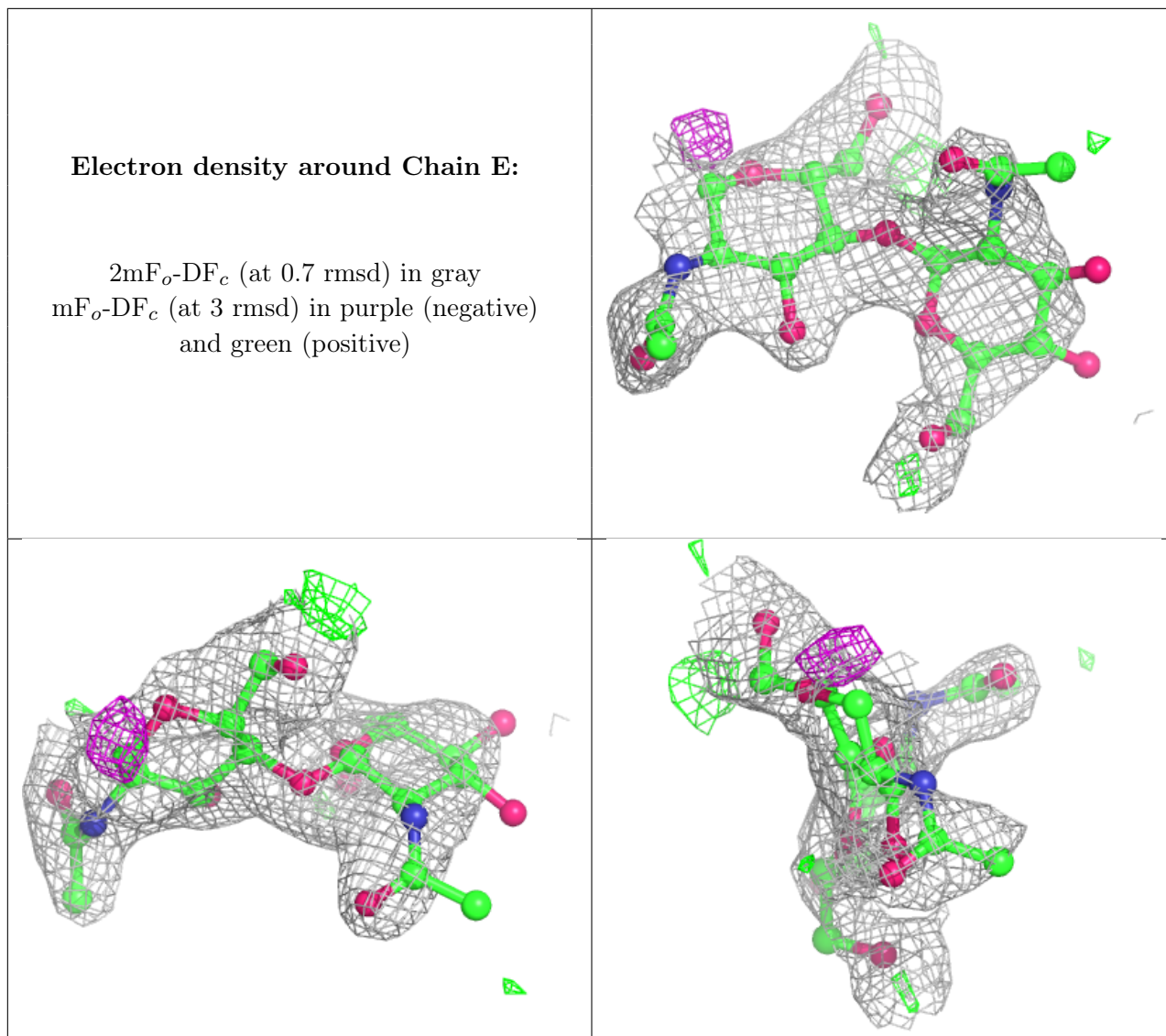
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain D:

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





6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	NAG	A	3081	14/15	0.79	0.31	73,77,79,80	0
4	NAG	A	5231	14/15	0.82	0.22	59,67,73,73	0
4	NAG	B	3081	14/15	0.90	0.20	49,52,60,65	0
5	CA	A	1001	1/1	0.97	0.04	27,27,27,27	0
6	PO4	A	2001	5/5	0.98	0.07	35,41,42,44	0
6	PO4	B	2002	5/5	0.98	0.11	28,30,40,43	0
5	CA	B	1002	1/1	0.99	0.05	28,28,28,28	0

6.5 Other polymers [i](#)

There are no such residues in this entry.