Full wwPDB X-ray Structure Validation Report (i)

Sep 25, 2023 – 04:12 PM EDT

PDB ID	:	6BMK
Title	:	Crystal structure of MHC-I like protein
Authors	:	Khandokar, Y.B.; Le Nours, J.; Rossjohn, J.
Deposited on	:	2017-11-15
Resolution	:	2.43 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 (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:

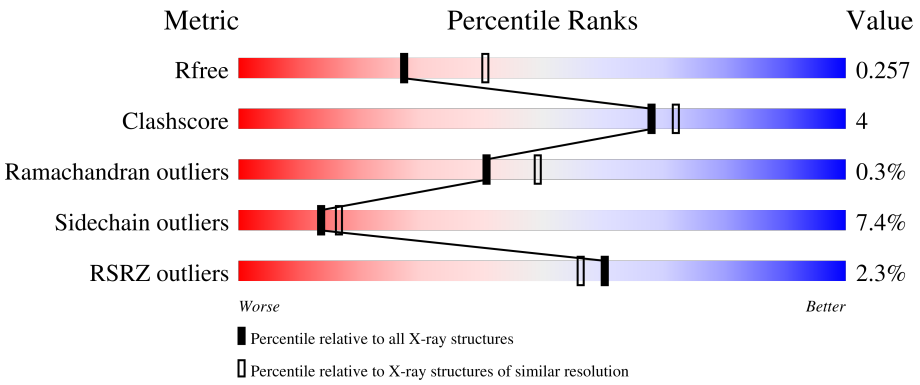
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35.1

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 2.43 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	1564 (2.46-2.42)
Clashscore	141614	1631 (2.46-2.42)
Ramachandran outliers	138981	1617 (2.46-2.42)
Sidechain outliers	138945	1617 (2.46-2.42)
RSRZ outliers	127900	1547 (2.46-2.42)

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	276	4% 85% 12% ••
1	C	276	2% 84% 13% ••
2	B	99	% 86% 12% ••
2	D	99	88% 10% ••
3	E	2	50% 50%

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Mol	Chain	Length	Quality of chain
3	F	2	50% 50%

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 6066 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Antigen-presenting glycoprotein CD1d2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	272	2150	1372	367	401	10	1	0	0
1	C	272	2130	1362	365	393	10	1	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	46	ILE	THR	conflict	UNP P11610
C	46	ILE	THR	conflict	UNP P11610

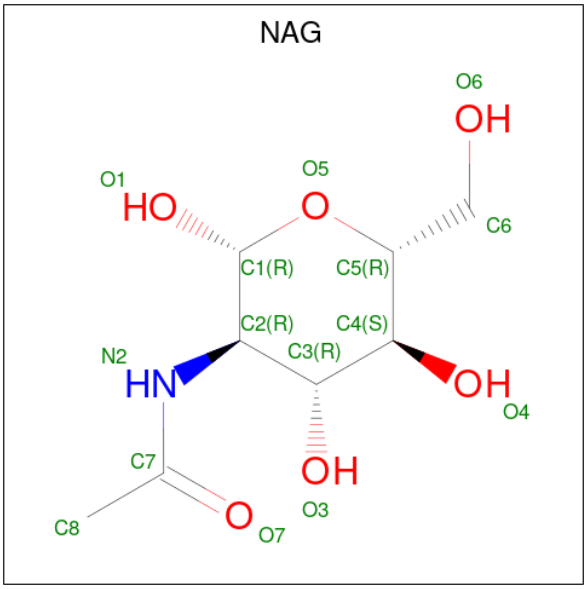
- Molecule 2 is a protein called Beta-2-microglobulin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	98	785	499	131	148	7	0	0	0
2	D	98	773	493	130	143	7	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.

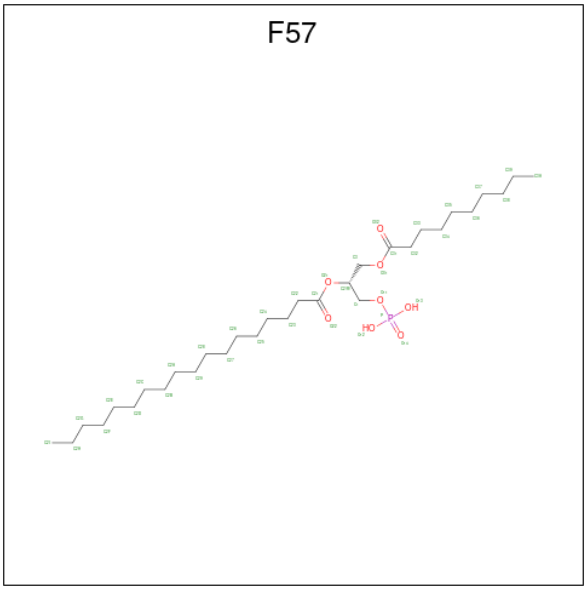
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	E	2	28	16	2	10	0	0	0
3	F	2	28	16	2	10	0	0	0

- Molecule 4 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		
4	A	1	14	8	1	5	0	0
			Total	C	N	O		
4	C	1	14	8	1	5	0	0

- Molecule 5 is (2R)-1-(decanoyloxy)-3-(phosphonooxy)propan-2-yl octadecanoate (three-letter code: F57) (formula: $C_{31}H_{61}O_8P$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	P		
5	A	1	40	31	8	1	0	0
			Total	C	O	P		
5	C	1	40	31	8	1	0	0

- Molecule 6 is water.

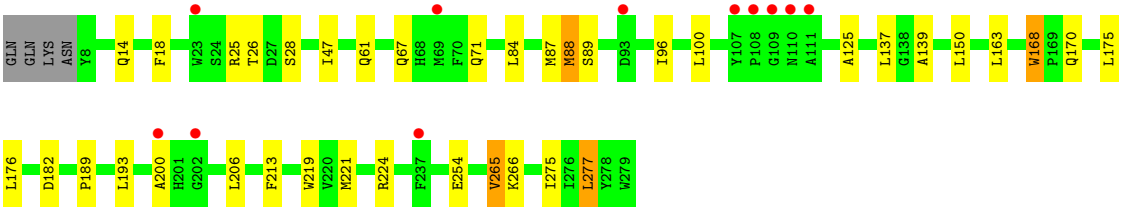
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
6	A	23	23	23	0	0
			Total	O		
6	B	10	10	10	0	0
			Total	O		
6	C	17	17	17	0	0
			Total	O		
6	D	14	14	14	0	0

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.

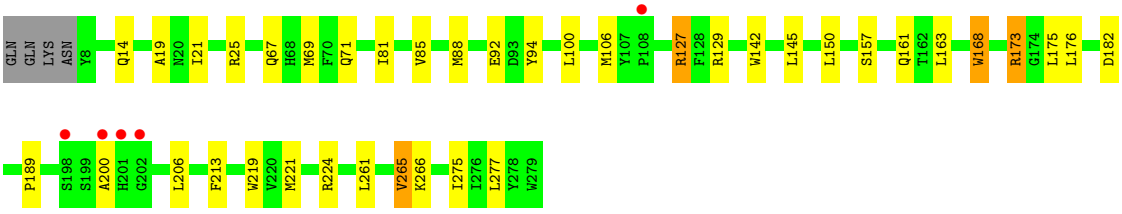
• Molecule 1: Antigen-presenting glycoprotein CD1d2

Chain A:



• Molecule 1: Antigen-presenting glycoprotein CD1d2

Chain C:



• Molecule 2: Beta-2-microglobulin

Chain B:

• Molecule 2: Beta-2-microglobulin

Chain D:

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

Chain E:

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

Chain F:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	58.57Å 71.55Å 104.75Å 90.00° 101.78° 90.00°	Depositor
Resolution (Å)	44.74 – 2.43 43.63 – 2.43	Depositor EDS
% Data completeness (in resolution range)	99.8 (44.74-2.43) 99.8 (43.63-2.43)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.87 (at 2.42Å)	Xtriage
Refinement program	BUSTER 2.10.2	Depositor
R, R_{free}	0.217 , 0.249 0.222 , 0.257	Depositor DCC
R_{free} test set	1627 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å^2)	36.5	Xtriage
Anisotropy	0.527	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 54.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	6066	wwPDB-VP
Average B, all atoms (Å^2)	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.38% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, F57

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\| >5$	RMSZ	$\#\|Z\| >5$
1	A	0.51	0/2213	0.69	0/3015
1	C	0.52	0/2192	0.68	0/2987
2	B	0.51	0/811	0.69	0/1109
2	D	0.52	0/799	0.69	0/1094
All	All	0.51	0/6015	0.69	0/8205

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2150	0	2023	16	0
1	C	2130	0	2006	22	0
2	B	785	0	717	4	0
2	D	773	0	703	3	0
3	E	28	0	25	0	0
3	F	28	0	25	0	0
4	A	14	0	13	1	0
4	C	14	0	13	1	0
5	A	40	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	C	40	0	0	0	0
6	A	23	0	0	0	0
6	B	10	0	0	0	0
6	C	17	0	0	0	0
6	D	14	0	0	0	0
All	All	6066	0	5525	44	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 4.

All (44) 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:224:ARG:HG3	1:C:261:LEU:CD2	2.01	0.90
1:C:224:ARG:HG3	1:C:261:LEU:HD21	1.61	0.80
1:C:106:MET:HE1	1:C:173:ARG:HG2	1.70	0.73
1:C:224:ARG:HG3	1:C:261:LEU:HD23	1.85	0.58
1:A:219:TRP:HB3	1:A:266:LYS:HB2	1.89	0.54
1:C:219:TRP:HB3	1:C:266:LYS:HB2	1.90	0.53
2:D:73:THR:HG22	2:D:76:ASP:H	1.73	0.53
2:B:73:THR:HG22	2:B:76:ASP:H	1.74	0.53
1:C:127:ARG:HE	1:C:129:ARG:HG3	1.75	0.52
1:C:224:ARG:CG	1:C:261:LEU:HD21	2.35	0.52
2:D:7:ILE:HD12	2:D:91:LYS:HD2	1.93	0.51
1:A:125:ALA:HA	1:A:139:ALA:HB2	1.93	0.50
2:B:7:ILE:HD12	2:B:91:LYS:HD2	1.94	0.50
2:B:74:GLU:HG3	2:B:75:THR:HG23	1.92	0.50
1:A:265:VAL:HG13	1:A:275:ILE:HB	1.94	0.50
1:C:265:VAL:HG13	1:C:275:ILE:HB	1.94	0.49
1:C:25:ARG:HB3	4:C:501:NAG:H82	1.94	0.49
1:C:19:ALA:O	1:C:94:TYR:HB3	2.11	0.48
1:C:14:GLN:HB3	1:C:100:LEU:HB3	1.95	0.48
1:A:14:GLN:HB3	1:A:100:LEU:HB2	1.97	0.47
1:C:224:ARG:CG	1:C:261:LEU:CD2	2.83	0.47
1:C:168:TRP:HE3	1:C:168:TRP:HA	1.80	0.47
1:C:168:TRP:HA	1:C:168:TRP:CE3	2.50	0.47
1:A:18:PHE:HB2	1:A:96:ILE:HB	1.97	0.47
1:C:219:TRP:CZ2	1:C:221:MET:HG3	2.49	0.46
1:A:189:PRO:HB3	1:A:213:PHE:HB3	1.98	0.46
1:A:219:TRP:CZ2	1:A:221:MET:HG3	2.49	0.46
1:A:168:TRP:HA	1:A:168:TRP:CE3	2.50	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:168:TRP:HA	1:A:168:TRP:HE3	1.80	0.46
1:C:81:ILE:O	1:C:85:VAL:HG23	2.17	0.45
1:C:92:GLU:HG2	1:C:142:TRP:CH2	2.51	0.45
1:C:189:PRO:HB3	1:C:213:PHE:HB3	1.99	0.45
1:A:87:MET:HG3	1:A:88:MET:HG2	1.99	0.45
1:C:157:SER:O	1:C:161:GLN:HG3	2.17	0.44
1:C:106:MET:CE	1:C:173:ARG:HG2	2.44	0.44
1:A:25:ARG:HB3	4:A:501:NAG:H82	2.00	0.43
1:A:137:LEU:HD11	2:D:22:ILE:HG13	2.00	0.42
1:A:219:TRP:CH2	1:A:221:MET:HB2	2.55	0.42
1:C:67:GLN:O	1:C:71:GLN:HG3	2.19	0.42
1:A:47:ILE:HD12	1:A:67:GLN:HG3	2.02	0.42
1:C:219:TRP:CH2	1:C:221:MET:HB2	2.56	0.40
1:A:67:GLN:O	1:A:71:GLN:HG3	2.21	0.40
1:A:193:LEU:HG	1:A:277:LEU:HD13	2.03	0.40
2:B:34:HIS:O	2:B:84:HIS:HD2	2.04	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	270/276 (98%)	260 (96%)	9 (3%)	1 (0%)	34	41
1	C	270/276 (98%)	262 (97%)	7 (3%)	1 (0%)	34	41
2	B	96/99 (97%)	96 (100%)	0	0	100	100
2	D	96/99 (97%)	96 (100%)	0	0	100	100
All	All	732/750 (98%)	714 (98%)	16 (2%)	2 (0%)	41	49

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	200	ALA
1	C	200	ALA

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	227/240 (95%)	209 (92%)	18 (8%)	12	14
1	C	222/240 (92%)	207 (93%)	15 (7%)	16	19
2	B	86/93 (92%)	80 (93%)	6 (7%)	15	18
2	D	83/93 (89%)	76 (92%)	7 (8%)	11	12
All	All	618/666 (93%)	572 (93%)	46 (7%)	13	16

All (46) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	26	THR
1	A	28	SER
1	A	61	GLN
1	A	84	LEU
1	A	88	MET
1	A	89	SER
1	A	150	LEU
1	A	163	LEU
1	A	168	TRP
1	A	170	GLN
1	A	175	LEU
1	A	176	LEU
1	A	182	ASP
1	A	206	LEU
1	A	224	ARG
1	A	254	GLU
1	A	265	VAL
1	A	277	LEU
2	B	12	ARG
2	B	40	LEU

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Mol	Chain	Res	Type
2	B	64	ILE
2	B	70	PHE
2	B	73	THR
2	B	93	VAL
1	C	21	ILE
1	C	69	MET
1	C	88	MET
1	C	127	ARG
1	C	145	LEU
1	C	150	LEU
1	C	163	LEU
1	C	168	TRP
1	C	173	ARG
1	C	175	LEU
1	C	176	LEU
1	C	182	ASP
1	C	206	LEU
1	C	265	VAL
1	C	277	LEU
2	D	12	ARG
2	D	40	LEU
2	D	64	ILE
2	D	70	PHE
2	D	73	THR
2	D	89	GLU
2	D	93	VAL

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

Mol	Chain	Res	Type
1	A	14	GLN

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)

4 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	E	1	1,3	14,14,15	0.33	0	17,19,21	0.76	0
3	NAG	E	2	3	14,14,15	0.32	0	17,19,21	0.90	1 (5%)
3	NAG	F	1	1,3	14,14,15	0.37	0	17,19,21	0.68	0
3	NAG	F	2	3	14,14,15	0.38	0	17,19,21	0.89	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	E	1	1,3	-	1/6/23/26	0/1/1/1
3	NAG	E	2	3	-	0/6/23/26	0/1/1/1
3	NAG	F	1	1,3	-	2/6/23/26	0/1/1/1
3	NAG	F	2	3	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	E	2	NAG	C1-O5-C5	3.23	116.56	112.19
3	F	2	NAG	C1-O5-C5	3.15	116.46	112.19

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	F	1	NAG	C4-C5-C6-O6
3	E	1	NAG	C4-C5-C6-O6

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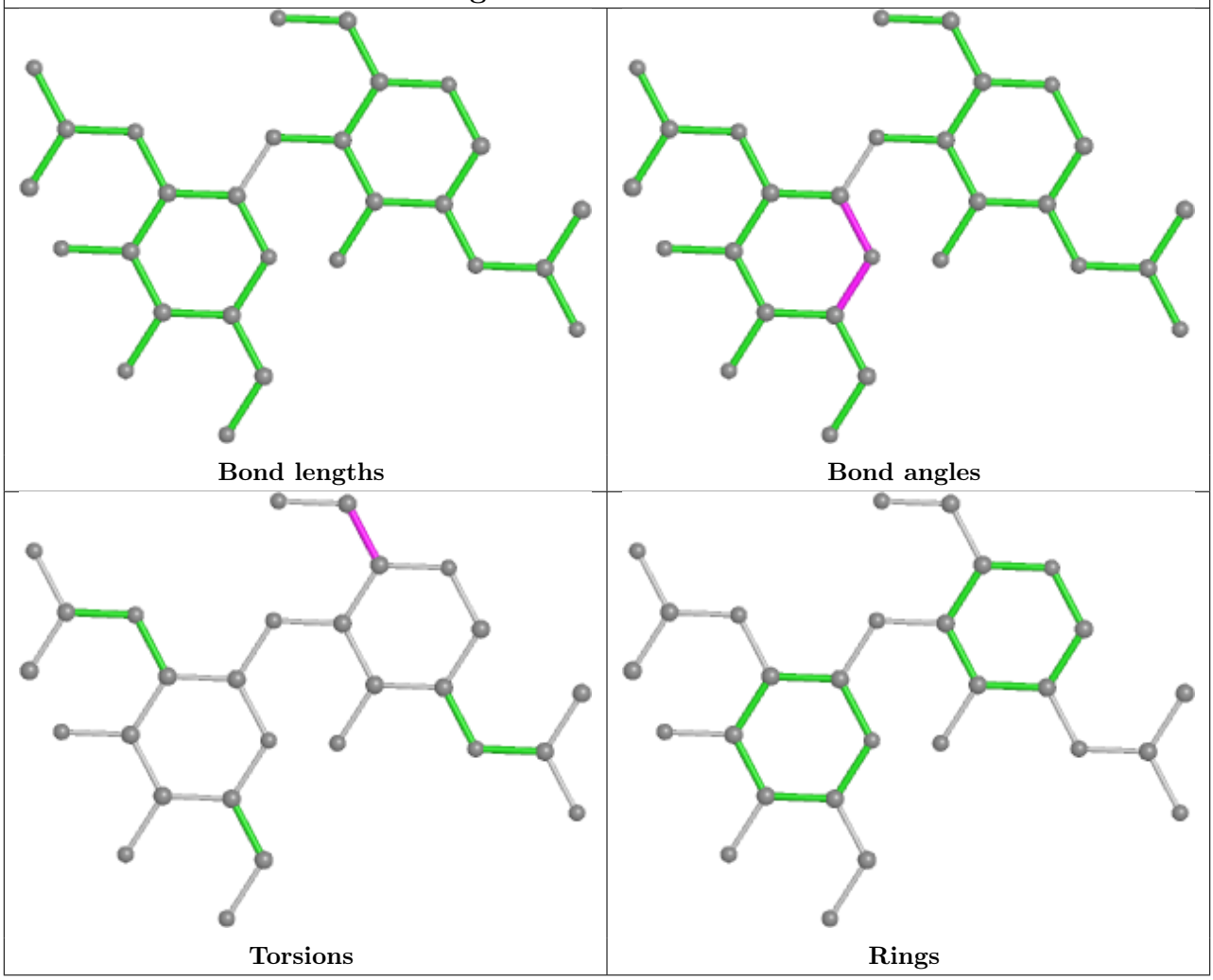
Mol	Chain	Res	Type	Atoms
3	F	1	NAG	O5-C5-C6-O6

There are no ring outliers.

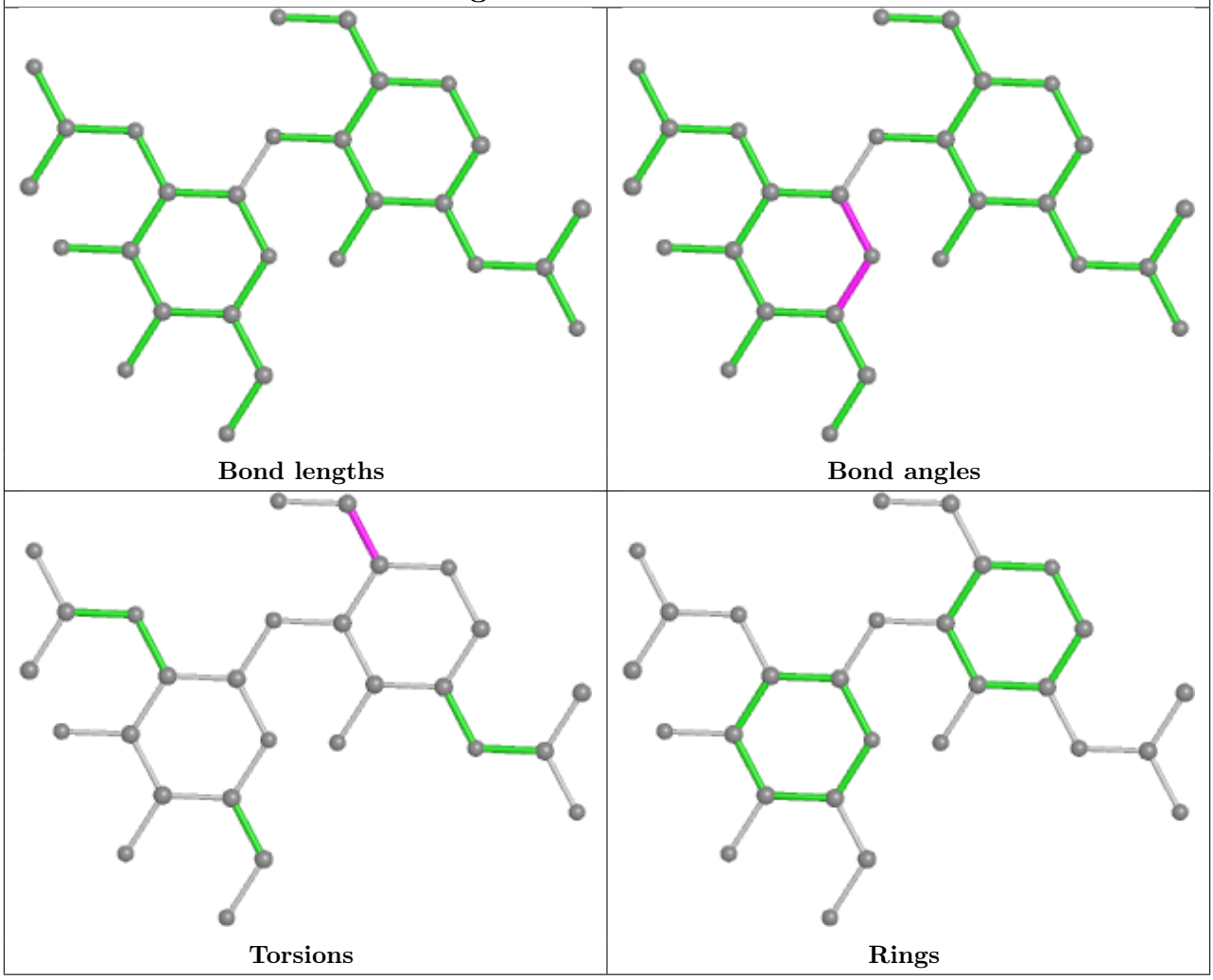
No monomer is involved in short contacts.

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

Oligosaccharide Chain E



Oligosaccharide Chain F



5.6 Ligand geometry (i)

4 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	F57	C	504	-	39,39,39	0.72	0	43,44,44	0.97	1 (2%)
5	F57	A	504	-	39,39,39	0.76	0	43,44,44	1.06	2 (4%)
4	NAG	C	501	1	14,14,15	0.36	0	17,19,21	0.63	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
4	NAG	A	501	1	14,14,15	0.33	0	17,19,21	0.77	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	F57	C	504	-	-	22/41/41/41	-
5	F57	A	504	-	-	24/41/41/41	-
4	NAG	C	501	1	-	0/6/23/26	0/1/1/1
4	NAG	A	501	1	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	A	504	F57	C2-O21-C21	3.79	127.12	117.79
5	A	504	F57	O12-P-O14	2.30	119.68	110.68
5	C	504	F57	O12-P-O14	2.27	119.57	110.68

There are no chirality outliers.

All (46) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	504	F57	O22-C21-O21-C2
5	A	504	F57	C22-C21-O21-C2
5	C	504	F57	C32-C31-O31-C3
5	A	504	F57	C32-C31-O31-C3
5	A	504	F57	C31-C32-C33-C34
5	A	504	F57	O32-C31-O31-C3
5	C	504	F57	O32-C31-O31-C3
5	C	504	F57	C25-C26-C27-C28
5	A	504	F57	C24-C25-C26-C27
5	C	504	F57	C36-C37-C38-C39
5	A	504	F57	C2B-C2C-C2D-C2E
5	C	504	F57	C27-C28-C29-C2A
5	A	504	F57	C36-C37-C38-C39
5	C	504	F57	C32-C33-C34-C35
5	C	504	F57	C29-C2A-C2B-C2C
5	C	504	F57	C22-C23-C24-C25

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Mol	Chain	Res	Type	Atoms
5	A	504	F57	C27-C28-C29-C2A
5	A	504	F57	C25-C26-C27-C28
5	A	504	F57	C29-C2A-C2B-C2C
5	A	504	F57	C35-C36-C37-C38
5	C	504	F57	C33-C34-C35-C36
5	A	504	F57	C28-C29-C2A-C2B
5	C	504	F57	C1-C2-C3-O31
5	C	504	F57	C37-C38-C39-C3A
5	A	504	F57	C2E-C2F-C2G-C2H
5	C	504	F57	C2F-C2G-C2H-C2I
5	C	504	F57	O21-C2-C3-O31
5	A	504	F57	C37-C38-C39-C3A
5	A	504	F57	C32-C33-C34-C35
5	A	504	F57	C2F-C2G-C2H-C2I
5	A	504	F57	O11-C1-C2-O21
5	A	504	F57	C22-C23-C24-C25
5	C	504	F57	C31-C32-C33-C34
5	C	504	F57	C28-C29-C2A-C2B
5	A	504	F57	C34-C35-C36-C37
5	A	504	F57	C1-C2-O21-C21
5	C	504	F57	O22-C21-O21-C2
5	C	504	F57	C34-C35-C36-C37
5	A	504	F57	C2A-C2B-C2C-C2D
5	C	504	F57	C35-C36-C37-C38
5	A	504	F57	C21-C22-C23-C24
5	A	504	F57	O21-C2-C3-O31
5	C	504	F57	C2C-C2D-C2E-C2F
5	C	504	F57	C2E-C2F-C2G-C2H
5	C	504	F57	C2A-C2B-C2C-C2D
5	C	504	F57	O31-C31-C32-C33

There are no ring outliers.

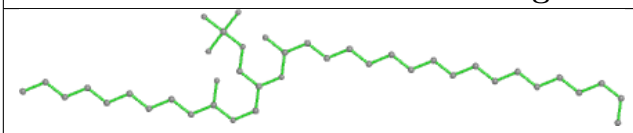
2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	501	NAG	1	0
4	A	501	NAG	1	0

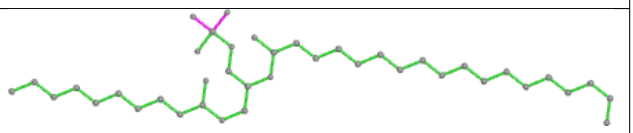
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

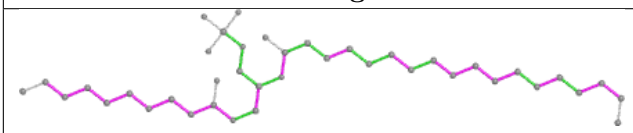
Ligand F57 C 504



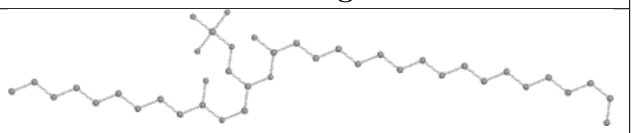
Bond lengths



Bond angles

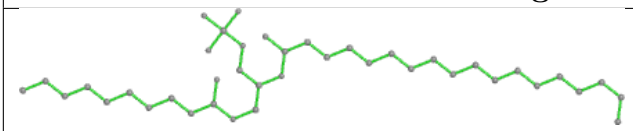


Torsions

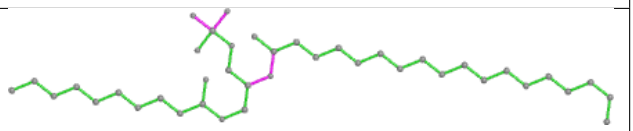


Rings

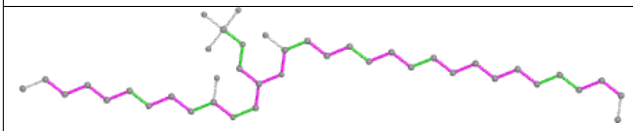
Ligand F57 A 504



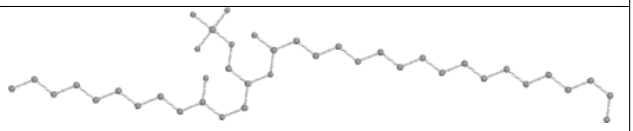
Bond lengths



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 (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	272/276 (98%)	0.32	11 (4%)	38	35	23, 40, 74, 95	4 (1%)
1	C	272/276 (98%)	0.15	5 (1%)	68	64	23, 37, 63, 81	4 (1%)
2	B	98/99 (98%)	0.14	1 (1%)	82	81	23, 37, 53, 68	0
2	D	98/99 (98%)	0.01	0	100	100	18, 32, 48, 60	0
All	All	740/750 (98%)	0.19	17 (2%)	60	56	18, 37, 65, 95	8 (1%)

All (17) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	111	ALA	5.0
1	A	108	PRO	4.4
1	C	201	HIS	3.8
1	A	107	TYR	3.7
1	C	200	ALA	3.3
2	B	99	MET	2.6
1	A	237	PHE	2.5
1	A	23	TRP	2.5
1	A	69	MET	2.5
1	A	110	ASN	2.4
1	C	108	PRO	2.3
1	A	93	ASP	2.2
1	C	198	SER	2.2
1	A	109	GLY	2.1
1	C	202	GLY	2.0
1	A	202	GLY	2.0
1	A	200	ALA	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)

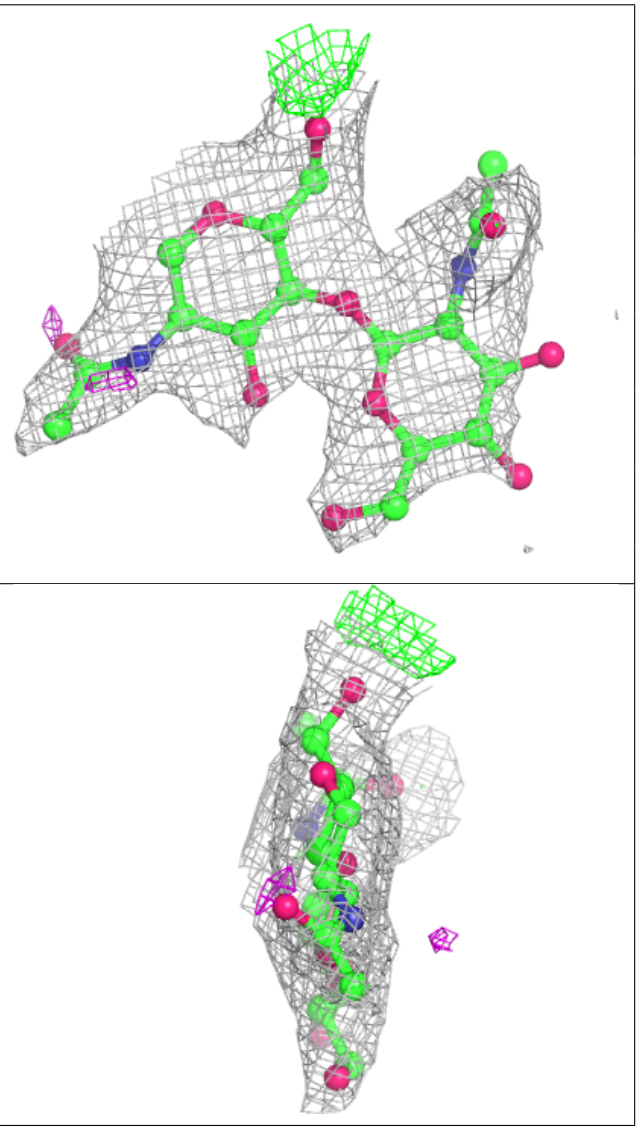
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	0.77	0.23	55,59,66,69	0
3	NAG	E	2	14/15	0.80	0.24	71,73,79,79	0
3	NAG	F	1	14/15	0.83	0.17	26,40,45,48	0
3	NAG	F	2	14/15	0.87	0.17	46,50,54,55	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.

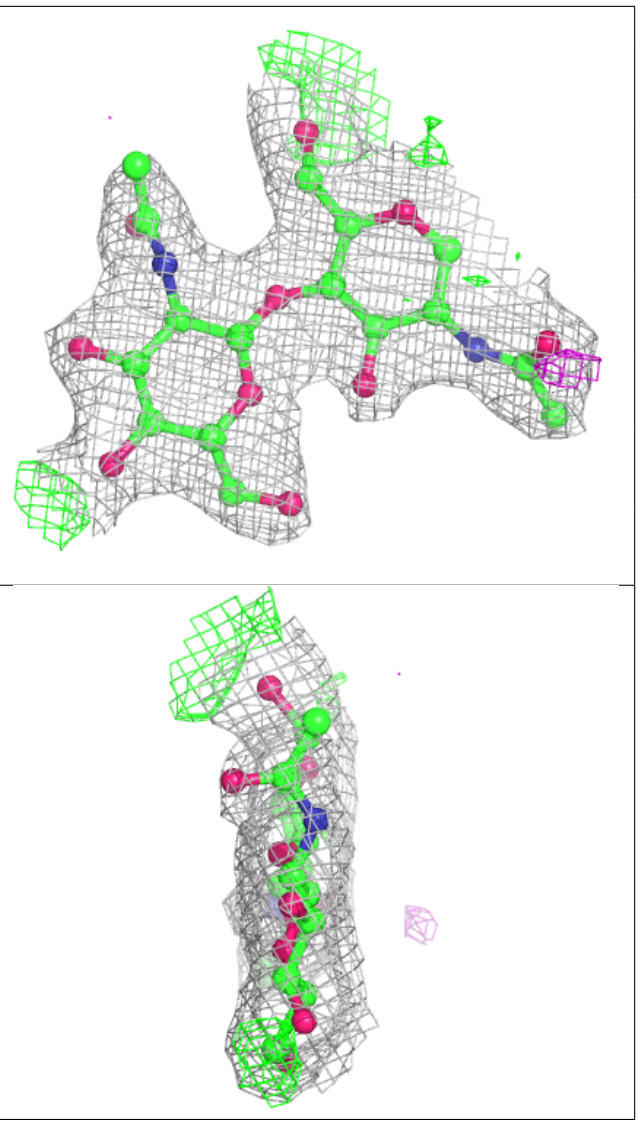
Electron density around Chain E:

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 F:

$2mF_o$-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.

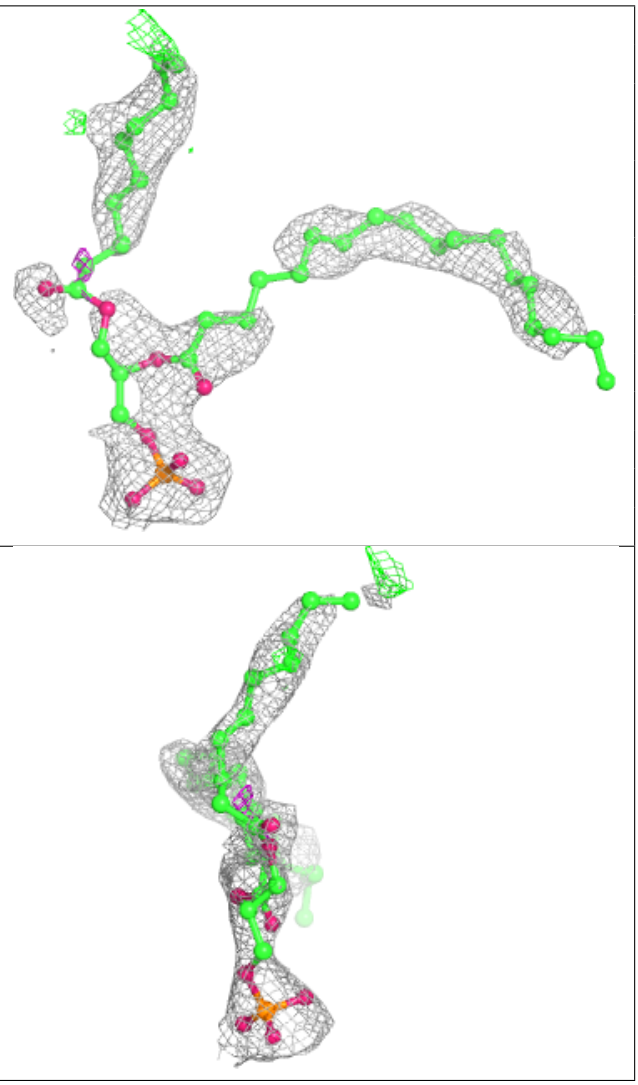
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	F57	A	504	40/40	0.74	0.36	60,73,97,98	0
5	F57	C	504	40/40	0.81	0.29	37,56,97,98	0
4	NAG	A	501	14/15	0.89	0.16	42,46,50,51	0
4	NAG	C	501	14/15	0.90	0.14	40,50,53,56	0

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.

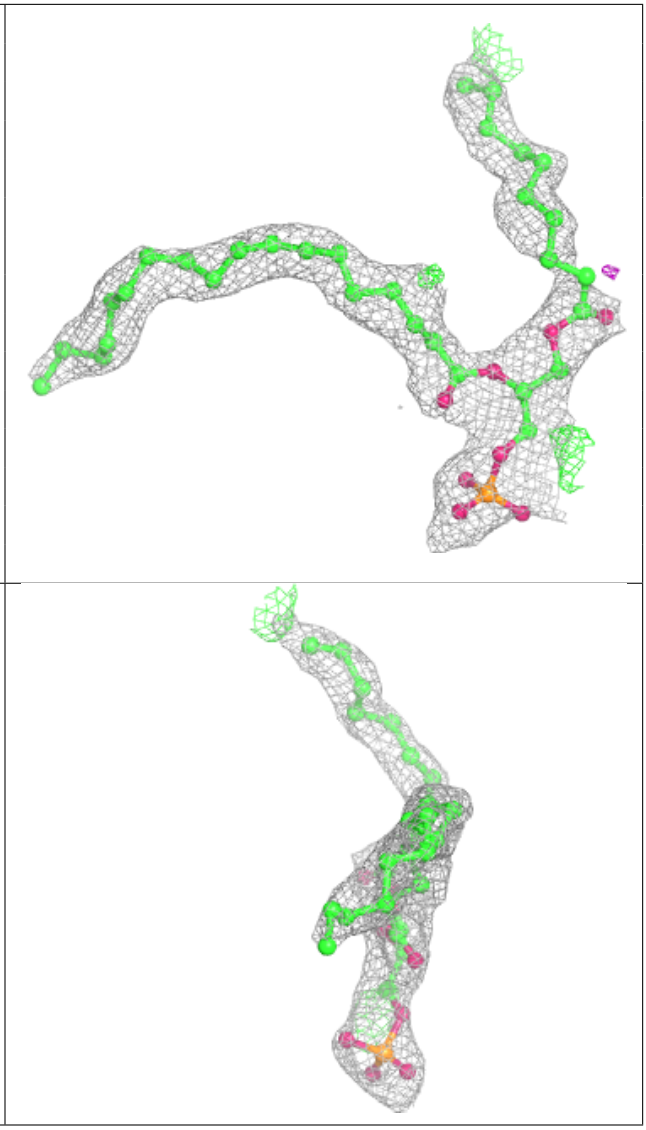
Electron density around F57 A 504:

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



Electron density around F57 C 504:

$2mF_o$-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.