wwPDB X-ray Structure Validation Summary Report (i)

Aug 7, 2020 – 10:01 AM BST

PDB ID	:	6MU6
Title	:	Crystal Structure of HIV-1 BG505 SOSIP.664 Prefusion Env Trimer Bound to Small Molecule HIV-1 Entry Inhibitor BMS-814508 in Complex with Human Antibodies 3H109L and 35O22 at 3.2 Angstrom
Authors	:	Lai, Y.-T.; Kwong, P.D.
Deposited on	:	2018-10-22
Resolution	:	2.55 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 following versions of software and data (see references (1)) were used in the production of this report:

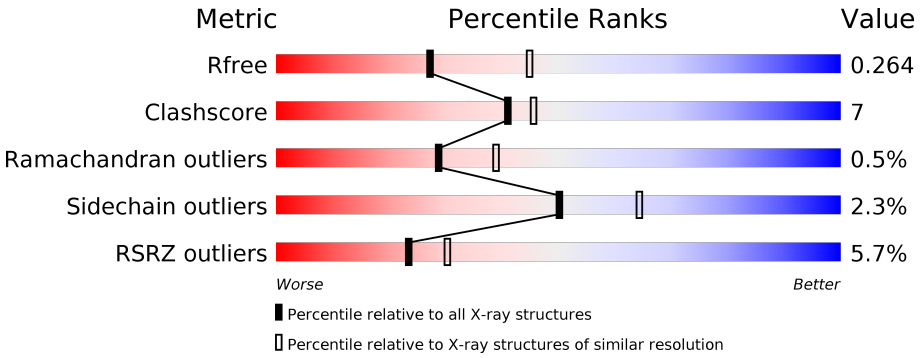
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.13.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.13.1

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 2.55 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	1279 (2.58-2.54)
Clashscore	141614	1327 (2.58-2.54)
Ramachandran outliers	138981	1312 (2.58-2.54)
Sidechain outliers	138945	1312 (2.58-2.54)
RSRZ outliers	127900	1269 (2.58-2.54)

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 on 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	B	153	% 74% 8% • 16%
2	D	134	21% 79% 16% • •
3	E	114	10% 78% 13% • 8%
4	G	481	4% 70% 20% • 8%
5	H	244	3% 73% 18% • 7%
6	L	217	% 76% 20% • •

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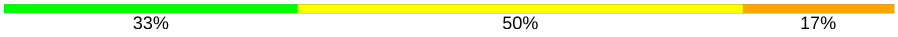
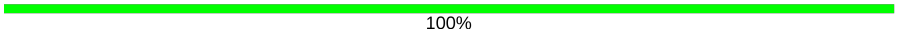
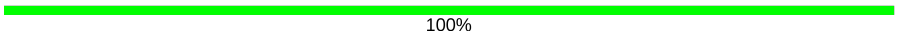
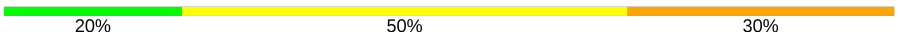
Mol	Chain	Length	Quality of chain
7	A	6	
8	C	3	
8	I	3	
9	F	2	
9	J	2	
9	K	2	
9	N	2	
10	M	10	

2 Entry composition

There are 13 unique types of molecules in this entry. The entry contains 10185 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 Envelope glycoprotein gp160.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	B	128	Total	C	N	O	S	0	0	0
			1019	648	175	190	6			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	559	PRO	ILE	engineered mutation	UNP Q2N0S6
B	605	CYS	THR	engineered mutation	UNP Q2N0S6

- Molecule 2 is a protein called 35O22 scFv heavy chain portion.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	128	Total	C	N	O	S	0	0	0
			994	628	169	192	5			

- Molecule 3 is a protein called 35O22 scFv light chain portion.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	E	105	Total	C	N	O	S	0	0	0
			805	506	133	160	6			

- Molecule 4 is a protein called Envelope glycoprotein gp160.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	G	442	Total	C	N	O	S	0	0	0
			3479	2186	617	648	28			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	137	ALA	ASN	engineered mutation	UNP Q2N0S6
G	332	ASN	THR	conflict	UNP Q2N0S6

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Chain	Residue	Modelled	Actual	Comment	Reference
G	501	CYS	ALA	conflict	UNP Q2N0S6
G	509	ARG	-	expression tag	UNP Q2N0S6
G	510	ARG	-	expression tag	UNP Q2N0S6
G	511	ARG	-	expression tag	UNP Q2N0S6
G	512	ARG	-	expression tag	UNP Q2N0S6
G	513	ARG	-	expression tag	UNP Q2N0S6

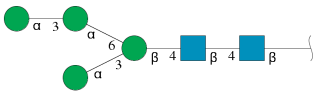
- Molecule 5 is a protein called 3H109L Fab heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	H	226	Total	C	N	O	S	0	0	0
			1715	1093	278	338	6			

- Molecule 6 is a protein called 3H109L Fab light chain.

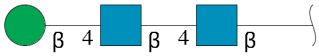
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
6	L	211	Total	C	N	O	S	0	0	0
			1604	1009	276	312	7			

- Molecule 7 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-alpha-D-mannopyranose-(1-6)-[alpha-D-mannopyranose-(1-3)]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
7	A	6	Total	C	N	O	0	0	0
			72	40	2	30			

- Molecule 8 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
8	C	3	Total	C	N	O	0	0	0
			39	22	2	15			

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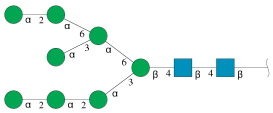
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
8	I	3	Total	C	N	O	0	0	0
			39	22	2	15			

- Molecule 9 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

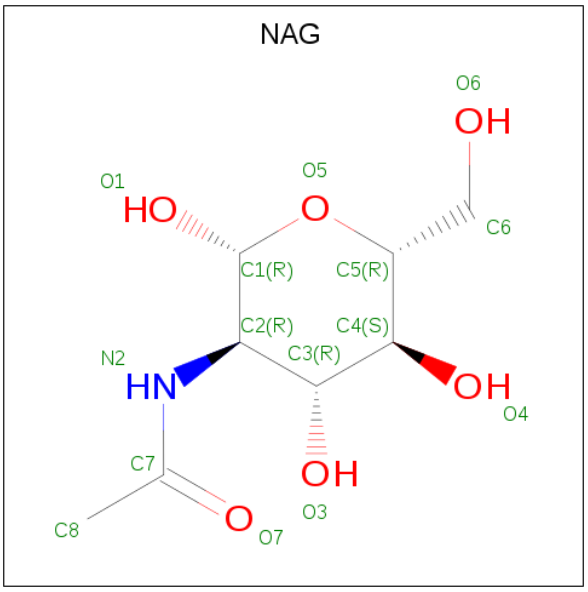
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
9	F	2	Total	C	N	O	0	0	0
			28	16	2	10			
9	J	2	Total	C	N	O	0	0	0
			28	16	2	10			
9	K	2	Total	C	N	O	0	0	0
			28	16	2	10			
9	N	2	Total	C	N	O	0	0	0
			28	16	2	10			

- Molecule 10 is an oligosaccharide called alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-6)-[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.



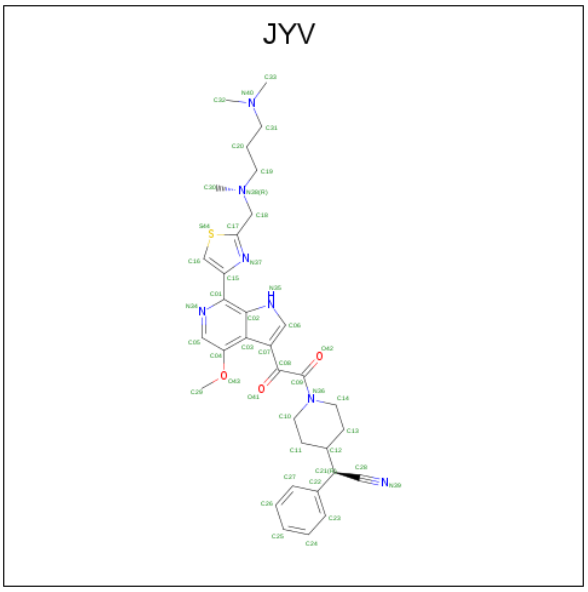
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
10	M	10	Total	C	N	O	0	0	0
			116	64	2	50			

- Molecule 11 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



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

- Molecule 12 is (2R)-{1-[{7-[2-({[3-(dimethylamino)propyl](methyl)amino}methyl)-1,3-thiazol-4-yl]-4-methoxy-1H-pyrrolo[2,3-c]pyridin-3-yl}(oxo)acetyl]piperidin-4-yl}(phenyl)acetonitrile (three-letter code: JYV) (formula: $C_{33}H_{39}N_7O_3S$) (labeled as "Ligand of Interest" by author).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
12	G	1	Total C N O S 44 33 7 3 1	0	0

- Molecule 13 is water.

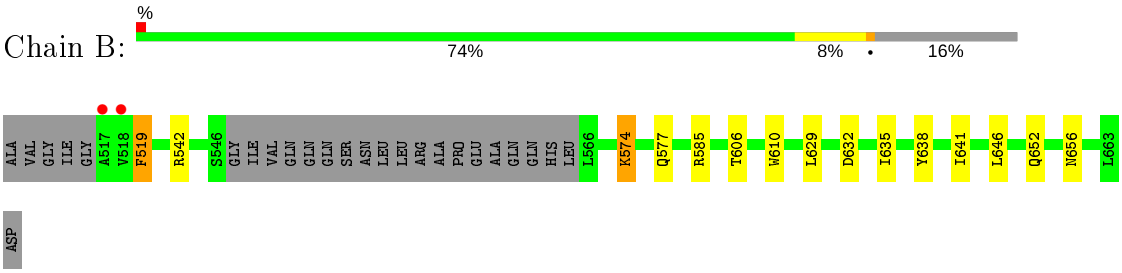
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
13	B	1	Total O 1 1	0	0
13	E	1	Total O 1 1	0	0
13	G	5	Total O 5 5	0	0

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.

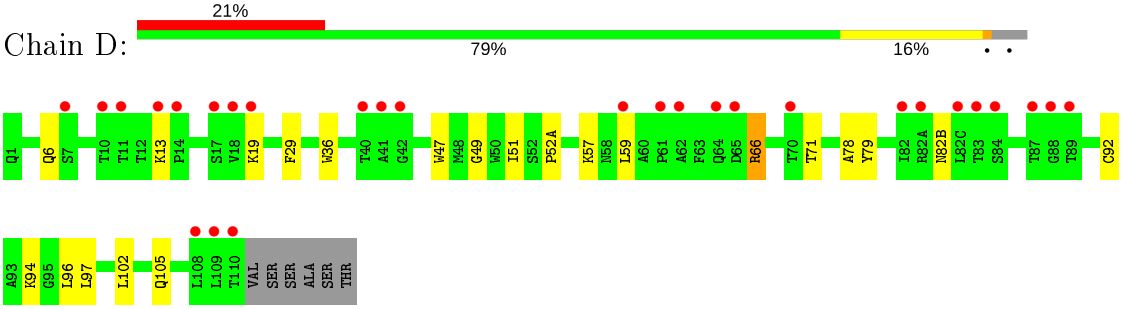
- Molecule 1: Envelope glycoprotein gp160

Chain B:



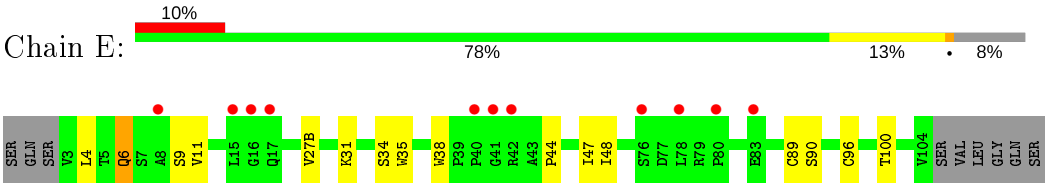
- Molecule 2: 35O22 scFv heavy chain portion

Chain D:



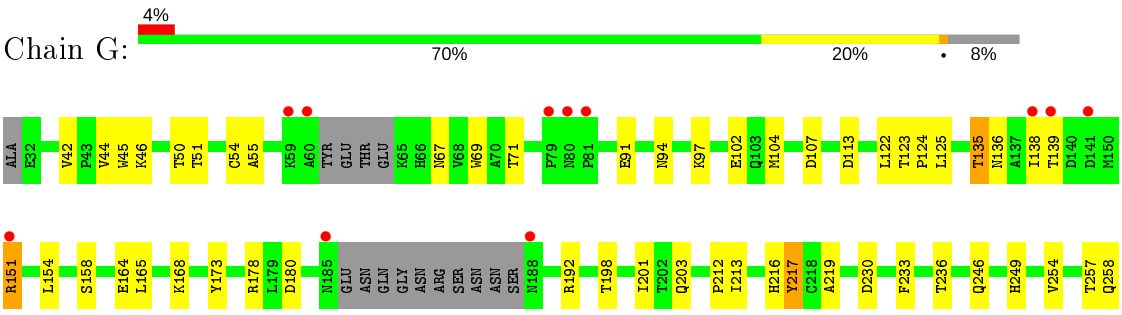
- Molecule 3: 35O22 scFv light chain portion

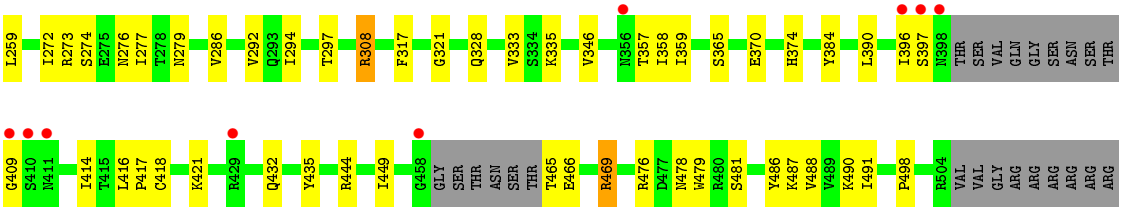
Chain E:



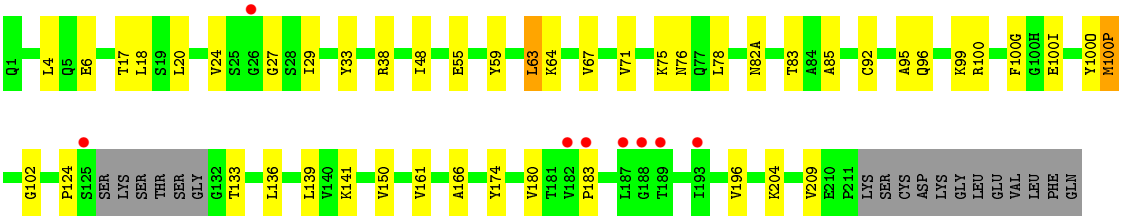
- Molecule 4: Envelope glycoprotein gp160

Chain G:

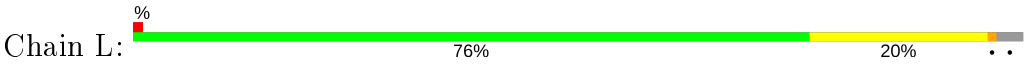


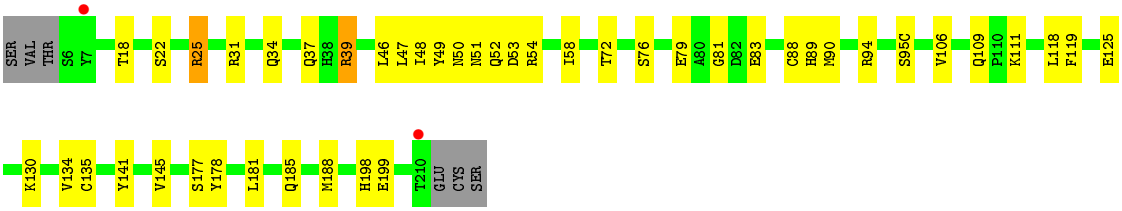


• Molecule 5: 3H109L Fab heavy chain

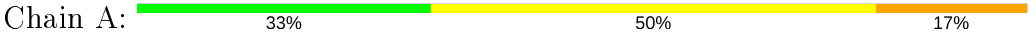


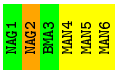
• Molecule 6: 3H109L Fab light chain





• Molecule 7: alpha-D-mannopyranose-(1-3)-alpha-D-mannopyranose-(1-6)-[alpha-D-mannopyranose-(1-3)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose





• Molecule 8: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

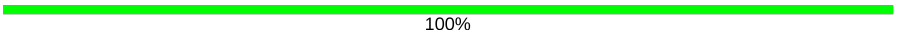
• Molecule 8: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

• Molecule 9: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain F:

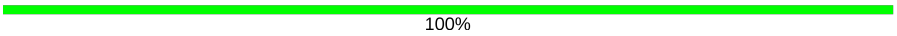
• Molecule 9: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain J:



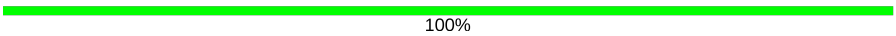
• Molecule 9: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain K:



• Molecule 9: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain N:



• Molecule 10: alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-6)-[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

Chain M:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 63	Depositor
Cell constants a, b, c, α, β, γ	131.25Å 131.25Å 314.12Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	42.96 – 2.55 42.96 – 2.53	Depositor EDS
% Data completeness (in resolution range)	39.1 (42.96-2.55) 38.4 (42.96-2.53)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.35 (at 2.54Å)	Xtriage
Refinement program	PHENIX 1.13_2998	Depositor
R, R_{free}	0.231 , 0.264 0.230 , 0.264	Depositor DCC
R_{free} test set	1933 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å^2)	34.1	Xtriage
Anisotropy	0.072	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.28 , 25.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.058 for h,-h-k,-l	Xtriage
F_o,F_c correlation	0.85	EDS
Total number of atoms	10185	wwPDB-VP
Average B, all atoms (Å^2)	47.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.62% of the height of the origin peak. No significant pseudotranslation is detected.*

[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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: JYV, BMA, NAG, 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	B	0.22	0/1037	0.37	0/1406
2	D	0.24	0/1021	0.45	0/1390
3	E	0.24	0/829	0.44	0/1133
4	G	0.24	0/3550	0.45	0/4815
5	H	0.24	0/1758	0.46	0/2397
6	L	0.24	0/1647	0.44	0/2247
All	All	0.24	0/9842	0.44	0/13388

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

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	B	1019	0	1009	11	0
2	D	994	0	952	11	0
3	E	805	0	752	7	0
4	G	3479	0	3423	67	0
5	H	1715	0	1685	28	0
6	L	1604	0	1553	26	0
7	A	72	0	61	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
8	C	39	0	34	0	0
8	I	39	0	34	0	0
9	F	28	0	25	1	0
9	J	28	0	25	0	0
9	K	28	0	25	0	0
9	N	28	0	25	0	0
10	M	116	0	97	3	0
11	B	28	0	26	0	0
11	D	14	0	13	0	0
11	G	98	0	91	1	0
12	G	44	0	0	2	0
13	B	1	0	0	0	0
13	E	1	0	0	0	0
13	G	5	0	0	0	0
All	All	10185	0	9830	142	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 7.

The worst 5 of 142 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)
4:G:274:SER:HB3	4:G:277:ILE:HG12	1.67	0.76
5:H:136:LEU:HD13	5:H:209:VAL:HG21	1.70	0.73
3:E:35:TRP:HD1	3:E:48:ILE:HD11	1.57	0.69
2:D:96:LEU:HG	2:D:97:LEU:HG	1.74	0.68
4:G:233:PHE:O	4:G:273:ARG:NH1	2.27	0.67

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	B	124/153 (81%)	118 (95%)	6 (5%)	0	100	100
2	D	126/134 (94%)	108 (86%)	18 (14%)	0	100	100
3	E	103/114 (90%)	83 (81%)	18 (18%)	2 (2%)	8	9
4	G	432/481 (90%)	397 (92%)	33 (8%)	2 (0%)	29	39
5	H	222/244 (91%)	210 (95%)	11 (5%)	1 (0%)	29	39
6	L	209/217 (96%)	197 (94%)	11 (5%)	1 (0%)	29	39
All	All	1216/1343 (90%)	1113 (92%)	97 (8%)	6 (0%)	29	39

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
6	L	51	ASN
3	E	11	VAL
3	E	6	GLN
4	G	135	THR
4	G	321	GLY

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	B	110/129 (85%)	108 (98%)	2 (2%)	59	73
2	D	107/112 (96%)	105 (98%)	2 (2%)	57	71
3	E	92/100 (92%)	88 (96%)	4 (4%)	29	39
4	G	393/427 (92%)	385 (98%)	8 (2%)	55	69
5	H	196/212 (92%)	191 (97%)	5 (3%)	46	59
6	L	175/181 (97%)	171 (98%)	4 (2%)	50	64
All	All	1073/1161 (92%)	1048 (98%)	25 (2%)	50	64

5 of 25 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	G	178	ARG

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Mol	Chain	Res	Type
4	G	217	TYR
6	L	79	GLU
4	G	192	ARG
4	G	308	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
4	G	246	GLN

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

30 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	$\#\|Z\| > 2$
7	NAG	A	1	4,7	14,14,15	0.32	0	17,19,21	0.46	0
7	NAG	A	2	7	14,14,15	0.38	0	17,19,21	1.28	1 (5%)
7	BMA	A	3	7	11,11,12	0.75	0	15,15,17	0.73	0
7	MAN	A	4	7	11,11,12	1.22	2 (18%)	15,15,17	1.58	3 (20%)
7	MAN	A	5	7	11,11,12	1.68	2 (18%)	15,15,17	2.24	4 (26%)
7	MAN	A	6	7	11,11,12	0.72	0	15,15,17	1.03	2 (13%)
8	NAG	C	1	8,4	14,14,15	0.27	0	17,19,21	0.42	0
8	NAG	C	2	8	14,14,15	0.22	0	17,19,21	0.40	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
8	BMA	C	3	8	11,11,12	0.61	0	15,15,17	0.72	0
9	NAG	F	1	9,4	14,14,15	0.21	0	17,19,21	0.42	0
9	NAG	F	2	9	14,14,15	0.26	0	17,19,21	0.39	0
8	NAG	I	1	8,4	14,14,15	0.30	0	17,19,21	0.50	0
8	NAG	I	2	8	14,14,15	0.26	0	17,19,21	0.50	0
8	BMA	I	3	8	11,11,12	0.60	0	15,15,17	0.71	0
9	NAG	J	1	9,4	14,14,15	0.32	0	17,19,21	0.40	0
9	NAG	J	2	9	14,14,15	0.24	0	17,19,21	0.40	0
9	NAG	K	1	9,4	14,14,15	0.24	0	17,19,21	0.42	0
9	NAG	K	2	9	14,14,15	0.23	0	17,19,21	0.48	0
10	NAG	M	1	10,4	14,14,15	0.37	0	17,19,21	1.37	2 (11%)
10	MAN	M	10	10	11,11,12	0.98	0	15,15,17	1.10	1 (6%)
10	NAG	M	2	10	14,14,15	0.23	0	17,19,21	0.44	0
10	BMA	M	3	10	11,11,12	0.72	0	15,15,17	1.05	0
10	MAN	M	4	10	11,11,12	0.80	1 (9%)	15,15,17	1.39	2 (13%)
10	MAN	M	5	10	11,11,12	0.62	0	15,15,17	0.99	2 (13%)
10	MAN	M	6	10	11,11,12	0.71	0	15,15,17	0.89	1 (6%)
10	MAN	M	7	10	11,11,12	0.79	0	15,15,17	0.96	1 (6%)
10	MAN	M	8	10	11,11,12	0.65	0	15,15,17	1.12	1 (6%)
10	MAN	M	9	10	11,11,12	0.77	1 (9%)	15,15,17	1.39	2 (13%)
9	NAG	N	1	9,4	14,14,15	0.33	0	17,19,21	0.56	0
9	NAG	N	2	9	14,14,15	0.25	0	17,19,21	0.38	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
7	NAG	A	1	4,7	-	0/6/23/26	0/1/1/1
7	NAG	A	2	7	-	5/6/23/26	0/1/1/1
7	BMA	A	3	7	-	2/2/19/22	0/1/1/1
7	MAN	A	4	7	-	2/2/19/22	0/1/1/1
7	MAN	A	5	7	-	1/2/19/22	0/1/1/1
7	MAN	A	6	7	-	0/2/19/22	0/1/1/1
8	NAG	C	1	8,4	-	0/6/23/26	0/1/1/1
8	NAG	C	2	8	-	0/6/23/26	0/1/1/1
8	BMA	C	3	8	-	0/2/19/22	0/1/1/1
9	NAG	F	1	9,4	-	1/6/23/26	0/1/1/1
9	NAG	F	2	9	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
8	NAG	I	1	8,4	-	0/6/23/26	0/1/1/1
8	NAG	I	2	8	-	2/6/23/26	0/1/1/1
8	BMA	I	3	8	-	0/2/19/22	0/1/1/1
9	NAG	J	1	9,4	-	2/6/23/26	0/1/1/1
9	NAG	J	2	9	-	2/6/23/26	0/1/1/1
9	NAG	K	1	9,4	-	0/6/23/26	0/1/1/1
9	NAG	K	2	9	-	2/6/23/26	0/1/1/1
10	NAG	M	1	10,4	-	3/6/23/26	0/1/1/1
10	MAN	M	10	10	-	0/2/19/22	0/1/1/1
10	NAG	M	2	10	-	2/6/23/26	0/1/1/1
10	BMA	M	3	10	-	0/2/19/22	0/1/1/1
10	MAN	M	4	10	-	2/2/19/22	0/1/1/1
10	MAN	M	5	10	-	2/2/19/22	0/1/1/1
10	MAN	M	6	10	-	2/2/19/22	0/1/1/1
10	MAN	M	7	10	-	0/2/19/22	0/1/1/1
10	MAN	M	8	10	-	1/2/19/22	0/1/1/1
10	MAN	M	9	10	-	2/2/19/22	0/1/1/1
9	NAG	N	1	9,4	-	0/6/23/26	0/1/1/1
9	NAG	N	2	9	-	0/6/23/26	0/1/1/1

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	5	MAN	C1-C2	4.19	1.61	1.52
7	A	5	MAN	O5-C1	3.30	1.49	1.43
7	A	4	MAN	C1-C2	2.82	1.58	1.52
7	A	4	MAN	C2-C3	2.49	1.56	1.52
10	M	4	MAN	C1-C2	2.35	1.57	1.52

The worst 5 of 22 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
7	A	5	MAN	C1-O5-C5	6.66	121.22	112.19
10	M	1	NAG	C2-N2-C7	4.48	129.28	122.90
10	M	9	MAN	C1-O5-C5	4.32	118.05	112.19
7	A	2	NAG	C2-N2-C7	4.32	129.05	122.90
7	A	4	MAN	C1-C2-C3	4.19	114.82	109.67

There are no chirality outliers.

5 of 35 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
10	M	4	MAN	O5-C5-C6-O6
10	M	2	NAG	O5-C5-C6-O6
8	I	2	NAG	O5-C5-C6-O6
7	A	3	BMA	O5-C5-C6-O6
10	M	9	MAN	O5-C5-C6-O6

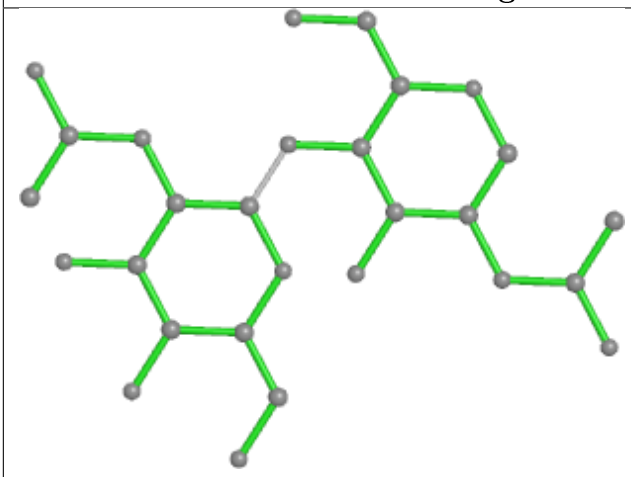
There are no ring outliers.

5 monomers are involved in 5 short contacts:

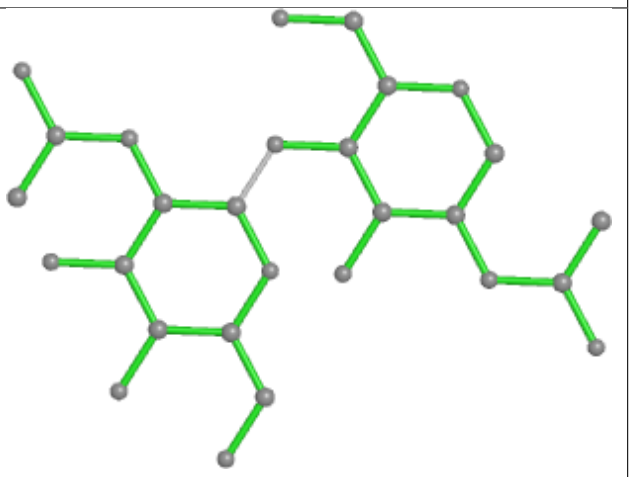
Mol	Chain	Res	Type	Clashes	Symm-Clashes
10	M	1	NAG	1	0
10	M	4	MAN	1	0
10	M	9	MAN	1	0
9	F	1	NAG	1	0
7	A	2	NAG	1	0

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

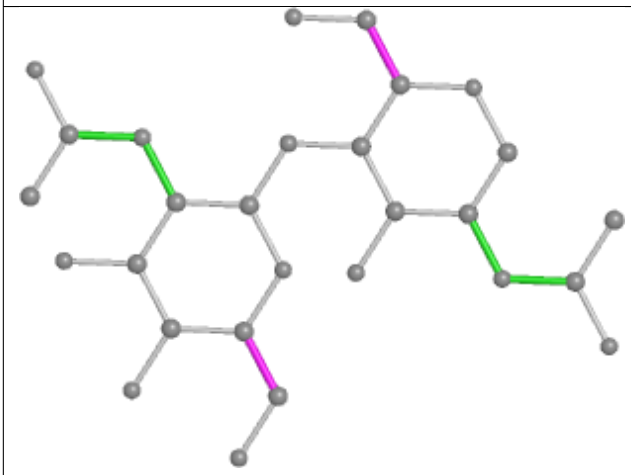
Oligosaccharide Chain J



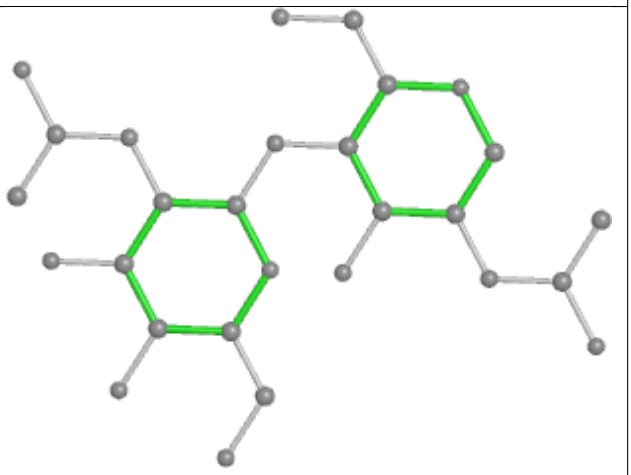
Bond lengths



Bond angles

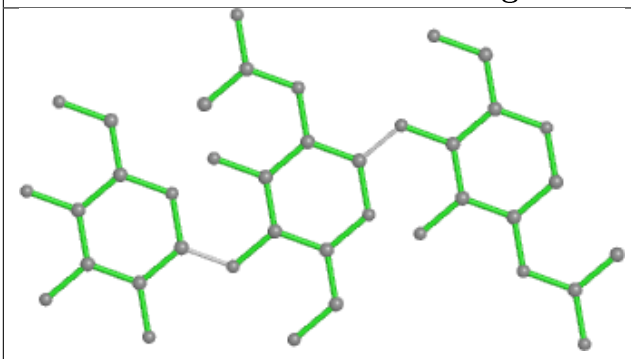


Torsions

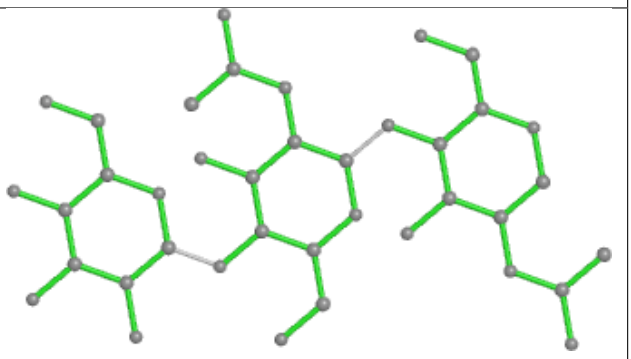


Rings

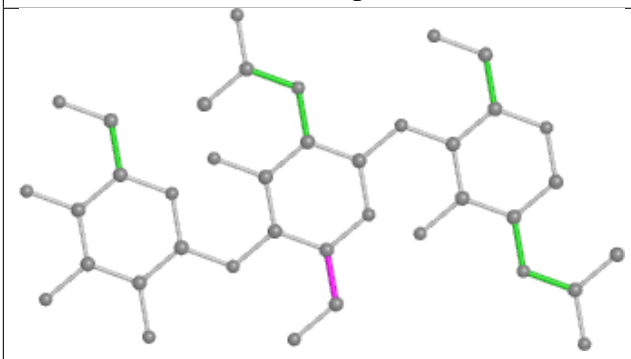
Oligosaccharide Chain I



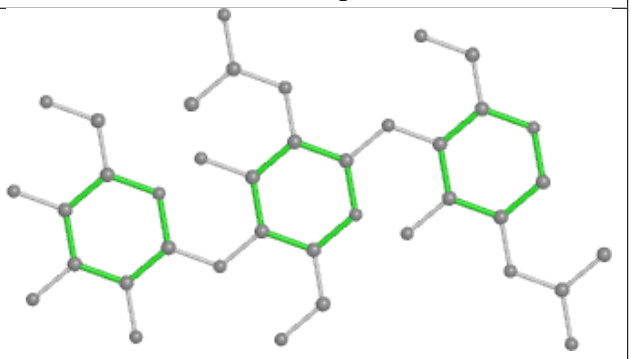
Bond lengths



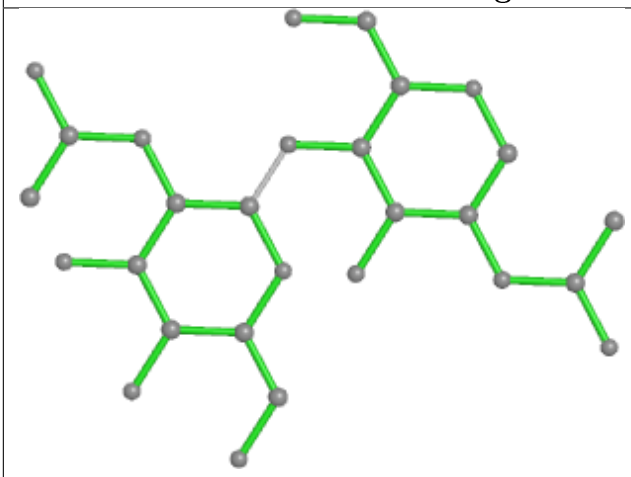
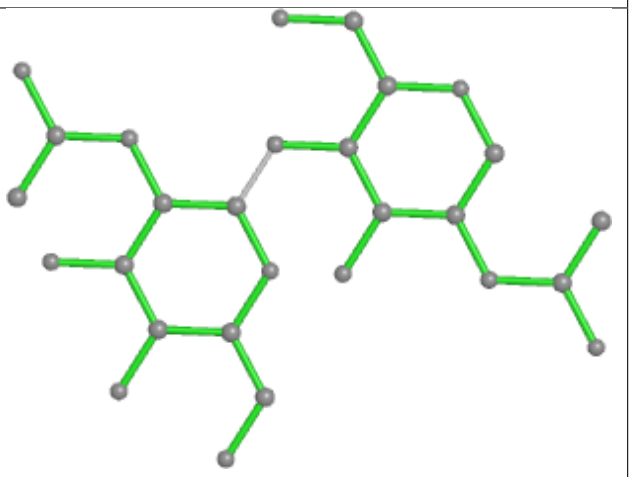
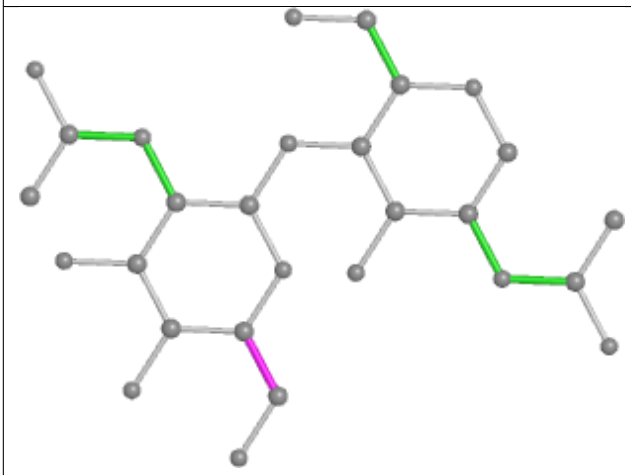
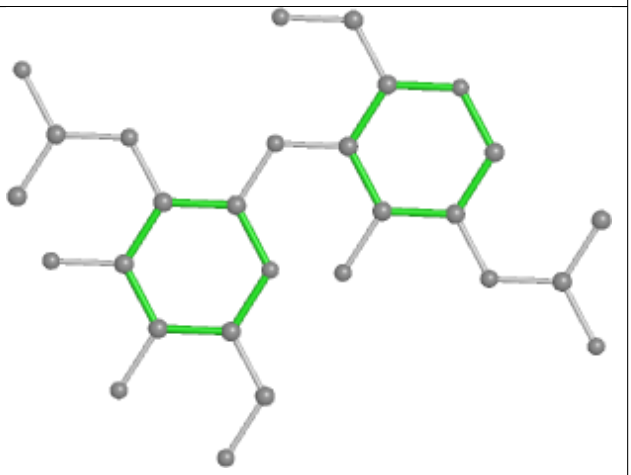
Bond angles

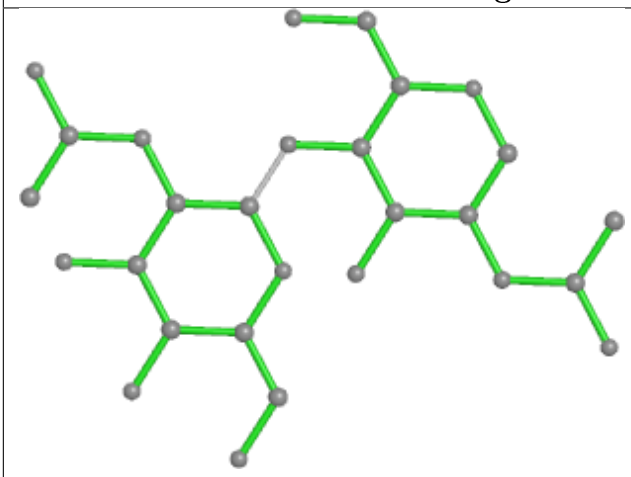
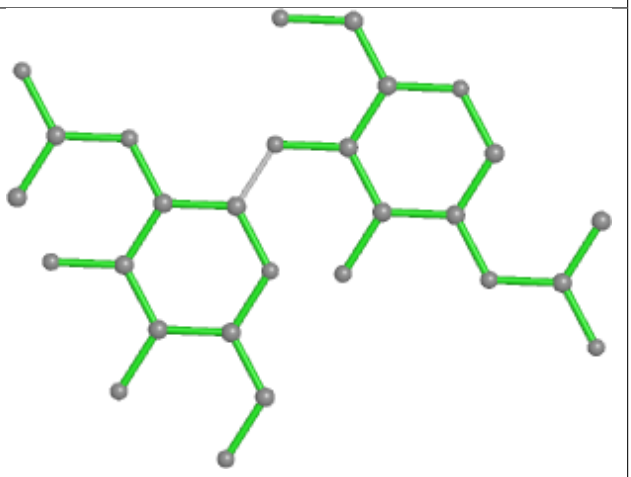
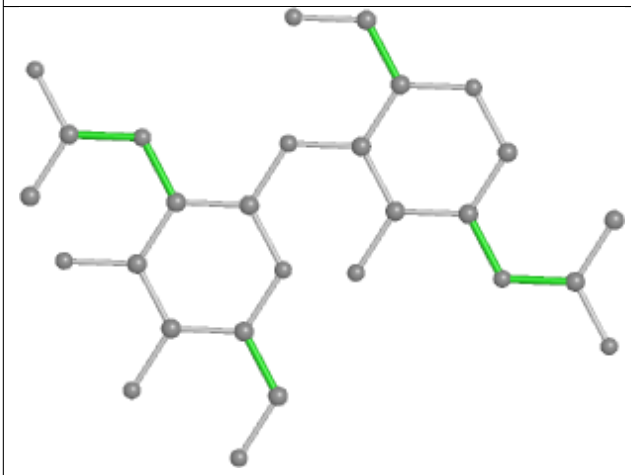
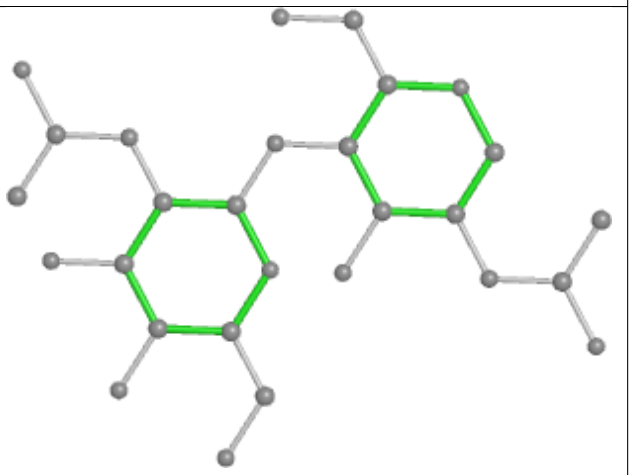


Torsions

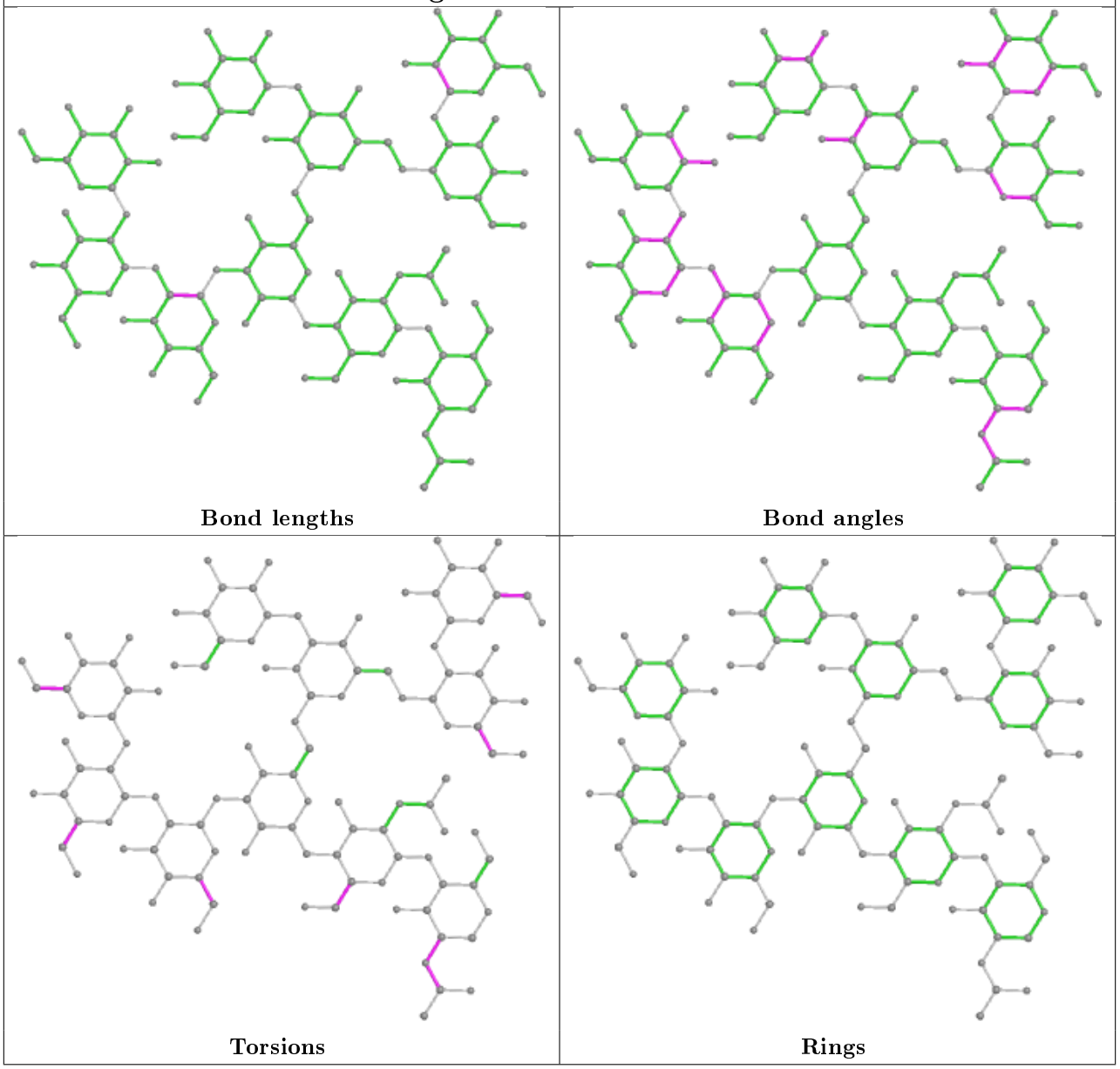


Rings

Oligosaccharide Chain K	
 Bond lengths	 Bond angles
 Torsions	 Rings

Oligosaccharide Chain N	
 Bond lengths	 Bond angles
 Torsions	 Rings

Oligosaccharide Chain M



5.6 Ligand geometry (i)

11 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	$\#\|Z\|>2$
11	NAG	B	701	1	14,14,15	0.36	0	17,19,21	0.53	0
11	NAG	G	618	4	14,14,15	0.25	0	17,19,21	0.40	0
12	JYV	G	638	-	42,48,48	5.02	19 (45%)	49,67,67	2.67	16 (32%)
11	NAG	D	201	2	14,14,15	0.30	0	17,19,21	0.49	0
11	NAG	B	702	1	14,14,15	0.22	0	17,19,21	0.44	0
11	NAG	G	635	4	14,14,15	0.25	0	17,19,21	0.54	0
11	NAG	G	607	4	14,14,15	0.24	0	17,19,21	0.51	0
11	NAG	G	611	4	14,14,15	0.28	0	17,19,21	0.45	0
11	NAG	G	634	4	14,14,15	0.22	0	17,19,21	0.47	0
11	NAG	G	614	4	14,14,15	0.30	0	17,19,21	0.42	0
11	NAG	G	633	4	14,14,15	0.26	0	17,19,21	0.46	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
11	NAG	B	701	1	-	2/6/23/26	0/1/1/1
11	NAG	G	618	4	-	2/6/23/26	0/1/1/1
12	JYV	G	638	-	-	12/28/48/48	0/5/5/5
11	NAG	D	201	2	-	1/6/23/26	0/1/1/1
11	NAG	B	702	1	-	1/6/23/26	0/1/1/1
11	NAG	G	635	4	-	2/6/23/26	0/1/1/1
11	NAG	G	607	4	-	0/6/23/26	0/1/1/1
11	NAG	G	611	4	-	2/6/23/26	0/1/1/1
11	NAG	G	634	4	-	2/6/23/26	0/1/1/1
11	NAG	G	614	4	-	1/6/23/26	0/1/1/1
11	NAG	G	633	4	-	0/6/23/26	0/1/1/1

The worst 5 of 19 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
12	G	638	JYV	C01-N34	14.56	1.47	1.32
12	G	638	JYV	C16-S44	-11.26	1.52	1.70
12	G	638	JYV	C23-C22	8.88	1.53	1.39
12	G	638	JYV	C27-C22	8.41	1.52	1.39
12	G	638	JYV	C05-C04	8.37	1.52	1.38

The worst 5 of 16 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
12	G	638	JYV	C13-C12-C21	9.16	125.24	112.09
12	G	638	JYV	C11-C12-C21	8.65	124.51	112.09
12	G	638	JYV	C22-C21-C28	6.69	119.25	110.88
12	G	638	JYV	C11-C10-N36	4.27	117.31	110.82
12	G	638	JYV	O43-C04-C03	4.00	121.77	115.89

There are no chirality outliers.

5 of 25 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
12	G	638	JYV	C13-C12-C21-C22
12	G	638	JYV	C13-C12-C21-C28
12	G	638	JYV	N34-C01-C15-C16
12	G	638	JYV	C17-C18-N38-C30
11	G	634	NAG	C4-C5-C6-O6

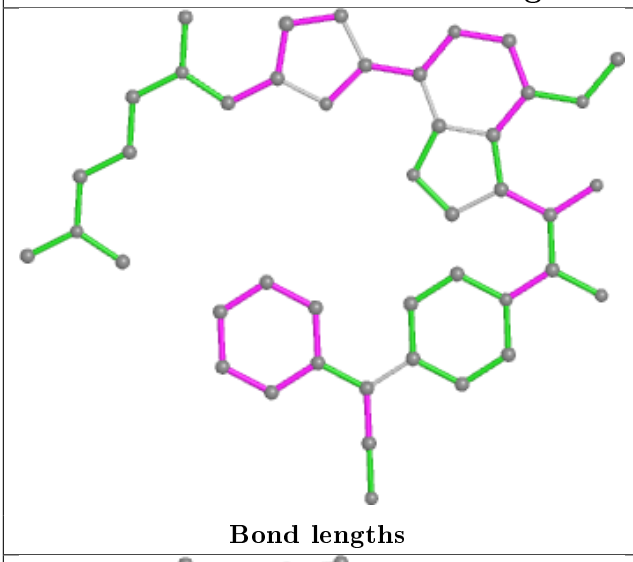
There are no ring outliers.

2 monomers are involved in 3 short contacts:

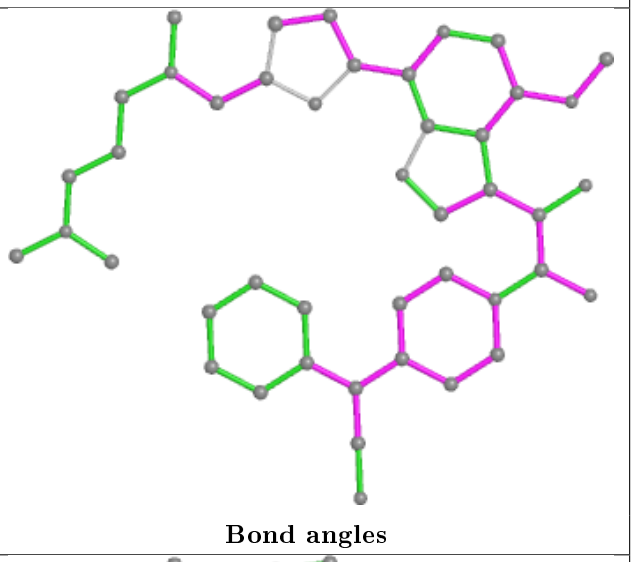
Mol	Chain	Res	Type	Clashes	Symm-Clashes
12	G	638	JYV	2	0
11	G	614	NAG	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 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.

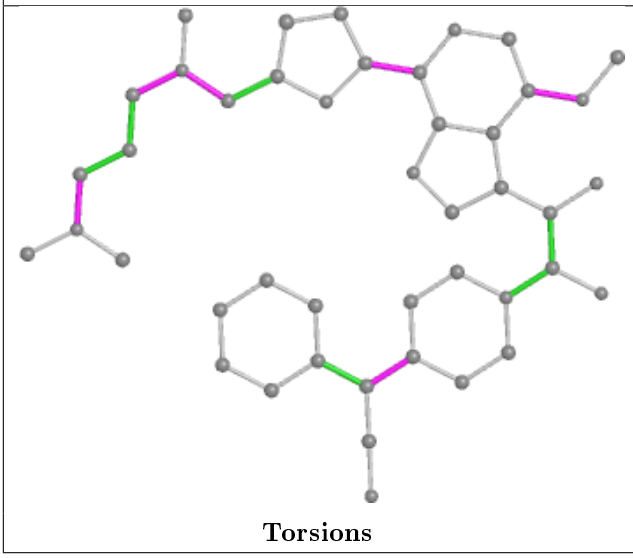
Ligand JYV G 638



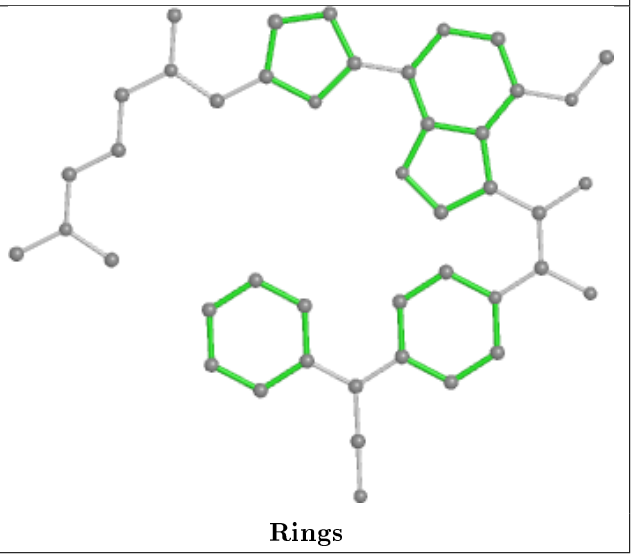
Bond lengths



Bond angles



Torsions



Rings

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, 95^{th} 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	B	128/153 (83%)	-0.00	2 (1%) 72 78	10, 35, 70, 108	0
2	D	128/134 (95%)	1.11	28 (21%) 0 1	38, 80, 118, 125	0
3	E	105/114 (92%)	0.59	11 (10%) 6 9	39, 68, 108, 119	0
4	G	442/481 (91%)	-0.07	20 (4%) 33 42	7, 30, 84, 122	0
5	H	226/244 (92%)	0.13	8 (3%) 44 53	18, 49, 87, 107	0
6	L	211/217 (97%)	-0.30	2 (0%) 84 89	10, 33, 54, 109	0
All	All	1240/1343 (92%)	0.11	71 (5%) 23 30	7, 41, 99, 125	0

The worst 5 of 71 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	517	ALA	11.0
2	D	18	VAL	7.7
4	G	188	ASN	7.5
2	D	110	THR	6.8
6	L	7	TYR	6.4

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

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

6.3 Carbohydrates

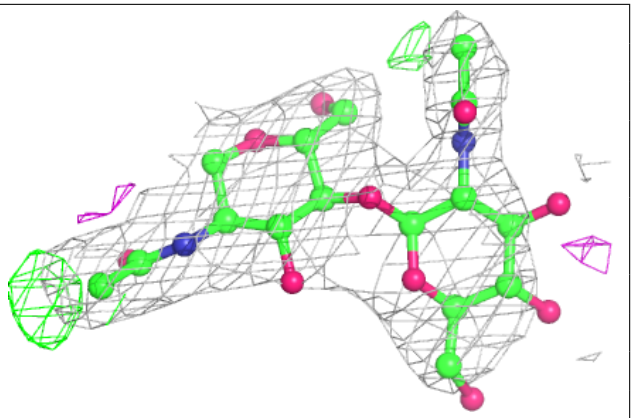
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

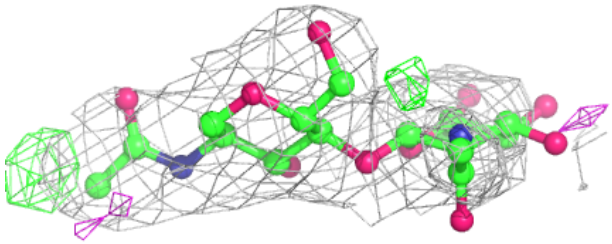
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
9	NAG	J	2	14/15	0.81	0.39	56,95,104,109	0
9	NAG	F	2	14/15	0.81	0.31	83,99,106,122	0
8	BMA	C	3	11/12	0.86	0.25	79,107,126,129	0
7	MAN	A	4	11/12	0.86	0.27	61,89,93,93	0
9	NAG	K	2	14/15	0.88	0.28	63,78,95,100	0
10	MAN	M	9	11/12	0.89	0.35	82,90,101,107	0
8	NAG	C	2	14/15	0.90	0.21	68,86,99,111	0
8	NAG	I	2	14/15	0.91	0.17	33,55,71,71	0
9	NAG	N	2	14/15	0.92	0.22	66,77,90,95	0
10	MAN	M	6	11/12	0.92	0.15	23,35,46,57	0
9	NAG	J	1	14/15	0.92	0.14	34,57,73,89	0
10	MAN	M	7	11/12	0.93	0.13	33,48,65,67	0
8	BMA	I	3	11/12	0.93	0.22	70,85,101,107	0
10	MAN	M	10	11/12	0.93	0.12	48,62,68,79	0
10	NAG	M	1	14/15	0.93	0.13	33,48,61,63	0
10	MAN	M	8	11/12	0.93	0.16	46,58,71,75	0
8	NAG	C	1	14/15	0.94	0.15	28,54,67,79	0
7	MAN	A	5	11/12	0.94	0.25	73,89,98,116	0
10	BMA	M	3	11/12	0.95	0.10	35,40,45,45	0
7	NAG	A	1	14/15	0.95	0.15	17,35,43,46	0
7	MAN	A	6	11/12	0.95	0.11	26,41,52,55	0
8	NAG	I	1	14/15	0.95	0.15	5,24,41,43	0
9	NAG	F	1	14/15	0.95	0.15	40,62,78,89	0
10	MAN	M	4	11/12	0.96	0.12	15,23,34,35	0
9	NAG	N	1	14/15	0.96	0.17	43,51,71,76	0
10	MAN	M	5	11/12	0.96	0.13	18,24,34,34	0
7	NAG	A	2	14/15	0.96	0.11	31,42,53,60	0
9	NAG	K	1	14/15	0.96	0.14	17,29,45,65	0
10	NAG	M	2	14/15	0.96	0.12	17,43,52,59	0
7	BMA	A	3	11/12	0.96	0.13	33,46,60,80	0

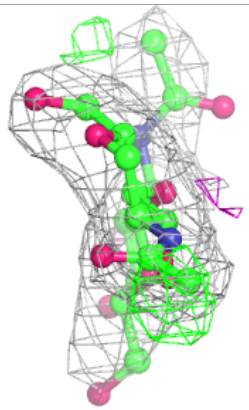
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around Chain J:

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

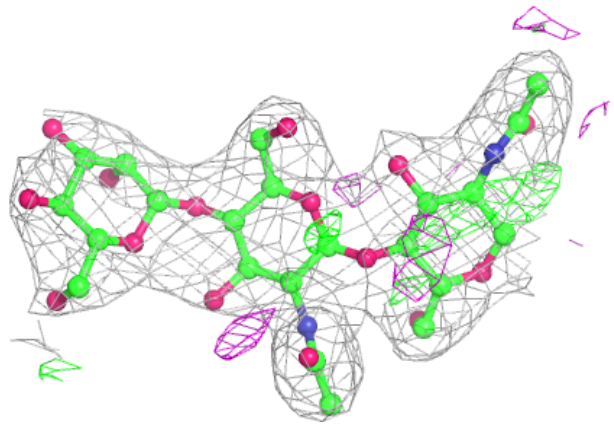


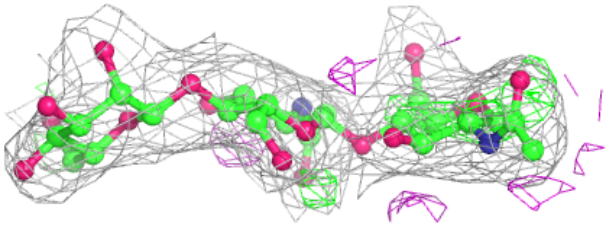


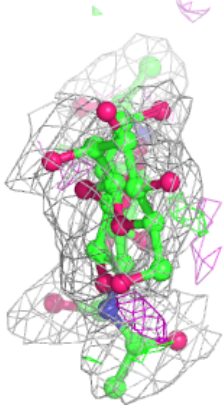


Electron density around Chain I:

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

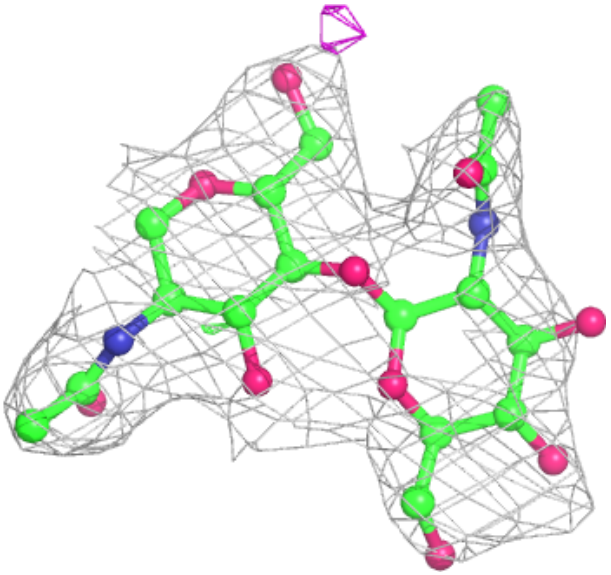


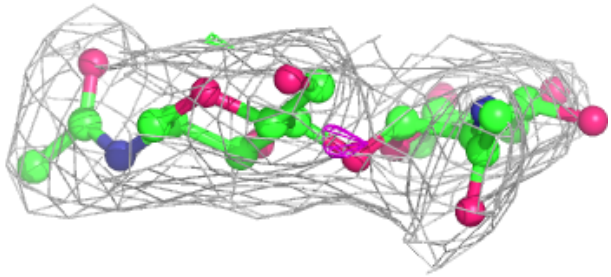


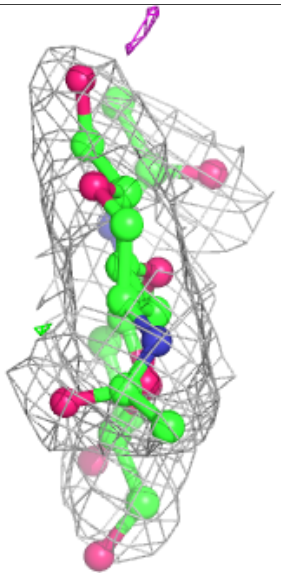


Electron density around Chain K:

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

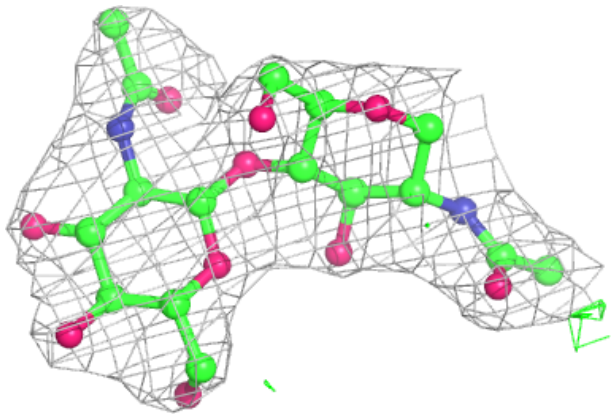


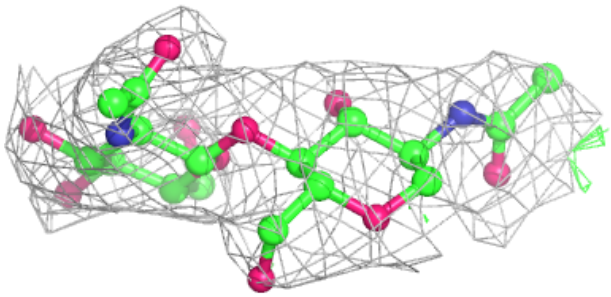


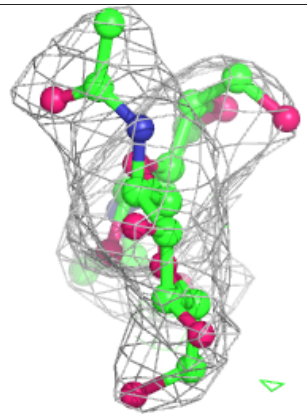


Electron density around Chain N:

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

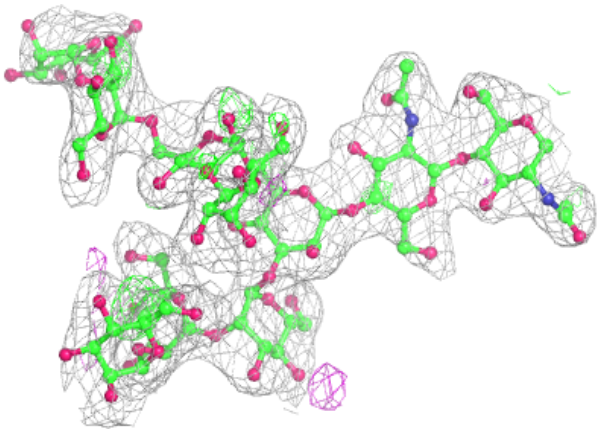


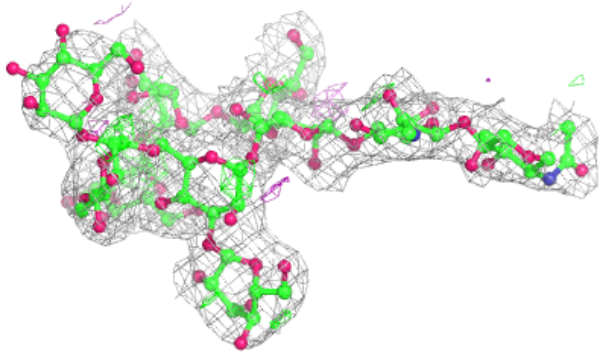


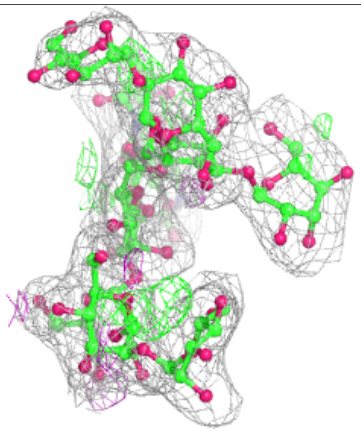


Electron density around Chain M:

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







6.4 Ligands

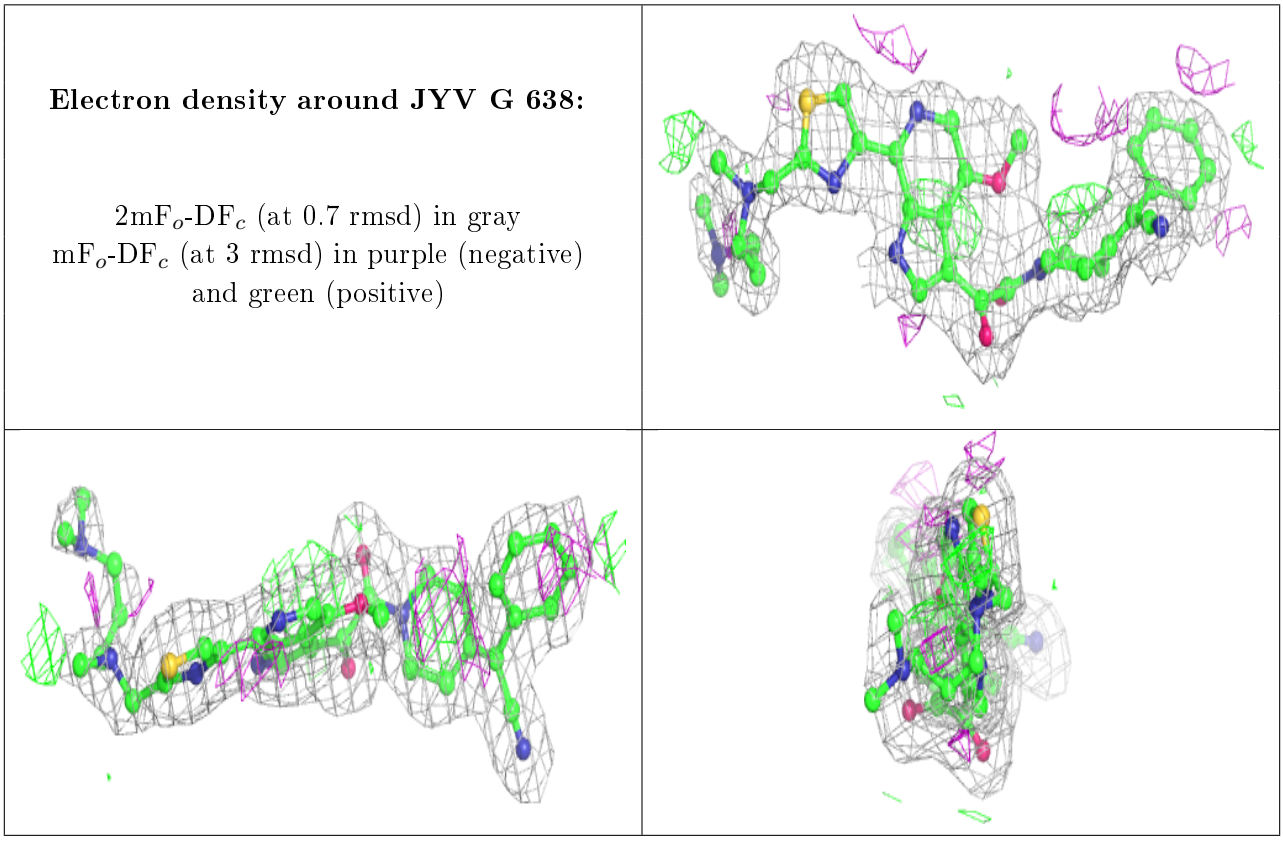
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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
11	NAG	D	201	14/15	0.85	0.32	61,91,104,108	0
11	NAG	B	702	14/15	0.88	0.35	70,98,109,118	0
11	NAG	G	633	14/15	0.88	0.29	81,98,111,114	0
11	NAG	G	607	14/15	0.89	0.33	79,89,115,121	0
11	NAG	B	701	14/15	0.90	0.39	45,75,88,103	0
11	NAG	G	618	14/15	0.92	0.30	53,72,91,97	0
11	NAG	G	611	14/15	0.92	0.21	37,76,84,99	0
11	NAG	G	635	14/15	0.92	0.15	41,52,67,74	0
11	NAG	G	614	14/15	0.93	0.23	63,76,86,90	0
12	JYV	G	638	44/44	0.94	0.17	3,15,70,90	0
11	NAG	G	634	14/15	0.94	0.16	38,57,67,74	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 JYV G 638:

$2mF_o$-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.