wwPDB X-ray Structure Validation Summary Report (i)

Jun 19, 2024 – 04:57 AM EDT

PDB ID	:	4KW1
Title	:	Structure of a/egypt/n03072/2010 h5 ha
Authors	:	Shore, D.A.; Yang, H.; Carney, P.J.; Chang, J.C.; Stevens, J.
Deposited on	:	2013-05-23
Resolution	:	2.50 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 (i) 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 (i)) were used in the production of this report:

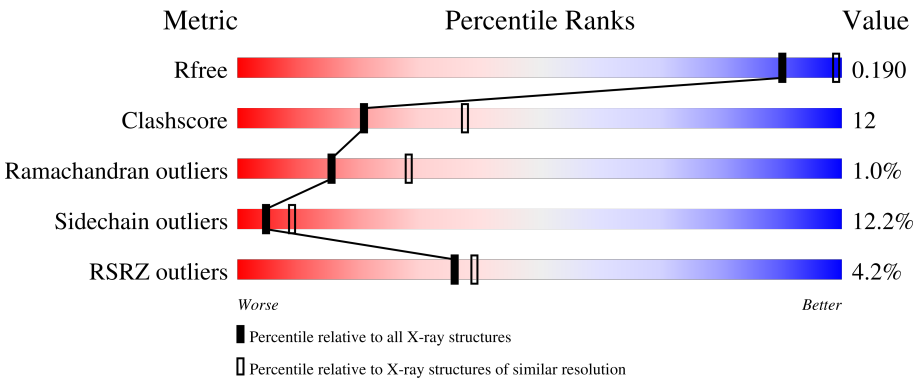
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.37.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance (i)

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))
R_{free}	130704	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (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 <=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	329	5%; 71%; 21%; 5%; •
1	C	329	5%; 67%; 22%; 5%; •; 5%
1	E	329	4%; 63%; 23%; 5%; 9%
1	G	329	4%; 60%; 26%; 7%; •; 6%
2	B	181	%; 68%; 20%; •; 9%

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Mol	Chain	Length	Quality of chain
2	D	181	%, 70%, 13%, 6%, 11%
2	F	181	6%, 71%, 14%, •, 10%
2	H	181	4%, 70%, 18%, •, 9%
3	I	5	60%, 40%
3	K	5	40%, 60%
4	J	2	100%
4	L	2	100%
4	M	2	100%
4	N	2	100%
4	O	2	100%
4	P	2	50%, 50%

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	J	1	-	-	X	-
4	NAG	N	2	-	-	-	X
4	NAG	O	2	-	-	-	X
5	NAG	A	408	X	-	-	X
5	NAG	E	405	X	-	-	-
6	PO4	A	409	-	X	-	-
6	PO4	F	201	-	-	-	X

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 15700 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.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	321	2549	1604	445	486	14	0	0	0
1	C	314	2496	1572	434	476	14	0	1	0
1	E	301	2395	1509	418	456	12	0	0	0
1	G	310	2466	1555	429	469	13	0	0	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	ALA	-	expression tag	UNP G1JUF7
A	-2	ASP	-	expression tag	UNP G1JUF7
A	-1	PRO	-	expression tag	UNP G1JUF7
A	0	GLY	-	expression tag	UNP G1JUF7
C	-3	ALA	-	expression tag	UNP G1JUF7
C	-2	ASP	-	expression tag	UNP G1JUF7
C	-1	PRO	-	expression tag	UNP G1JUF7
C	0	GLY	-	expression tag	UNP G1JUF7
E	-3	ALA	-	expression tag	UNP G1JUF7
E	-2	ASP	-	expression tag	UNP G1JUF7
E	-1	PRO	-	expression tag	UNP G1JUF7
E	0	GLY	-	expression tag	UNP G1JUF7
G	-3	ALA	-	expression tag	UNP G1JUF7
G	-2	ASP	-	expression tag	UNP G1JUF7
G	-1	PRO	-	expression tag	UNP G1JUF7
G	0	GLY	-	expression tag	UNP G1JUF7

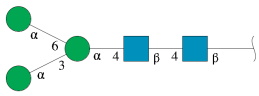
- Molecule 2 is a protein called Hemagglutinin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	165	1352	833	238	273	8	0	0	0
2	D	161	1318	813	233	264	8	0	0	0
2	F	162	1316	809	234	265	8	0	0	0
2	H	165	1347	830	238	271	8	0	0	0

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	175	SER	GLY	conflict	UNP G1JUF7
B	176	GLY	VAL	conflict	UNP G1JUF7
B	177	ARG	LYS	conflict	UNP G1JUF7
B	179	VAL	-	expression tag	UNP G1JUF7
B	180	PRO	-	expression tag	UNP G1JUF7
B	181	ARG	-	expression tag	UNP G1JUF7
D	175	SER	GLY	conflict	UNP G1JUF7
D	176	GLY	VAL	conflict	UNP G1JUF7
D	177	ARG	LYS	conflict	UNP G1JUF7
D	179	VAL	-	expression tag	UNP G1JUF7
D	180	PRO	-	expression tag	UNP G1JUF7
D	181	ARG	-	expression tag	UNP G1JUF7
F	175	SER	GLY	conflict	UNP G1JUF7
F	176	GLY	VAL	conflict	UNP G1JUF7
F	177	ARG	LYS	conflict	UNP G1JUF7
F	179	VAL	-	expression tag	UNP G1JUF7
F	180	PRO	-	expression tag	UNP G1JUF7
F	181	ARG	-	expression tag	UNP G1JUF7
H	175	SER	GLY	conflict	UNP G1JUF7
H	176	GLY	VAL	conflict	UNP G1JUF7
H	177	ARG	LYS	conflict	UNP G1JUF7
H	179	VAL	-	expression tag	UNP G1JUF7
H	180	PRO	-	expression tag	UNP G1JUF7
H	181	ARG	-	expression tag	UNP G1JUF7

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

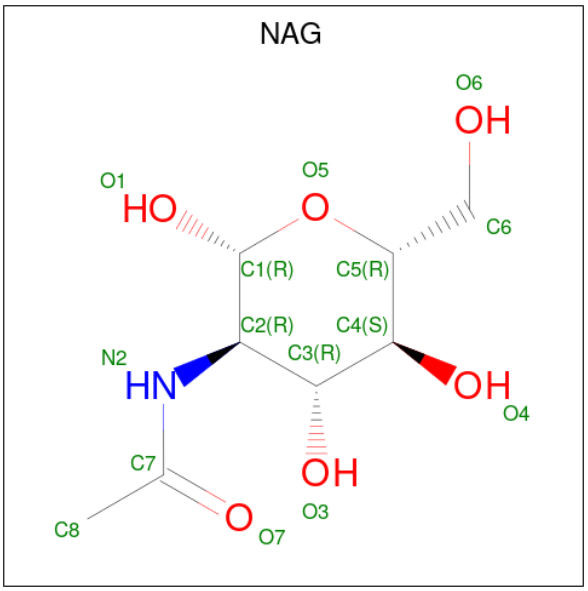


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	I	5	61	34	2	25	0	0	0
3	K	5	61	34	2	25	0	0	0

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

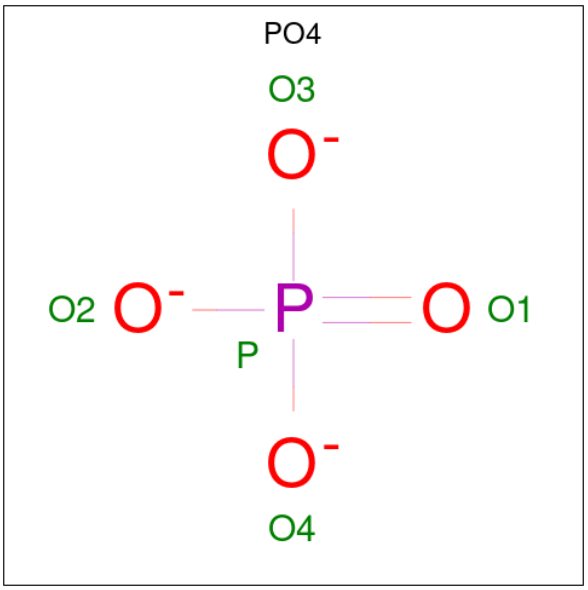
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
4	J	2	28	16	2	10	0	0	0
4	L	2	28	16	2	10	0	0	0
4	M	2	28	16	2	10	0	0	0
4	N	2	28	16	2	10	0	0	0
4	O	2	28	16	2	10	0	0	0
4	P	2	28	16	2	10	0	0	0

- Molecule 5 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		
5	A	1	14	8	1	5	0	0
5	C	1	14	8	1	5	0	0
5	E	1	14	8	1	5	0	0
5	G	1	14	8	1	5	0	0

- Molecule 6 is PHOSPHATE ION (three-letter code: PO4) (formula: O_4P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	P		
6	A	1	5	4	1	0	0
6	B	1	5	4	1	0	0
6	C	1	5	4	1	0	0
6	D	1	5	4	1	0	0
6	E	1	5	4	1	0	0
6	F	1	5	4	1	0	0
6	G	1	5	4	1	0	0
6	H	1	5	4	1	0	0

- Molecule 7 is water.

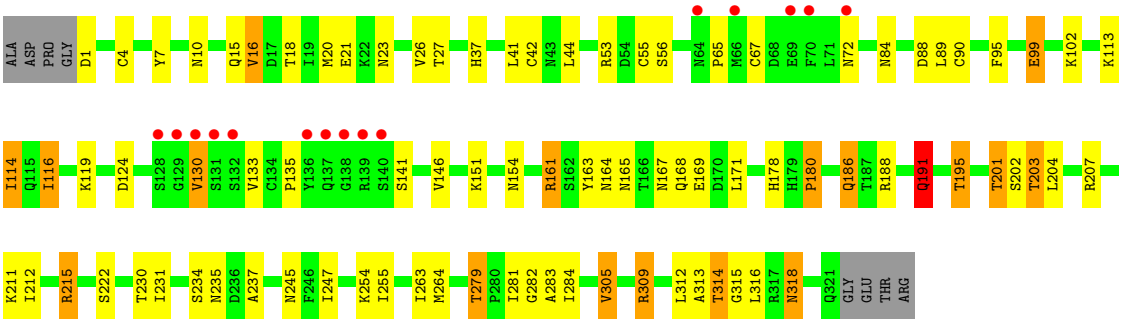
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	A	19	19	19	0	0
7	B	4	4	4	0	0
7	C	17	17	17	0	0
7	D	10	10	10	0	0
7	E	8	8	8	0	0
7	F	4	4	4	0	0
7	G	8	8	8	0	0
7	H	5	5	5	0	0

3 Residue-property plots (i)

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.

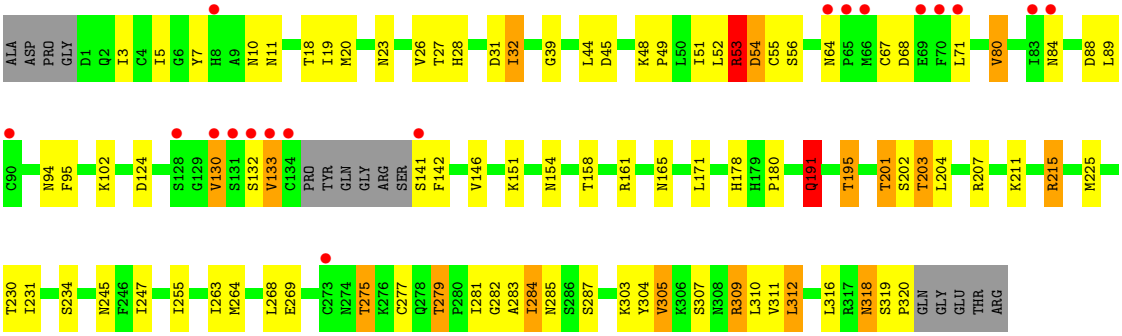
• Molecule 1: Hemagglutinin

Chain A:



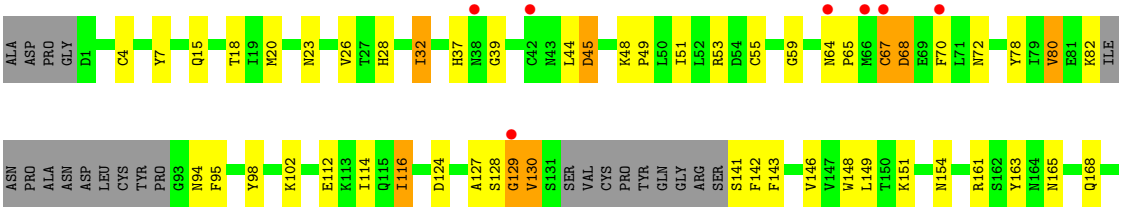
• Molecule 1: Hemagglutinin

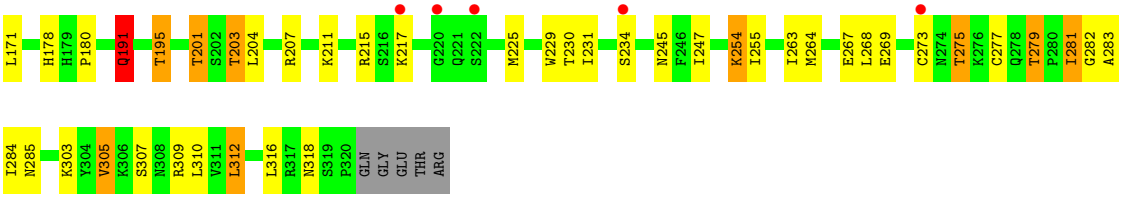
Chain C:



• Molecule 1: Hemagglutinin

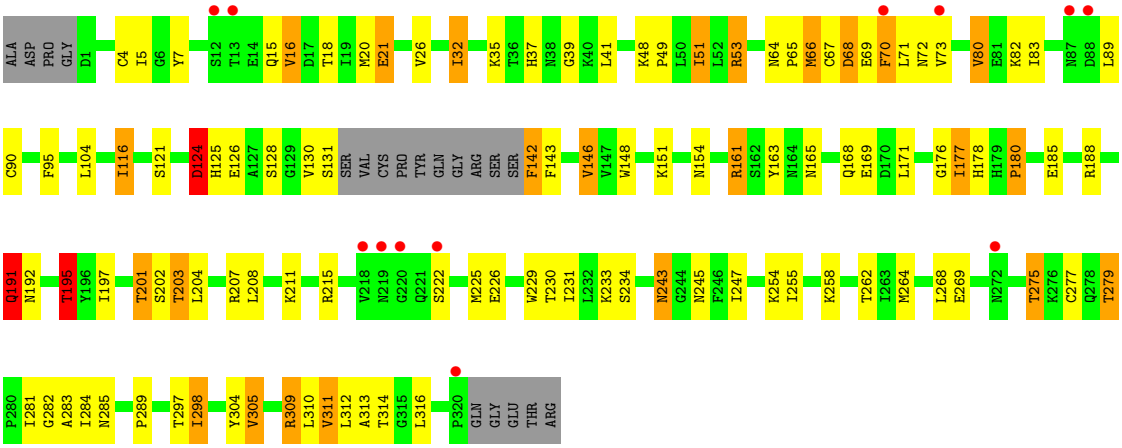
Chain E:





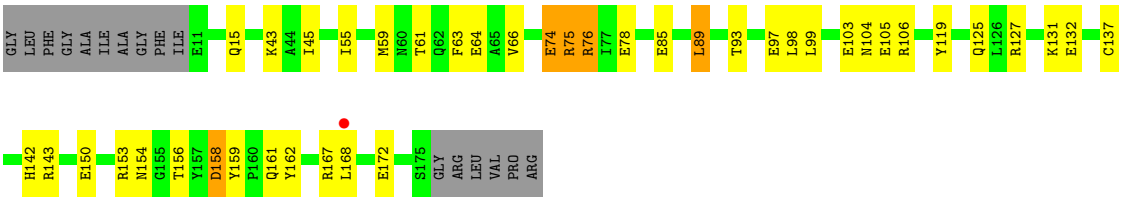
• Molecule 1: Hemagglutinin

Chain G:



• Molecule 2: Hemagglutinin

Chain B:

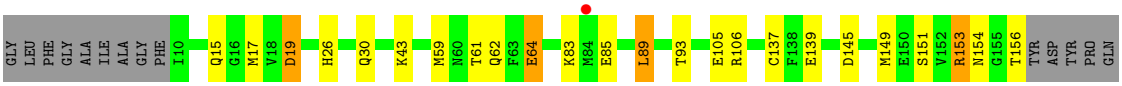


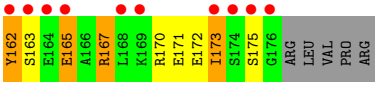
• Molecule 2: Hemagglutinin

Chain D:

• Molecule 2: Hemagglutinin

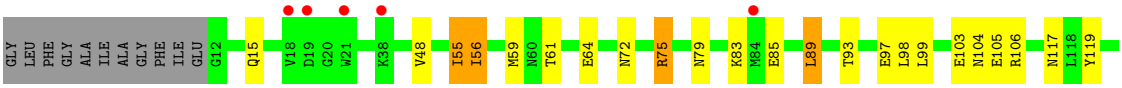
Chain F:

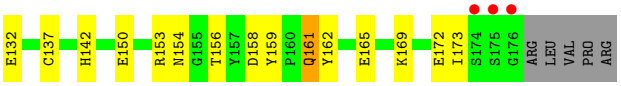




• Molecule 2: Hemagglutinin

Chain H:





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

Chain I:

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

Chain K:

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

Chain J:

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

Chain L:

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

Chain M: 100%

NAG1
NAG2

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

Chain N: 100%

NAG1
NAG2

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

Chain O: 100%

NAG1
NAG2

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

Chain P: 50% 50%

NAG1
NAG2

4 Data and refinement statistics (i)

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, α, β, γ	98.07Å 98.07Å 655.02Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	44.73 – 2.50 44.73 – 2.50	Depositor EDS
% Data completeness (in resolution range)	99.6 (44.73-2.50) 99.6 (44.73-2.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.08	Depositor
$< I/\sigma(I) >$ [1]	3.55 (at 2.51Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.193 , 0.227 0.167 , 0.190	Depositor DCC
R_{free} test set	4025 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å^2)	49.9	Xtriage
Anisotropy	0.094	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.38 , 48.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.53$, $< L^2 > = 0.37$	Xtriage
Estimated twinning fraction	0.276 for -h-k,k,-l	Xtriage
Reported twinning fraction	0.893 for H, K, L 0.107 for K, H, -L	Depositor
Outliers	0 of 80759 reflections	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	15700	wwPDB-VP
Average B, all atoms (Å^2)	57.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 44.54 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.5042e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ 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, PO4, MAN

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	1.00	2/2609 (0.1%)	0.92	3/3545 (0.1%)
1	C	1.00	0/2556	0.93	4/3472 (0.1%)
1	E	0.91	0/2448	0.90	2/3320 (0.1%)
1	G	0.93	2/2523 (0.1%)	0.89	1/3427 (0.0%)
2	B	0.99	1/1377 (0.1%)	0.87	3/1851 (0.2%)
2	D	0.98	0/1340	0.90	5/1798 (0.3%)
2	F	0.81	0/1337	0.85	3/1793 (0.2%)
2	H	0.87	0/1372	0.84	2/1844 (0.1%)
All	All	0.95	5/15562 (0.0%)	0.90	23/21050 (0.1%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	C	0	1
1	G	0	1
All	All	0	2

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	G	195	THR	CB-CG2	-5.68	1.33	1.52
1	A	235	ASN	N-CA	5.56	1.57	1.46
1	G	124	ASP	CB-CG	5.51	1.63	1.51
1	A	42	CYS	CB-SG	-5.35	1.73	1.81
2	B	172	GLU	CG-CD	5.13	1.59	1.51

The worst 5 of 23 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	188	ARG	NE-CZ-NH1	7.47	124.04	120.30
2	B	76	ARG	NE-CZ-NH1	7.32	123.96	120.30
1	C	264	MET	CG-SD-CE	-6.95	89.09	100.20
2	F	19	ASP	CB-CG-OD2	6.87	124.48	118.30
2	D	76	ARG	NE-CZ-NH2	6.79	123.69	120.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	319	SER	Peptide
1	G	285	ASN	Peptide

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2549	0	2485	64	0
1	C	2496	0	2436	64	0
1	E	2395	0	2342	76	0
1	G	2466	0	2409	92	0
2	B	1352	0	1251	27	1
2	D	1318	0	1228	25	0
2	F	1316	0	1227	19	0
2	H	1347	0	1248	27	0
3	I	61	0	52	1	0
3	K	61	0	52	2	0
4	J	28	0	25	8	0
4	L	28	0	25	3	0
4	M	28	0	25	1	0
4	N	28	0	25	0	0
4	O	28	0	25	0	0
4	P	28	0	25	3	0
5	A	14	0	13	0	0
5	C	14	0	13	6	0
5	E	14	0	13	0	0
5	G	14	0	13	0	0
6	A	5	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	5	0	0	1	0
6	C	5	0	0	1	0
6	D	5	0	0	0	0
6	E	5	0	0	0	0
6	F	5	0	0	0	0
6	G	5	0	0	0	0
6	H	5	0	0	1	0
7	A	19	0	0	6	0
7	B	4	0	0	1	0
7	C	17	0	0	3	0
7	D	10	0	0	2	0
7	E	8	0	0	1	0
7	F	4	0	0	0	0
7	G	8	0	0	2	0
7	H	5	0	0	3	0
All	All	15700	0	14932	374	1

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 12.

The worst 5 of 374 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:C:11[A]:ASN:HD22	5:C:408:NAG:C1	1.47	1.24
2:D:95:ASN:HB3	7:D:310:HOH:O	1.42	1.16
1:E:130:VAL:HG11	1:E:143:PHE:HB2	1.16	1.15
1:C:309:ARG:HA	7:C:516:HOH:O	1.47	1.13
1:E:65:PRO:HG2	1:E:142:PHE:H	1.12	1.09

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:74:GLU:OE1	2:B:76:ARG:NH2[2_655]	2.16	0.04

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	319/329 (97%)	300 (94%)	18 (6%)	1 (0%)	41	61
1	C	311/329 (94%)	290 (93%)	18 (6%)	3 (1%)	15	28
1	E	295/329 (90%)	273 (92%)	18 (6%)	4 (1%)	11	20
1	G	306/329 (93%)	287 (94%)	14 (5%)	5 (2%)	9	17
2	B	163/181 (90%)	160 (98%)	3 (2%)	0	100	100
2	D	157/181 (87%)	148 (94%)	8 (5%)	1 (1%)	25	43
2	F	158/181 (87%)	152 (96%)	5 (3%)	1 (1%)	25	43
2	H	163/181 (90%)	155 (95%)	5 (3%)	3 (2%)	8	14
All	All	1872/2040 (92%)	1765 (94%)	89 (5%)	18 (1%)	15	28

5 of 18 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	133	VAL
1	E	68	ASP
1	G	68	ASP
1	G	143	PHE
1	C	53	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	289/294 (98%)	255 (88%)	34 (12%)	5	10

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	284/294 (97%)	246 (87%)	38 (13%)	4	7
1	E	271/294 (92%)	232 (86%)	39 (14%)	3	6
1	G	279/294 (95%)	234 (84%)	45 (16%)	2	4
2	B	145/155 (94%)	135 (93%)	10 (7%)	15	30
2	D	141/155 (91%)	127 (90%)	14 (10%)	8	15
2	F	141/155 (91%)	125 (89%)	16 (11%)	6	11
2	H	144/155 (93%)	134 (93%)	10 (7%)	15	30
All	All	1694/1796 (94%)	1488 (88%)	206 (12%)	5	9

5 of 206 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	171	LEU
2	F	106	ARG
2	H	85	GLU
1	E	203	THR
1	E	281	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 36 such sidechains are listed below:

Mol	Chain	Res	Type
1	G	84	ASN
2	H	142	HIS
1	G	154	ASN
2	H	30	GLN
1	C	318	ASN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

22 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	$\#\|Z\| > 2$
3	NAG	I	1	1,3	14,14,15	0.81	0	17,19,21	2.32	5 (29%)
3	NAG	I	2	3	14,14,15	0.66	0	17,19,21	2.11	8 (47%)
3	MAN	I	3	3	11,11,12	0.97	1 (9%)	15,15,17	2.78	5 (33%)
3	MAN	I	4	3	11,11,12	1.07	1 (9%)	15,15,17	1.52	4 (26%)
3	MAN	I	5	3	11,11,12	0.96	1 (9%)	15,15,17	1.59	5 (33%)
4	NAG	J	1	1,4	14,14,15	0.87	1 (7%)	17,19,21	2.43	7 (41%)
4	NAG	J	2	4	14,14,15	0.58	0	17,19,21	1.25	1 (5%)
3	NAG	K	1	1,3	14,14,15	1.33	1 (7%)	17,19,21	2.54	6 (35%)
3	NAG	K	2	3	14,14,15	0.63	0	17,19,21	1.57	4 (23%)
3	MAN	K	3	3	11,11,12	1.03	2 (18%)	15,15,17	2.46	5 (33%)
3	MAN	K	4	3	11,11,12	1.14	1 (9%)	15,15,17	1.89	4 (26%)
3	MAN	K	5	3	11,11,12	0.95	0	15,15,17	1.41	3 (20%)
4	NAG	L	1	1,4	14,14,15	0.71	0	17,19,21	1.62	2 (11%)
4	NAG	L	2	4	14,14,15	0.63	0	17,19,21	1.75	5 (29%)
4	NAG	M	1	1,4	14,14,15	1.05	1 (7%)	17,19,21	2.96	5 (29%)
4	NAG	M	2	4	14,14,15	0.65	0	17,19,21	1.65	3 (17%)
4	NAG	N	1	1,4	14,14,15	1.08	1 (7%)	17,19,21	1.73	5 (29%)
4	NAG	N	2	4	14,14,15	0.68	0	17,19,21	1.16	1 (5%)
4	NAG	O	1	1,4	14,14,15	1.14	1 (7%)	17,19,21	1.51	2 (11%)
4	NAG	O	2	4	14,14,15	0.78	0	17,19,21	1.26	2 (11%)
4	NAG	P	1	1,4	14,14,15	0.65	0	17,19,21	1.51	3 (17%)
4	NAG	P	2	4	14,14,15	0.68	0	17,19,21	1.22	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
3	NAG	I	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	I	2	3	-	1/6/23/26	0/1/1/1
3	MAN	I	3	3	-	2/2/19/22	0/1/1/1
3	MAN	I	4	3	-	2/2/19/22	0/1/1/1
3	MAN	I	5	3	-	0/2/19/22	0/1/1/1
4	NAG	J	1	1,4	-	2/6/23/26	0/1/1/1
4	NAG	J	2	4	-	2/6/23/26	0/1/1/1
3	NAG	K	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	K	2	3	-	2/6/23/26	0/1/1/1
3	MAN	K	3	3	-	0/2/19/22	0/1/1/1
3	MAN	K	4	3	-	0/2/19/22	0/1/1/1
3	MAN	K	5	3	-	0/2/19/22	0/1/1/1
4	NAG	L	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	L	2	4	-	0/6/23/26	0/1/1/1
4	NAG	M	1	1,4	-	1/6/23/26	0/1/1/1
4	NAG	M	2	4	-	2/6/23/26	0/1/1/1
4	NAG	N	1	1,4	-	1/6/23/26	0/1/1/1
4	NAG	N	2	4	-	0/6/23/26	0/1/1/1
4	NAG	O	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	O	2	4	-	0/6/23/26	0/1/1/1
4	NAG	P	1	1,4	-	1/6/23/26	0/1/1/1
4	NAG	P	2	4	-	0/6/23/26	0/1/1/1

The worst 5 of 11 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	K	1	NAG	C1-C2	-4.06	1.46	1.52
4	N	1	NAG	C1-C2	3.29	1.56	1.52
4	O	1	NAG	C2-N2	-3.00	1.41	1.46
3	K	4	MAN	C2-C3	2.71	1.56	1.52
3	I	5	MAN	O5-C1	-2.59	1.39	1.43

The worst 5 of 86 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	M	1	NAG	C1-O5-C5	9.40	124.79	112.19
3	I	3	MAN	C1-C2-C3	8.15	121.50	109.64
3	K	3	MAN	C1-C2-C3	7.38	120.40	109.64
3	K	1	NAG	C1-O5-C5	6.98	121.55	112.19
3	I	1	NAG	C1-C2-N2	6.29	120.34	110.43

There are no chirality outliers.

5 of 16 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	J	1	NAG	C4-C5-C6-O6
4	J	1	NAG	O5-C5-C6-O6
3	I	4	MAN	C4-C5-C6-O6
3	I	4	MAN	O5-C5-C6-O6
4	J	2	NAG	O5-C5-C6-O6

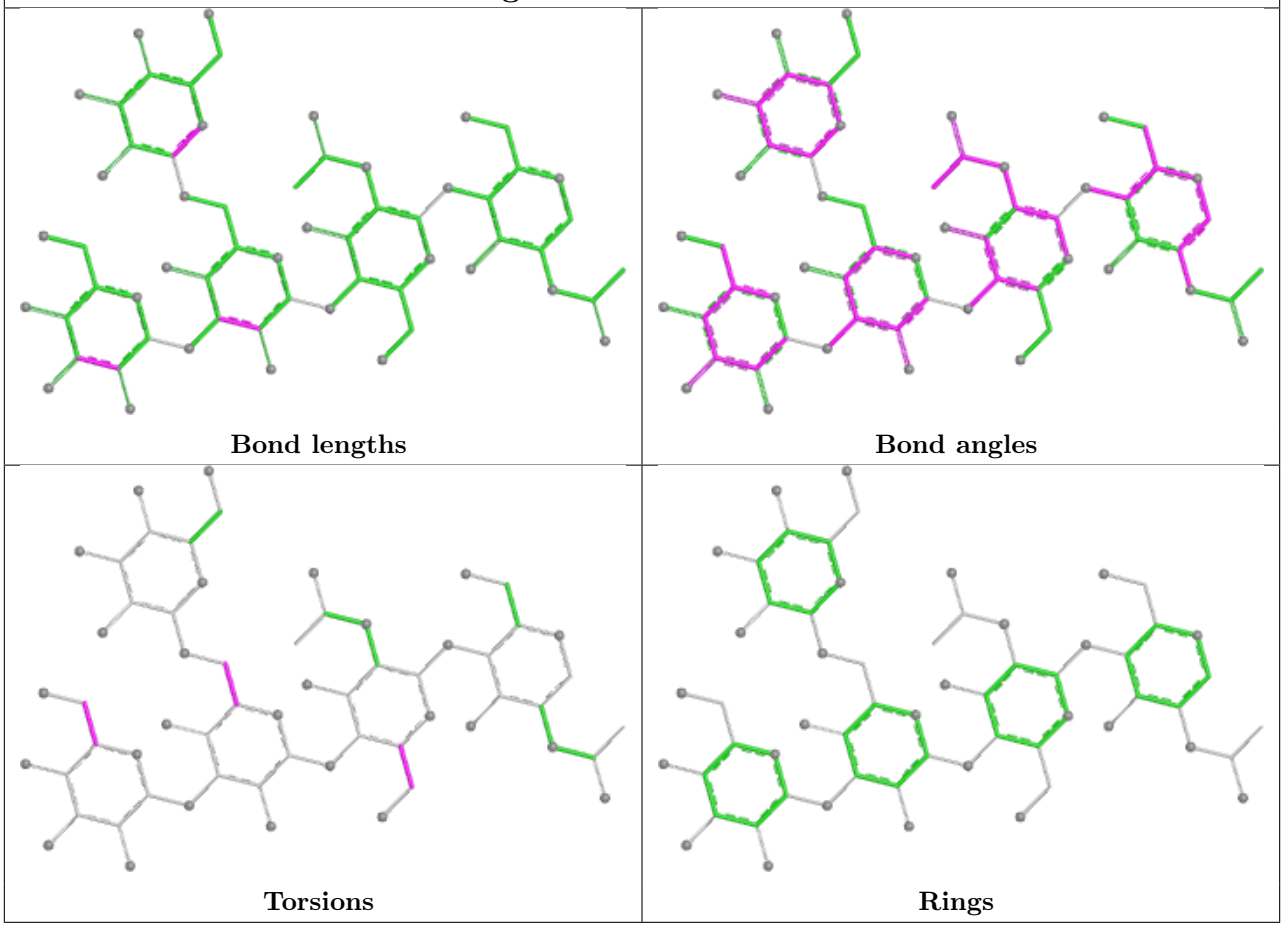
There are no ring outliers.

12 monomers are involved in 18 short contacts:

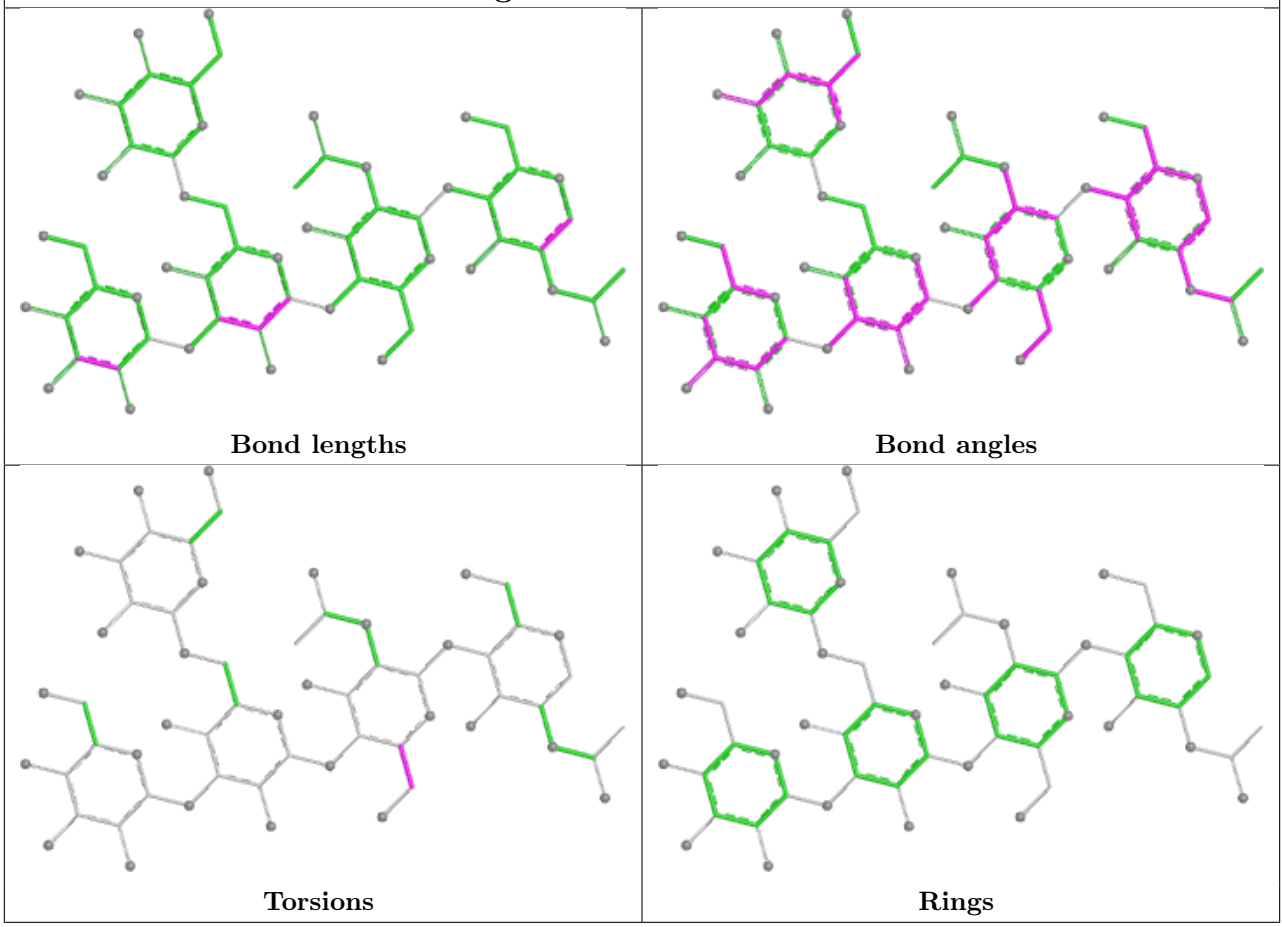
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	J	1	NAG	8	0
4	M	2	NAG	1	0
4	L	2	NAG	2	0
3	I	2	NAG	1	0
4	P	1	NAG	3	0
3	K	3	MAN	1	0
3	I	5	MAN	1	0
4	J	2	NAG	1	0
3	K	2	NAG	2	0
3	K	5	MAN	1	0
4	L	1	NAG	3	0
4	M	1	NAG	1	0

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

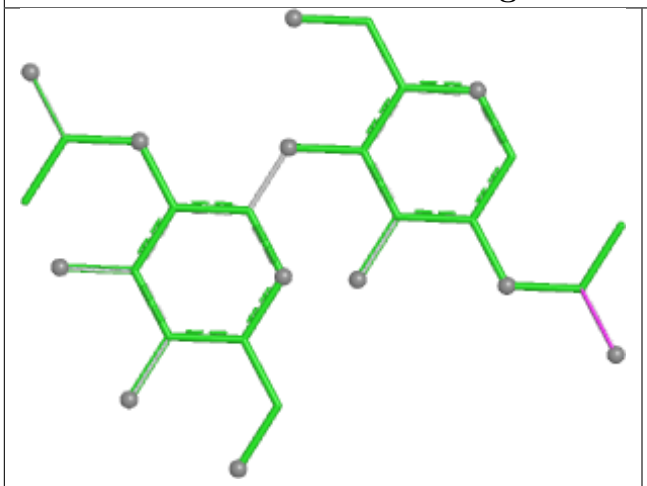
Oligosaccharide Chain I



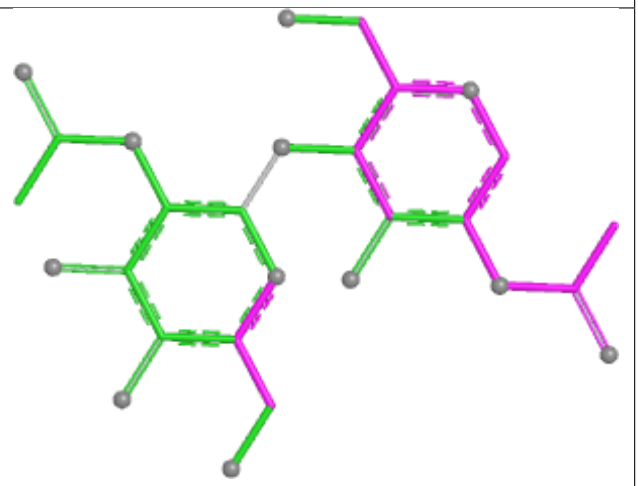
Oligosaccharide Chain K



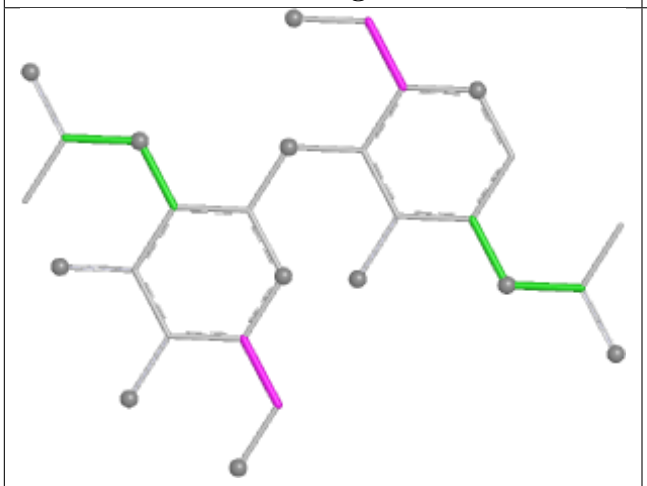
Oligosaccharide Chain J



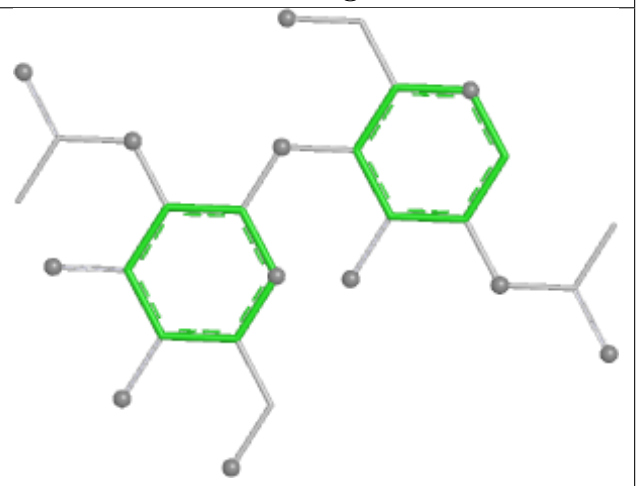
Bond lengths



Bond angles

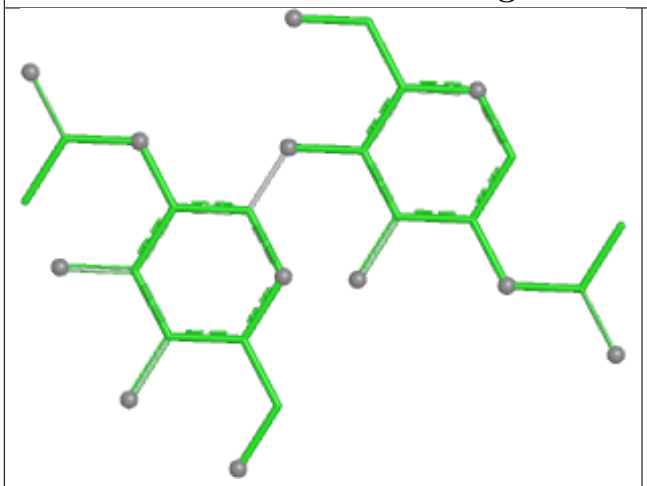


Torsions

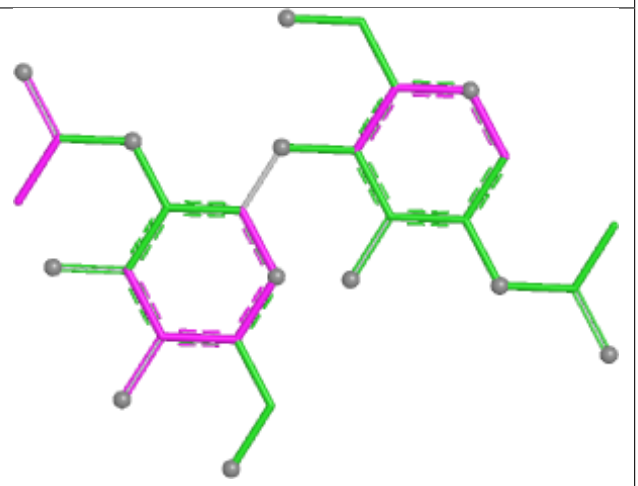


Rings

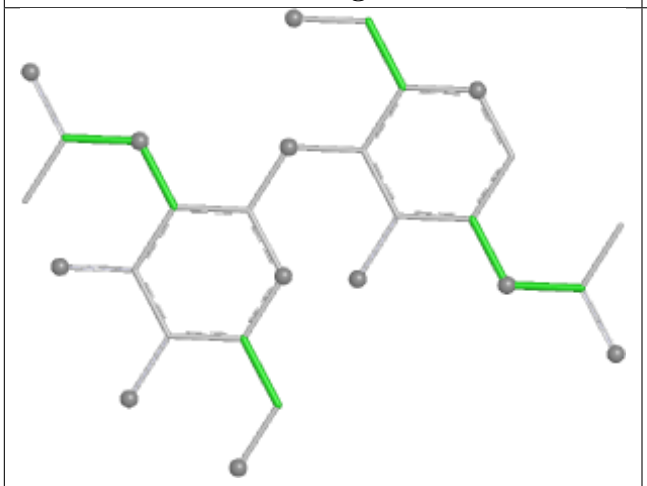
Oligosaccharide Chain L



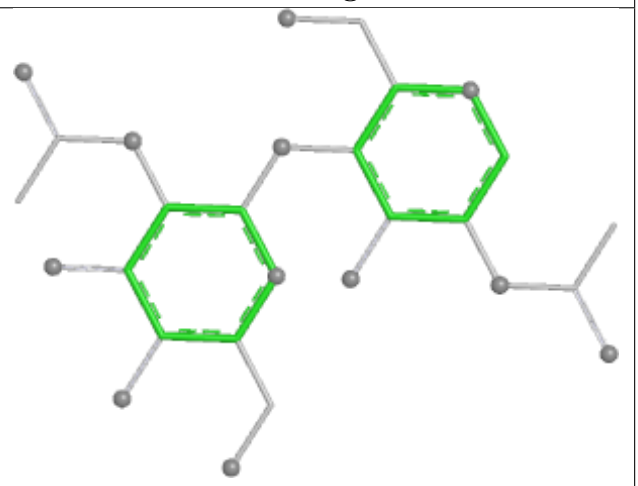
Bond lengths



Bond angles

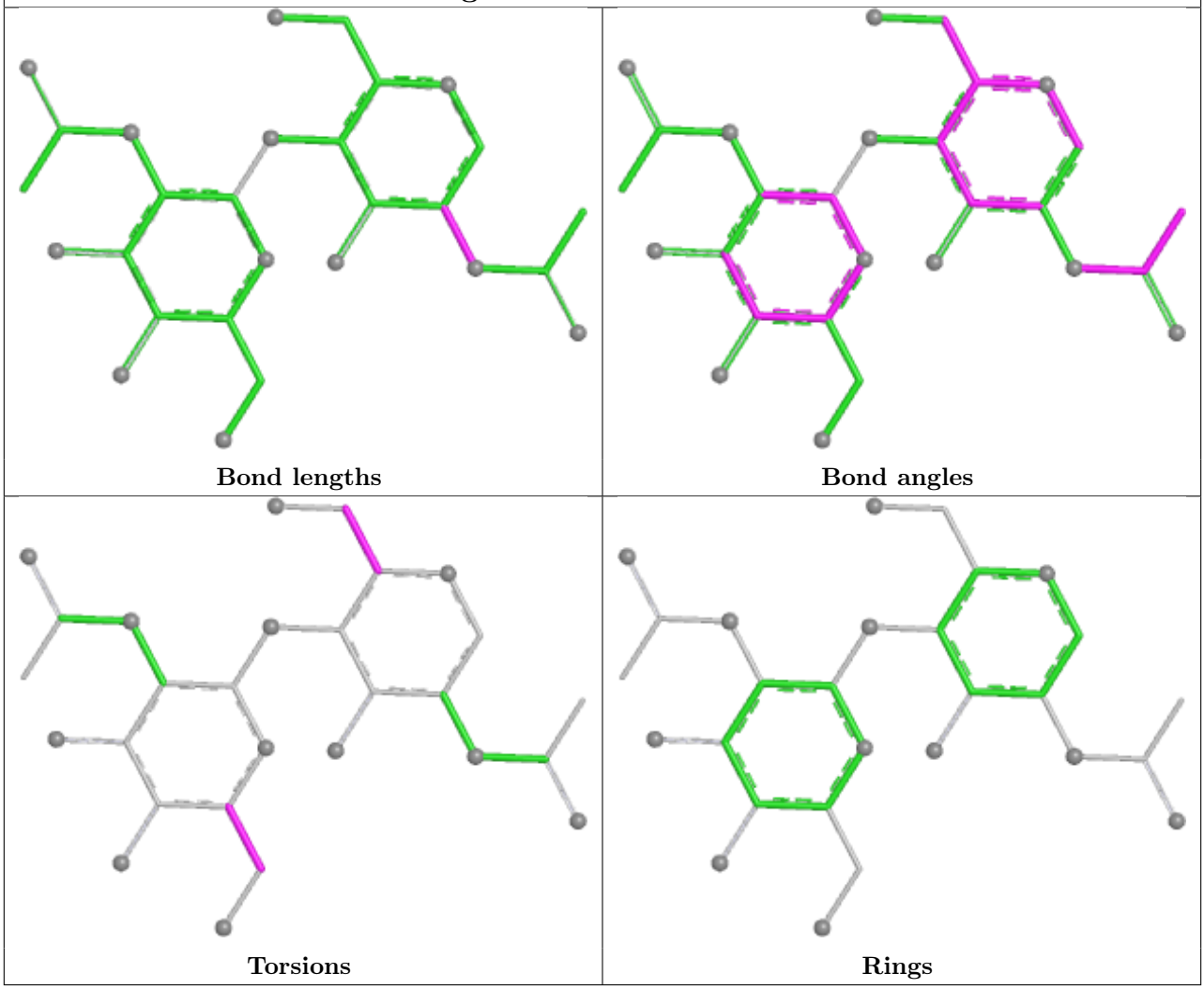


Torsions

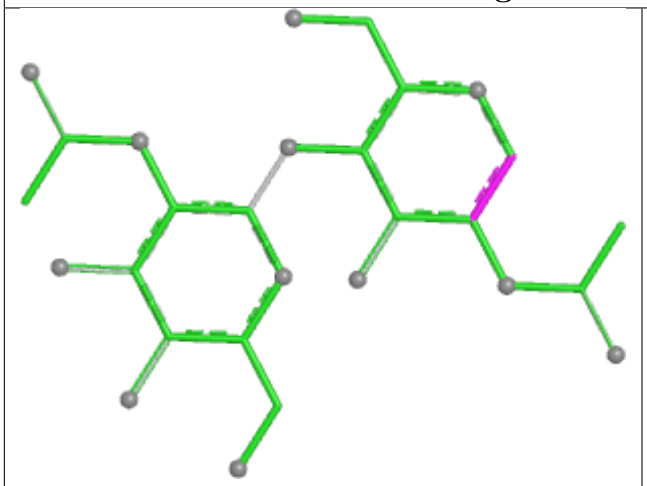


Rings

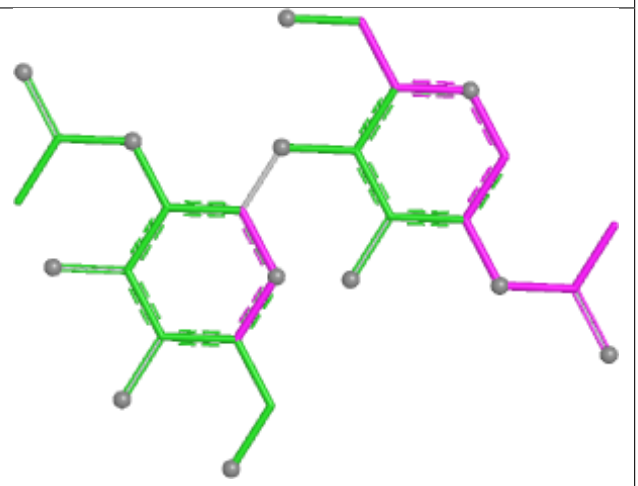
Oligosaccharide Chain M



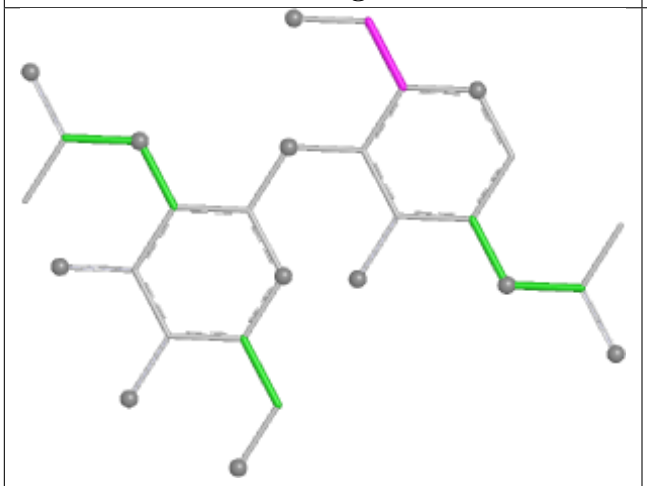
Oligosaccharide Chain N



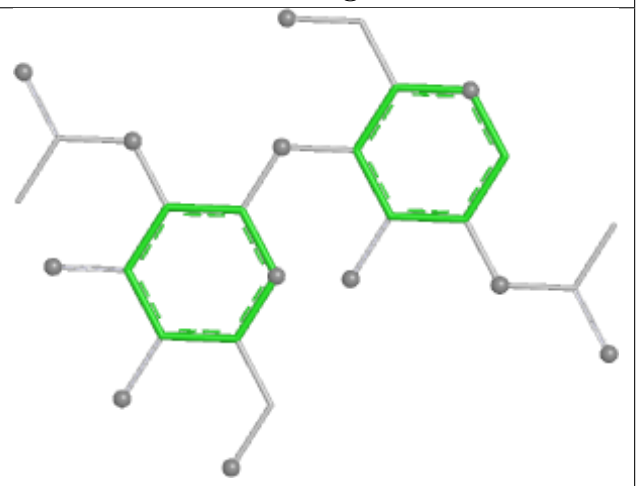
Bond lengths



Bond angles

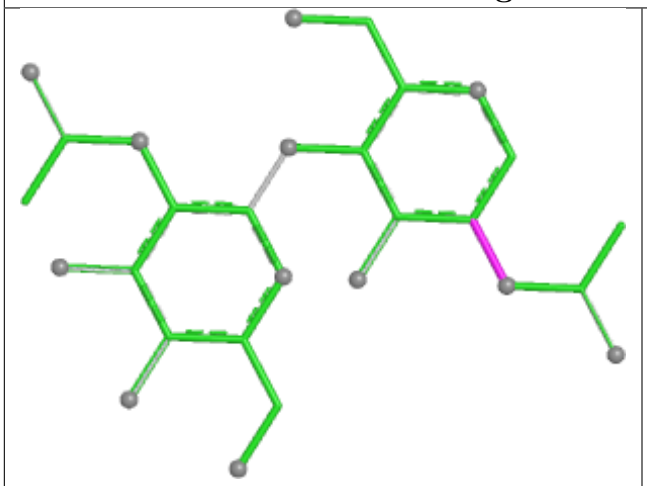


Torsions

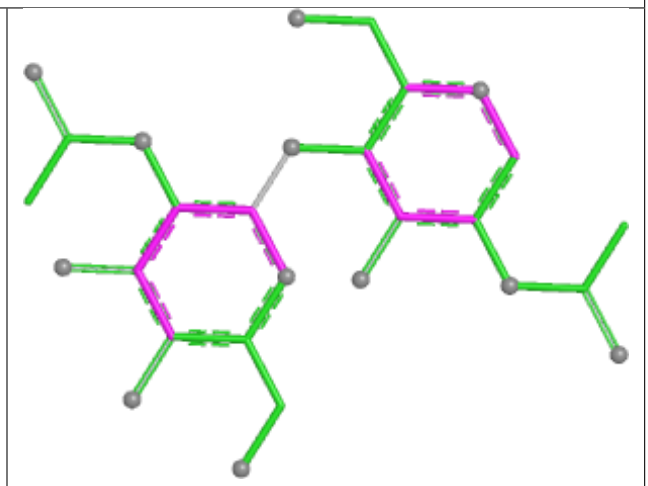


Rings

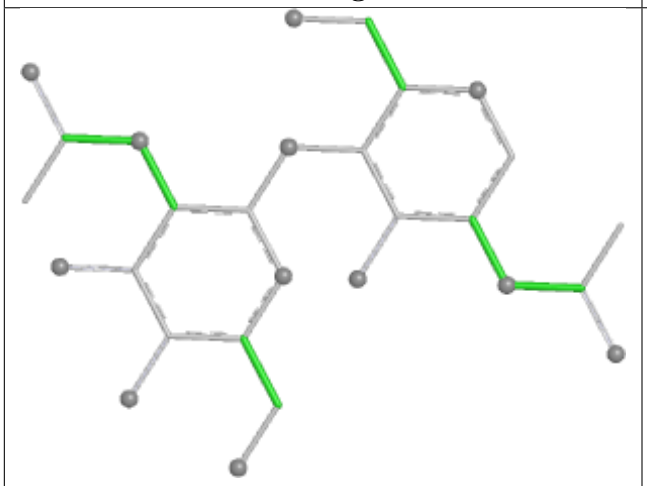
Oligosaccharide Chain O



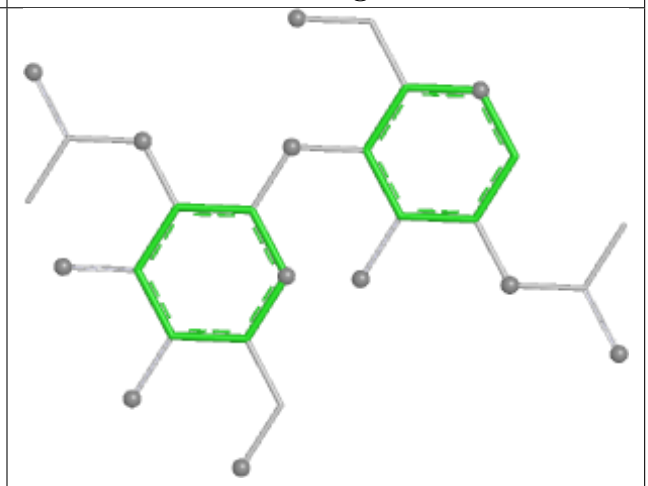
Bond lengths



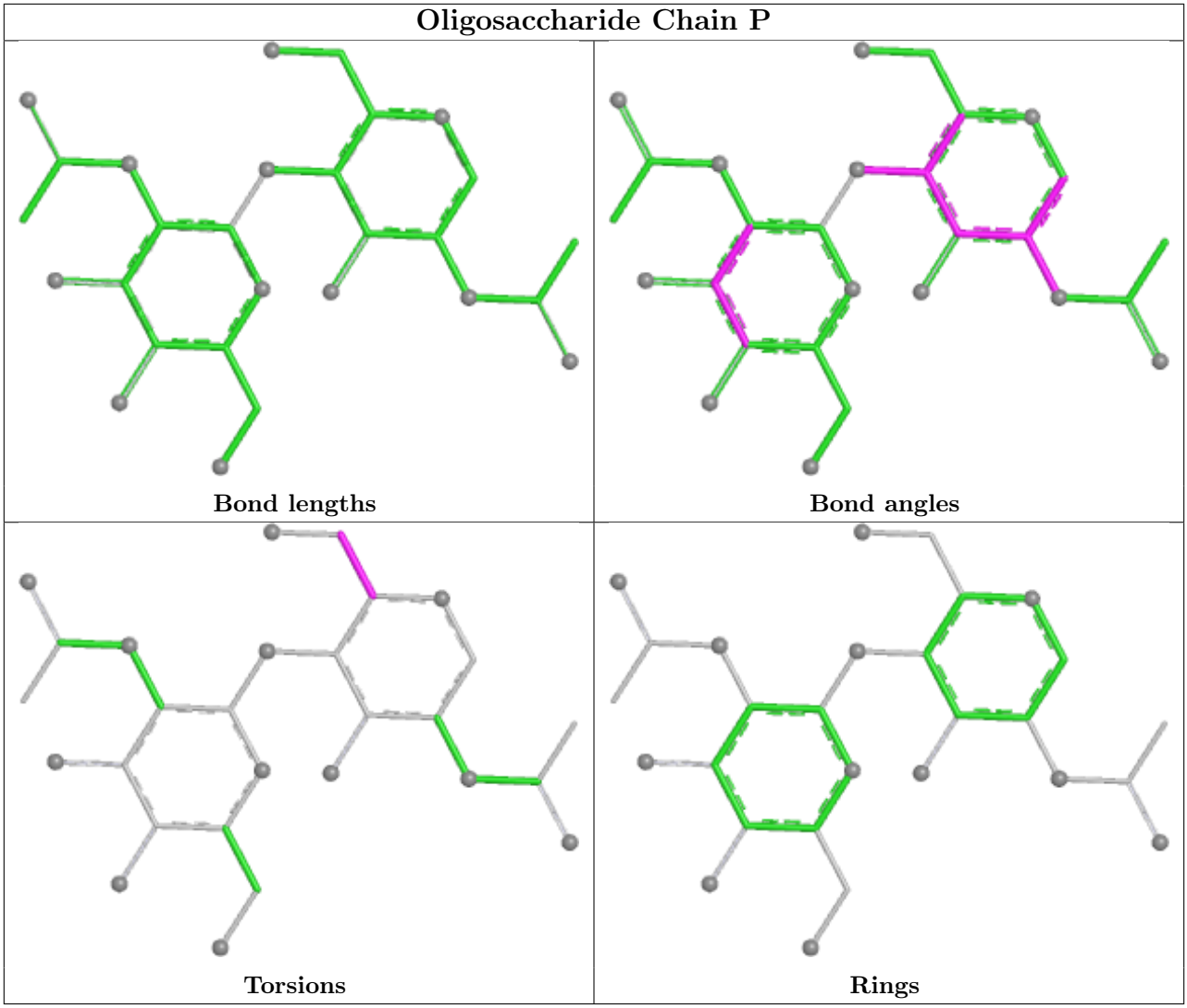
Bond angles



Torsions



Rings



5.6 Ligand geometry (i)

12 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
5	NAG	C	408	1	14,14,15	0.99	1 (7%)	17,19,21	1.91	4 (23%)
5	NAG	E	405	1	14,14,15	0.94	0	17,19,21	1.67	2 (11%)
6	PO4	C	409	-	4,4,4	1.26	0	6,6,6	1.81	3 (50%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
6	PO4	F	201	-	4,4,4	1.03	0	6,6,6	0.42	0
5	NAG	A	408	1	14,14,15	0.63	0	17,19,21	1.72	3 (17%)
6	PO4	D	201	-	4,4,4	0.90	0	6,6,6	0.47	0
6	PO4	H	201	-	4,4,4	0.92	0	6,6,6	0.53	0
6	PO4	A	409	-	4,4,4	1.71	2 (50%)	6,6,6	1.56	2 (33%)
6	PO4	E	406	-	4,4,4	0.95	0	6,6,6	0.91	0
5	NAG	G	405	1	14,14,15	0.72	0	17,19,21	1.61	4 (23%)
6	PO4	G	406	-	4,4,4	0.95	0	6,6,6	1.06	0
6	PO4	B	201	-	4,4,4	0.70	0	6,6,6	0.80	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
5	NAG	C	408	1	-	2/6/23/26	0/1/1/1
5	NAG	E	405	1	1/1/5/7	2/6/23/26	0/1/1/1
5	NAG	G	405	1	-	1/6/23/26	0/1/1/1
5	NAG	A	408	1	1/1/5/7	2/6/23/26	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	408	NAG	C1-C2	2.95	1.56	1.52
6	A	409	PO4	P-O4	-2.61	1.47	1.54
6	A	409	PO4	P-O1	2.21	1.55	1.50

The worst 5 of 18 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	E	405	NAG	C1-O5-C5	4.62	118.38	112.19
5	C	408	NAG	C4-C3-C2	-4.59	104.30	111.02
5	A	408	NAG	C1-O5-C5	4.05	117.62	112.19
5	A	408	NAG	C4-C3-C2	-3.69	105.60	111.02
5	C	408	NAG	C1-C2-N2	3.42	115.82	110.43

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
5	A	408	NAG	C1
5	E	405	NAG	C1

5 of 7 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	E	405	NAG	C4-C5-C6-O6
5	E	405	NAG	O5-C5-C6-O6
5	C	408	NAG	O5-C5-C6-O6
5	C	408	NAG	C4-C5-C6-O6
5	A	408	NAG	C4-C5-C6-O6

There are no ring outliers.

4 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	C	408	NAG	6	0
6	C	409	PO4	1	0
6	H	201	PO4	1	0
6	B	201	PO4	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 (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	321/329 (97%)	-0.01	15 (4%)	31	33	29, 45, 90, 131	0
1	C	314/329 (95%)	0.00	18 (5%)	23	25	27, 44, 92, 121	0
1	E	301/329 (91%)	0.13	12 (3%)	38	41	24, 54, 92, 128	0
1	G	310/329 (94%)	0.09	12 (3%)	39	42	34, 54, 104, 157	0
2	B	165/181 (91%)	-0.04	1 (0%)	89	90	31, 55, 76, 94	0
2	D	161/181 (88%)	0.04	2 (1%)	79	80	30, 54, 91, 118	0
2	F	162/181 (89%)	0.56	11 (6%)	17	17	44, 69, 107, 133	0
2	H	165/181 (91%)	0.29	8 (4%)	30	32	38, 64, 87, 126	0
All	All	1899/2040 (93%)	0.11	79 (4%)	36	39	24, 53, 95, 157	0

The worst 5 of 79 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	137	GLN	7.8
1	E	70	PHE	7.2
2	F	176	GLY	7.1
1	G	220	GLY	6.7
1	C	70	PHE	6.1

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,

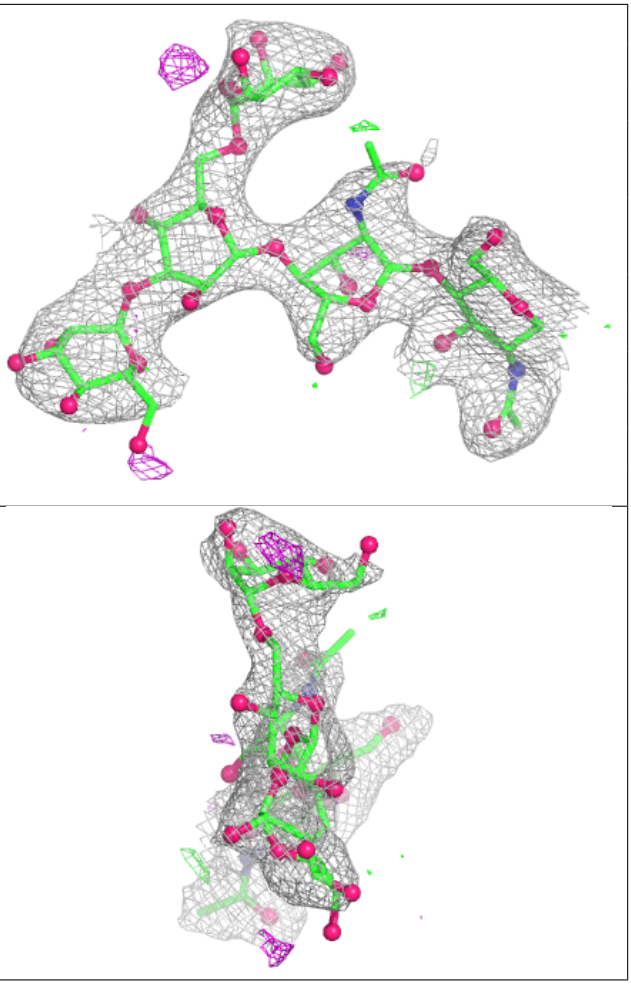
median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	NAG	L	1	14/15	0.76	0.18	88,128,144,173	0
4	NAG	O	2	14/15	0.76	0.51	91,138,152,152	0
4	NAG	P	1	14/15	0.76	0.37	104,132,139,145	0
4	NAG	M	2	14/15	0.78	0.39	113,137,148,152	0
4	NAG	L	2	14/15	0.79	0.37	94,123,142,144	0
3	MAN	K	5	11/12	0.80	0.21	79,93,98,98	0
4	NAG	N	2	14/15	0.80	0.50	130,142,154,160	0
3	MAN	I	5	11/12	0.86	0.20	97,101,108,116	0
4	NAG	J	2	14/15	0.86	0.18	66,103,120,136	0
4	NAG	J	1	14/15	0.87	0.17	78,103,117,132	0
3	NAG	K	2	14/15	0.87	0.18	66,82,100,116	0
4	NAG	N	1	14/15	0.89	0.24	90,111,126,127	0
4	NAG	M	1	14/15	0.89	0.17	63,89,106,118	0
3	MAN	K	4	11/12	0.90	0.26	71,83,111,115	0
4	NAG	P	2	14/15	0.90	0.36	112,126,135,150	0
3	NAG	I	2	14/15	0.91	0.19	80,96,106,121	0
3	MAN	I	4	11/12	0.92	0.23	75,88,111,111	0
4	NAG	O	1	14/15	0.94	0.14	51,76,93,111	0
3	MAN	I	3	11/12	0.94	0.16	77,86,94,96	0
3	NAG	K	1	14/15	0.95	0.14	45,57,68,86	0
3	NAG	I	1	14/15	0.95	0.13	41,62,73,77	0
3	MAN	K	3	11/12	0.96	0.12	68,76,81,89	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.

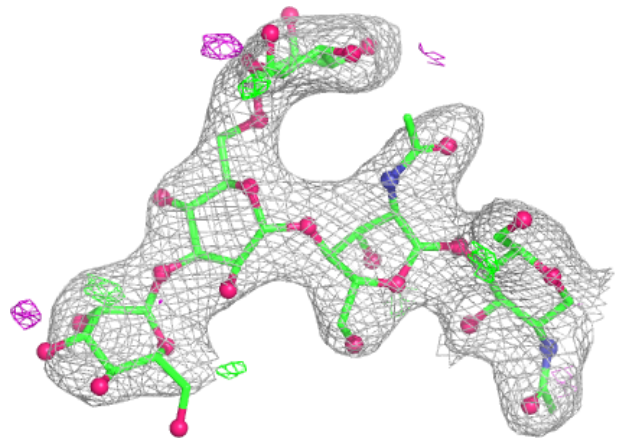
Electron density around Chain I:

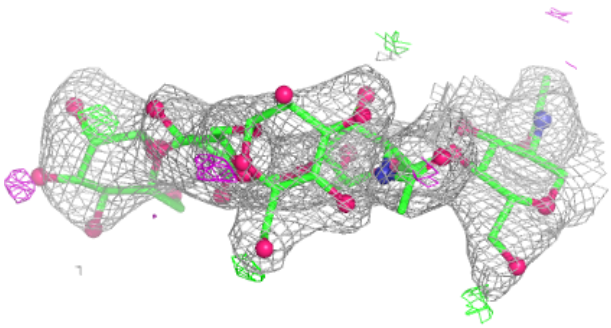
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

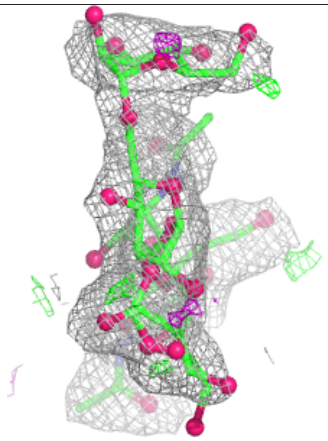


Electron density around Chain K:

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

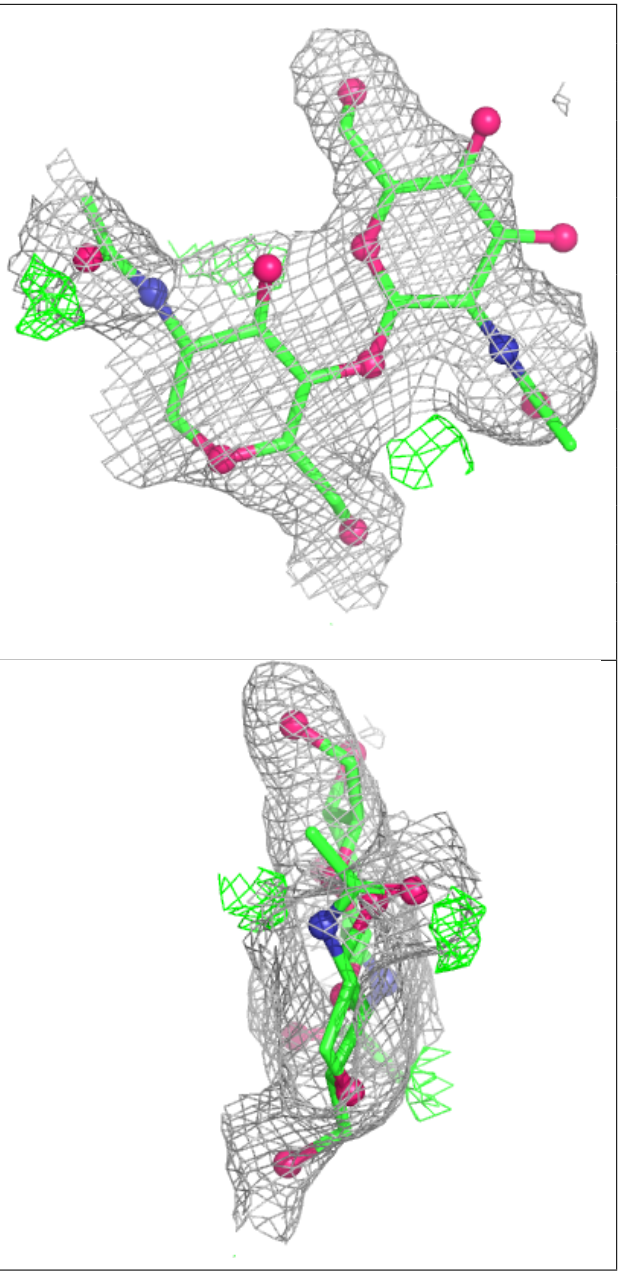






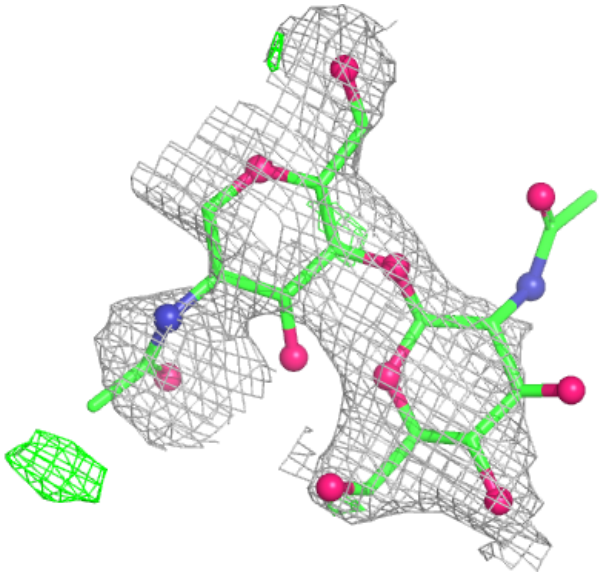
Electron density around Chain J:

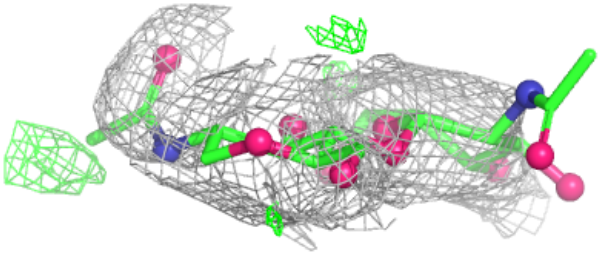
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

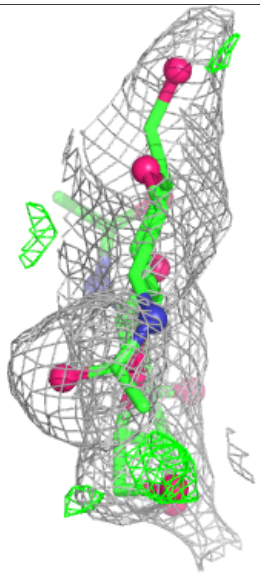


Electron density around Chain L:

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

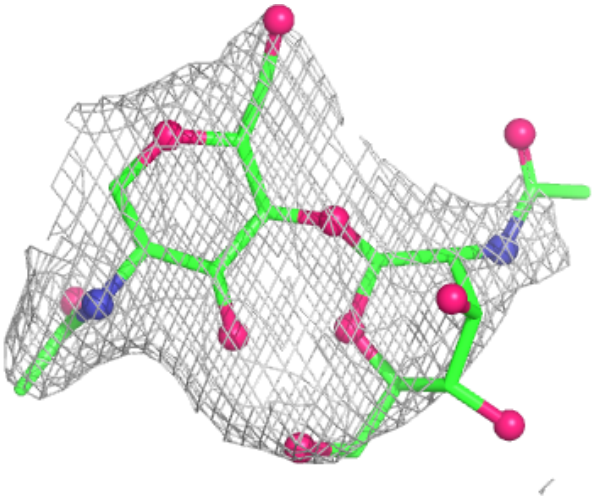


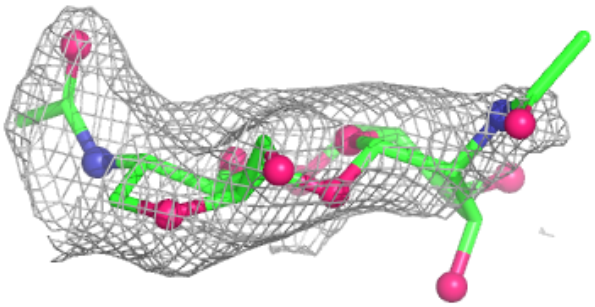


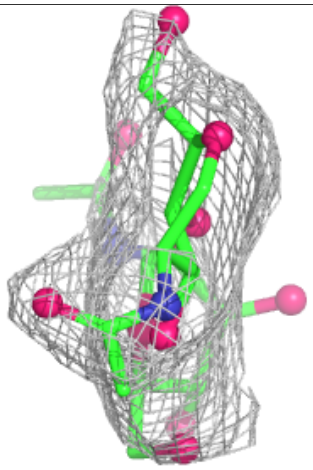


Electron density around Chain M:

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

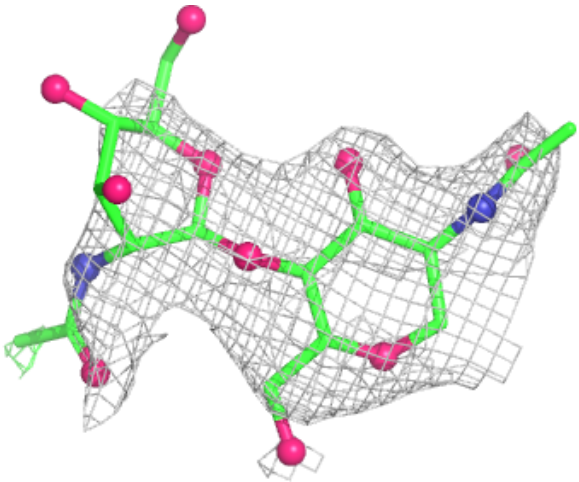


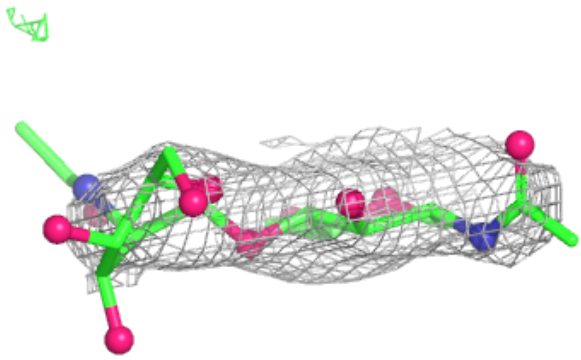


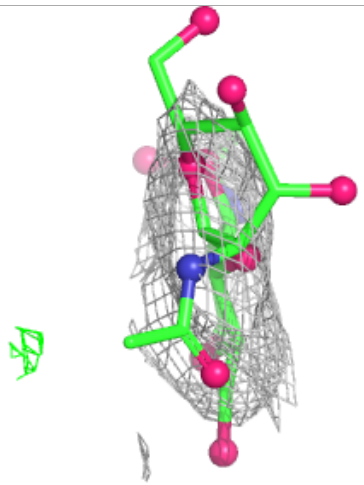


Electron density around Chain N:

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

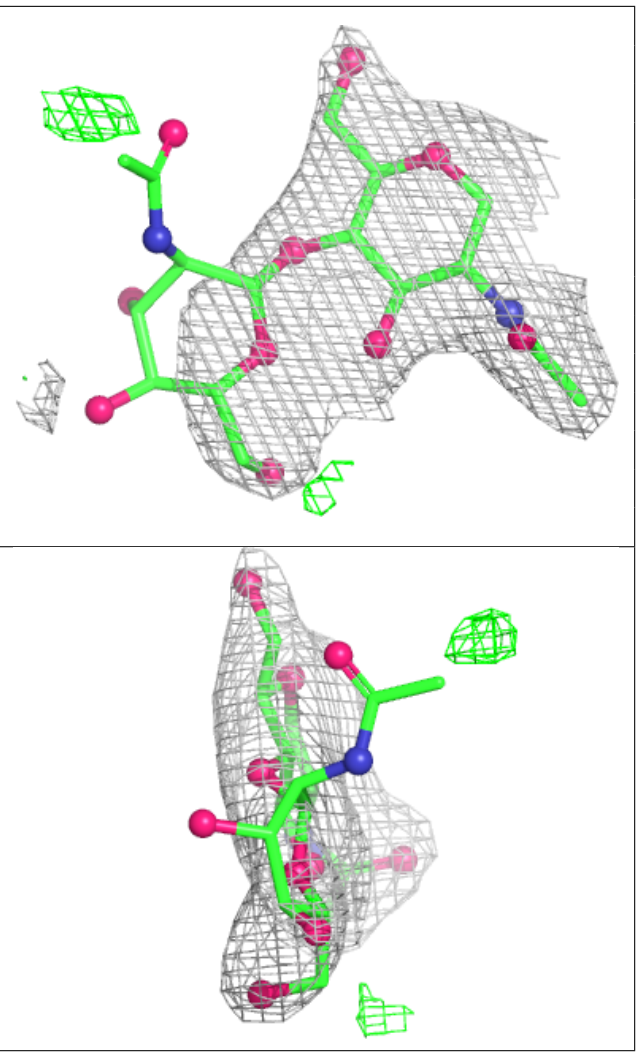






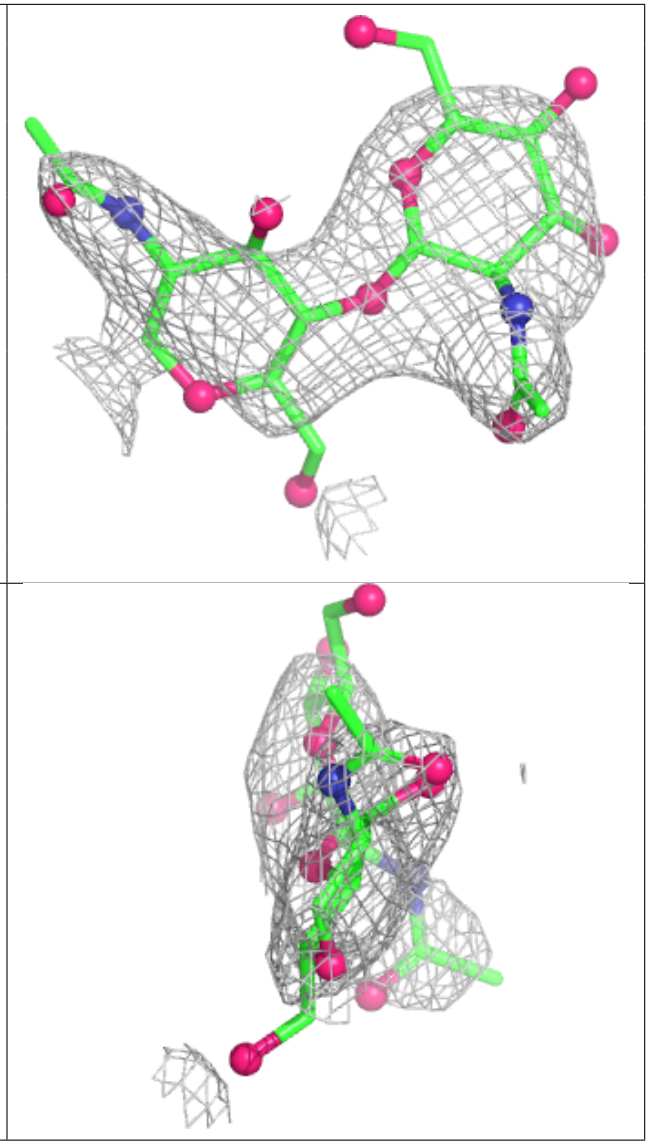
Electron density around Chain O:

$2mF_o$-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 P:

$2mF_o$-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
6	PO4	F	201	5/5	0.05	1.72	121,123,131,131	5
5	NAG	A	408	14/15	0.78	0.71	93,130,147,149	0
5	NAG	C	408	14/15	0.81	0.55	92,111,122,131	0
5	NAG	E	405	14/15	0.84	0.29	86,99,114,114	0
5	NAG	G	405	14/15	0.86	0.45	95,109,130,130	0
6	PO4	B	201	5/5	0.95	0.27	53,66,67,85	5

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
6	PO4	H	201	5/5	0.96	0.40	70,75,84,92	5
6	PO4	D	201	5/5	0.98	0.14	63,64,68,69	5
6	PO4	E	406	5/5	0.99	0.14	33,38,46,48	5
6	PO4	C	409	5/5	0.99	0.14	37,46,52,58	5
6	PO4	G	406	5/5	0.99	0.12	26,30,36,38	5
6	PO4	A	409	5/5	0.99	0.11	33,36,39,45	5

6.5 Other polymers (i)

There are no such residues in this entry.