



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 12, 2024 – 08:31 AM EDT

PDB ID : 6NWE  
Title : Crystal structure of bovine opsin with beta octyl glucoside bound  
Authors : Eger, B.T.; Morizumi, T.; Ernst, O.P.  
Deposited on : 2019-02-06  
Resolution : 2.71 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36.2  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36.2

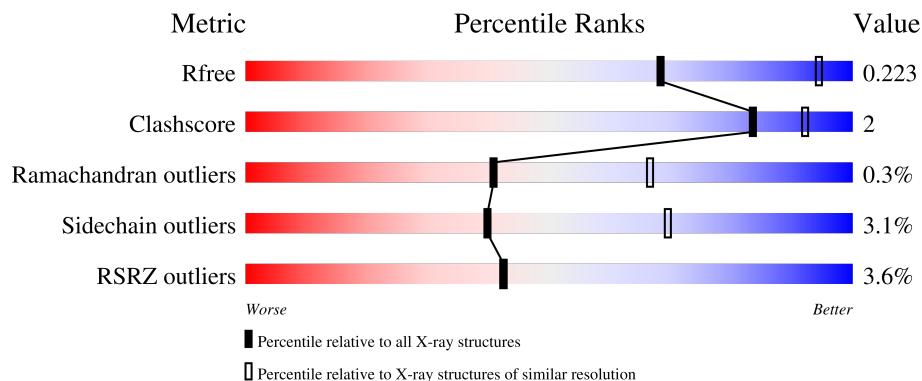
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.71 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	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

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  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	348	<div style="display: flex; align-items: center;"> <div style="width: 3%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 86%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 7%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 6%; height: 10px; background-color: grey;"></div> </div> <p style="text-align: center;">3%      86%      7%      6%</p>
2	B	11	<div style="display: flex; align-items: center;"> <div style="width: 73%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 27%; height: 10px; background-color: yellow;"></div> </div> <p style="text-align: center;">73%      27%</p>
3	C	4	<div style="display: flex; align-items: center;"> <div style="width: 75%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 25%; height: 10px; background-color: yellow;"></div> </div> <p style="text-align: center;">75%      25%</p>

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 2886 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.

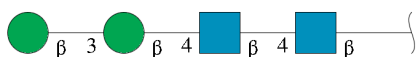
- Molecule 1 is a protein called Rhodopsin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	326	2606	1736	402	442	26	0	1	0

- Molecule 2 is a protein called ILENLKDVGLF peptide CT2.

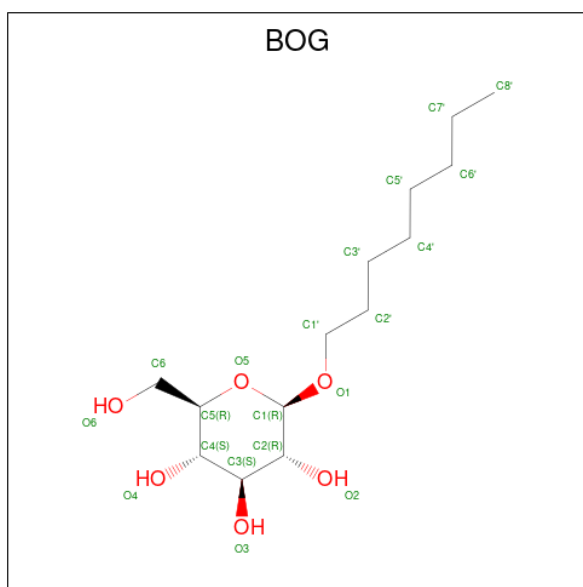
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	B	11	89	59	13	17	0	0	0

- Molecule 3 is an oligosaccharide called beta-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.



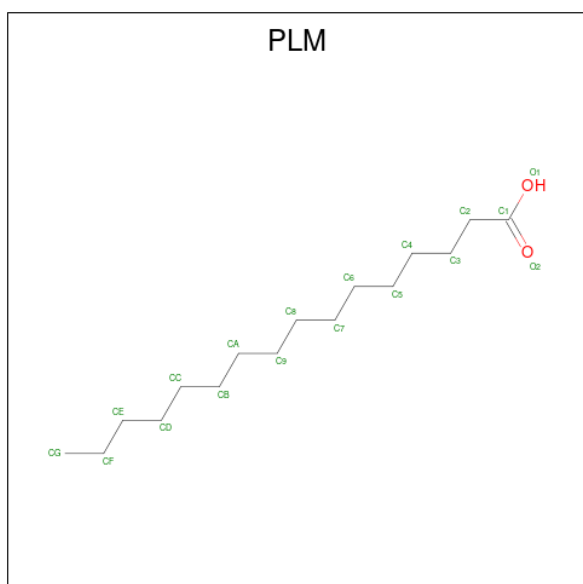
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	C	4	50	28	2	20	0	0	0

- Molecule 4 is octyl beta-D-glucopyranoside (three-letter code: BOG) (formula: C<sub>14</sub>H<sub>28</sub>O<sub>6</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 20 14 6	0	0
4	A	1	Total C O 20 14 6	0	0
4	A	1	Total C O 20 14 6	0	0
4	A	1	Total C O 20 14 6	0	0
4	A	1	Total C O 20 14 6	0	0

- Molecule 5 is PALMITIC ACID (three-letter code: PLM) (formula:  $C_{16}H_{32}O_2$ ).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf	
5	A	1	Total	C	O	0	0
			17	16	1		

- Molecule 6 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



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

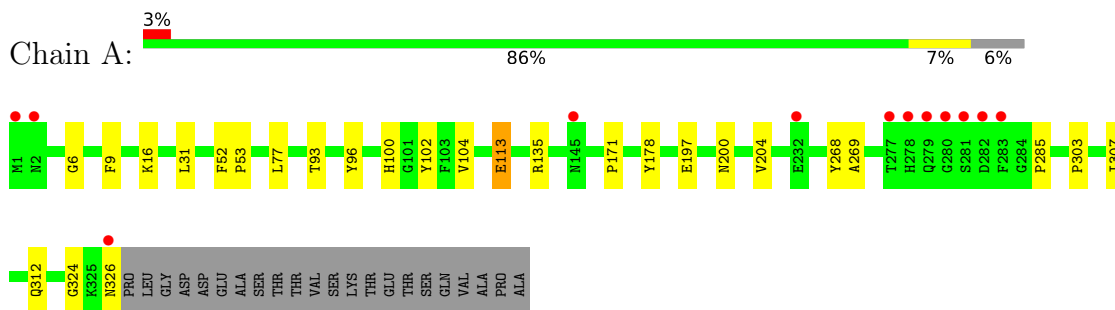
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf	
7	A	9	Total	O		0	0
			9	9			

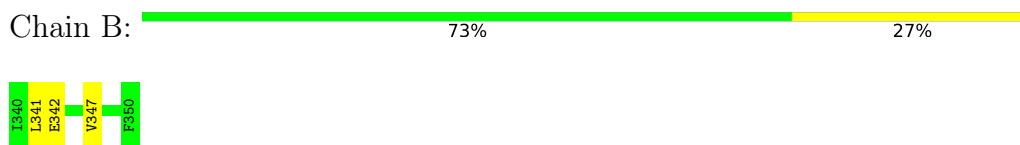
### 3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

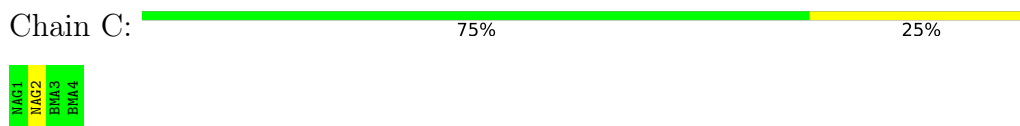
- Molecule 1: Rhodopsin



- Molecule 2: ILENLKDVGLF peptide CT2



- Molecule 3: beta-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



## 4 Data and refinement statistics

Property	Value	Source
Space group	H 3 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	242.17Å 242.17Å 110.72Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	40.10 – 2.71 40.10 – 2.71	Depositor EDS
% Data completeness (in resolution range)	99.3 (40.10-2.71) 99.3 (40.10-2.71)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.31 (at 2.69Å)	Xtrriage
Refinement program	PHENIX (1.10_2155)	Depositor
R, $R_{free}$	0.196 , 0.223 0.196 , 0.223	Depositor DCC
$R_{free}$ test set	1670 reflections (4.96%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	65.6	Xtrriage
Anisotropy	0.585	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 51.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	2886	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	73.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.83% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

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

## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, BMA, PLM, SO4, BOG

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	0.33	0/2690	0.46	0/3666
2	B	0.27	0/89	0.37	0/117
All	All	0.33	0/2779	0.45	0/3783

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	A	2606	0	2577	12	0
2	B	89	0	93	1	0
3	C	50	0	43	0	0
4	A	100	0	139	4	0
5	A	17	0	31	0	0
6	A	10	0	0	0	0
6	B	5	0	0	0	0
7	A	9	0	0	0	0
All	All	2886	0	2883	14	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 2.



All (14) 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:A:93:THR:HG21	1:A:113:GLU:HG3	1.91	0.52
1:A:171:PRO:HB2	1:A:178:TYR:CE2	2.47	0.49
1:A:269:ALA:HA	4:A:412:BOG:H7'1	1.95	0.49
1:A:135:ARG:HG2	2:B:347:VAL:HB	1.95	0.48
4:A:406:BOG:H2	4:A:406:BOG:H1'1	1.47	0.48
1:A:200:ASN:O	1:A:204:VAL:HG23	2.15	0.46
1:A:102:TYR:CZ	1:A:104:VAL:HG12	2.50	0.46
1:A:6:GLY:HA3	1:A:9:PHE:CZ	2.52	0.45
1:A:31:LEU:HB2	1:A:285:PRO:HG3	1.99	0.44
4:A:405:BOG:H2	4:A:405:BOG:H1'1	1.56	0.44
1:A:52:PHE:HB3	1:A:53:PRO:HD3	2.01	0.43
1:A:96:TYR:O	1:A:100:HIS:HD2	2.03	0.42
1:A:100:HIS:CE1	4:A:407:BOG:H3'2	2.54	0.42
1:A:303:PRO:O	1:A:307:ILE:HB	2.20	0.41

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	325/348 (93%)	311 (96%)	13 (4%)	1 (0%)	41	66
2	B	9/11 (82%)	9 (100%)	0	0	100	100
All	All	334/359 (93%)	320 (96%)	13 (4%)	1 (0%)	41	66

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	324	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	A	279/296 (94%)	272 (98%)	7 (2%)	47	76
2	B	10/10 (100%)	8 (80%)	2 (20%)	1	3
All	All	289/306 (94%)	280 (97%)	9 (3%)	40	69

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	16	LYS
1	A	77	LEU
1	A	113	GLU
1	A	197	GLU
1	A	268	TYR
1	A	312	GLN
1	A	326	ASN
2	B	341	LEU
2	B	342	GLU

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	312	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	C	1	3,1	14,14,15	0.70	0	17,19,21	0.78	0
3	NAG	C	2	3	14,14,15	0.85	1 (7%)	17,19,21	1.37	2 (11%)
3	BMA	C	3	3	11,11,12	0.60	0	15,15,17	0.83	0
3	BMA	C	4	3	11,11,12	0.51	0	15,15,17	0.74	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
3	NAG	C	1	3,1	-	0/6/23/26	0/1/1/1
3	NAG	C	2	3	-	0/6/23/26	0/1/1/1
3	BMA	C	3	3	-	2/2/19/22	0/1/1/1
3	BMA	C	4	3	-	1/2/19/22	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	2	NAG	O5-C1	2.05	1.47	1.43

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	2	NAG	O5-C5-C6	3.85	113.23	107.20
3	C	2	NAG	C6-C5-C4	-2.28	107.67	113.00

There are no chirality outliers.

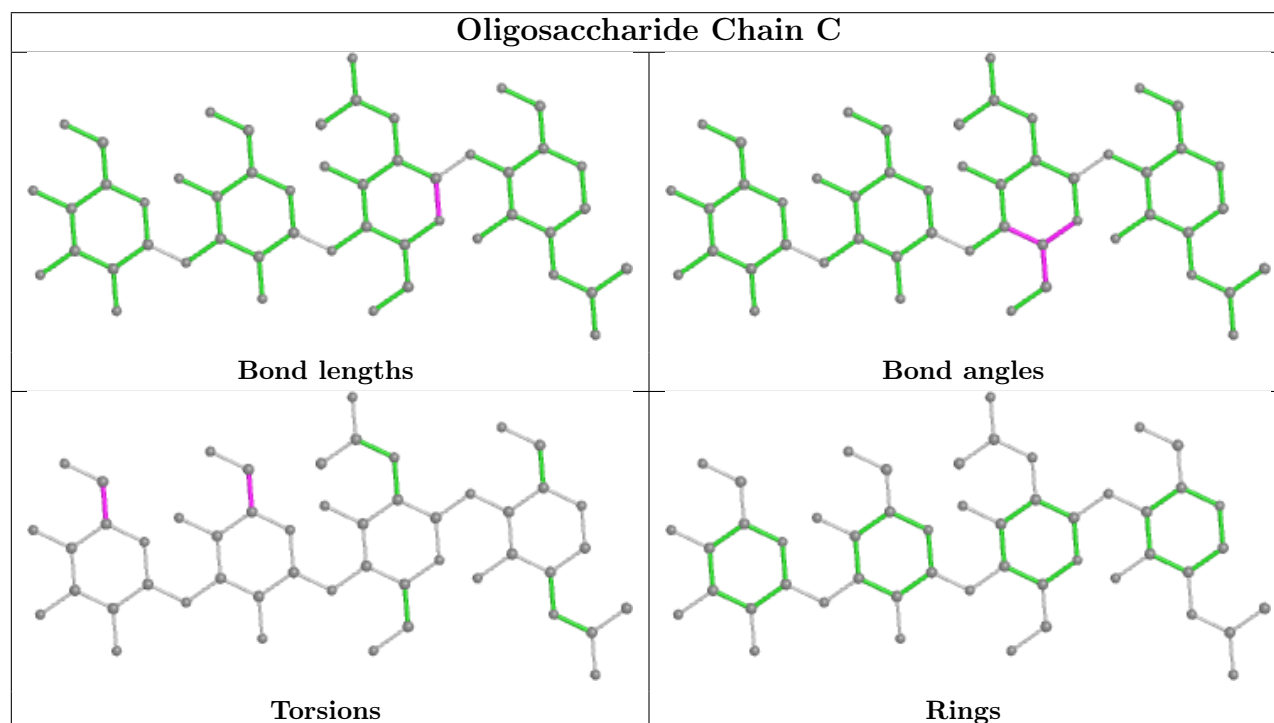
All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	3	BMA	C4-C5-C6-O6
3	C	3	BMA	O5-C5-C6-O6
3	C	4	BMA	O5-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

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



## 5.6 Ligand geometry [i](#)

9 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	$\# Z  > 2$
4	BOG	A	405	-	20,20,20	0.84	0	25,25,25	1.62	4 (16%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	PLM	A	409	1	16,16,17	0.30	0	15,15,17	0.76	0
6	SO4	A	411	-	4,4,4	0.16	0	6,6,6	0.12	0
4	BOG	A	406	-	20,20,20	1.01	2 (10%)	25,25,25	1.31	2 (8%)
4	BOG	A	407	-	20,20,20	0.99	1 (5%)	25,25,25	1.62	3 (12%)
4	BOG	A	408	-	20,20,20	0.92	2 (10%)	25,25,25	1.37	3 (12%)
6	SO4	B	401	-	4,4,4	0.14	0	6,6,6	0.10	0
4	BOG	A	412	-	20,20,20	0.96	1 (5%)	25,25,25	1.34	4 (16%)
6	SO4	A	410	-	4,4,4	0.13	0	6,6,6	0.07	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	BOG	A	405	-	-	5/11/31/31	0/1/1/1
5	PLM	A	409	1	-	6/13/14/15	-
4	BOG	A	406	-	-	5/11/31/31	0/1/1/1
4	BOG	A	407	-	-	8/11/31/31	0/1/1/1
4	BOG	A	408	-	-	7/11/31/31	0/1/1/1
4	BOG	A	412	-	-	8/11/31/31	0/1/1/1

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	412	BOG	O5-C1	2.63	1.48	1.41
4	A	406	BOG	O5-C1	2.34	1.47	1.41
4	A	406	BOG	C4-C3	-2.33	1.46	1.52
4	A	407	BOG	C3-C2	-2.28	1.46	1.52
4	A	408	BOG	C4-C3	-2.06	1.47	1.52
4	A	408	BOG	O5-C1	2.01	1.47	1.41

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	407	BOG	C3-C4-C5	4.78	118.77	110.24
4	A	405	BOG	C4-C3-C2	4.52	118.72	110.82
4	A	407	BOG	O5-C5-C4	4.40	117.69	109.69
4	A	405	BOG	C3-C4-C5	3.76	116.94	110.24
4	A	408	BOG	C1-C2-C3	3.73	117.76	110.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	412	BOG	O5-C1-C2	3.72	118.22	110.35
4	A	406	BOG	C1-C2-C3	3.48	117.23	110.00
4	A	406	BOG	O5-C1-C2	3.34	117.41	110.35
4	A	408	BOG	C4-C3-C2	3.33	116.63	110.82
4	A	405	BOG	C1-C2-C3	3.07	116.40	110.00
4	A	412	BOG	C3-C4-C5	-2.87	105.12	110.24
4	A	407	BOG	C4-C3-C2	2.75	115.62	110.82
4	A	412	BOG	C1-C2-C3	2.71	115.64	110.00
4	A	412	BOG	O5-C5-C6	2.60	112.89	106.44
4	A	408	BOG	O5-C1-C2	2.29	115.20	110.35
4	A	405	BOG	C1-O5-C5	-2.05	109.66	113.69

There are no chirality outliers.

All (39) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	406	BOG	O5-C1-O1-C1'
4	A	407	BOG	C2-C1-O1-C1'
4	A	407	BOG	O5-C1-O1-C1'
4	A	408	BOG	C2'-C1'-O1-C1
4	A	412	BOG	O5-C1-O1-C1'
4	A	407	BOG	C4-C5-C6-O6
4	A	408	BOG	O5-C5-C6-O6
4	A	407	BOG	O5-C5-C6-O6
4	A	408	BOG	C4-C5-C6-O6
4	A	406	BOG	C2-C1-O1-C1'
4	A	407	BOG	O1-C1'-C2'-C3'
4	A	412	BOG	C4-C5-C6-O6
4	A	412	BOG	O1-C1'-C2'-C3'
4	A	405	BOG	C4-C5-C6-O6
4	A	405	BOG	O5-C5-C6-O6
4	A	408	BOG	C4'-C5'-C6'-C7'
4	A	406	BOG	C2'-C3'-C4'-C5'
5	A	409	PLM	C6-C7-C8-C9
4	A	405	BOG	C4'-C5'-C6'-C7'
4	A	412	BOG	C2'-C1'-O1-C1
4	A	412	BOG	C1'-C2'-C3'-C4'
4	A	412	BOG	O5-C5-C6-O6
4	A	408	BOG	C5'-C6'-C7'-C8'
4	A	406	BOG	O5-C5-C6-O6
4	A	408	BOG	C2'-C3'-C4'-C5'
4	A	405	BOG	C2-C1-O1-C1'

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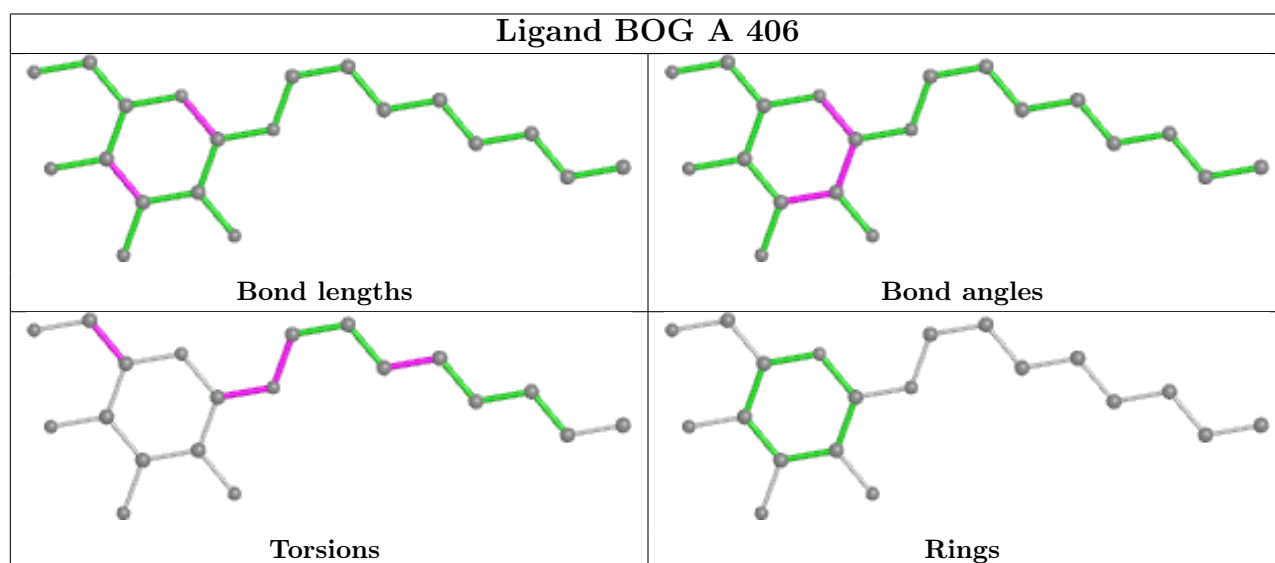
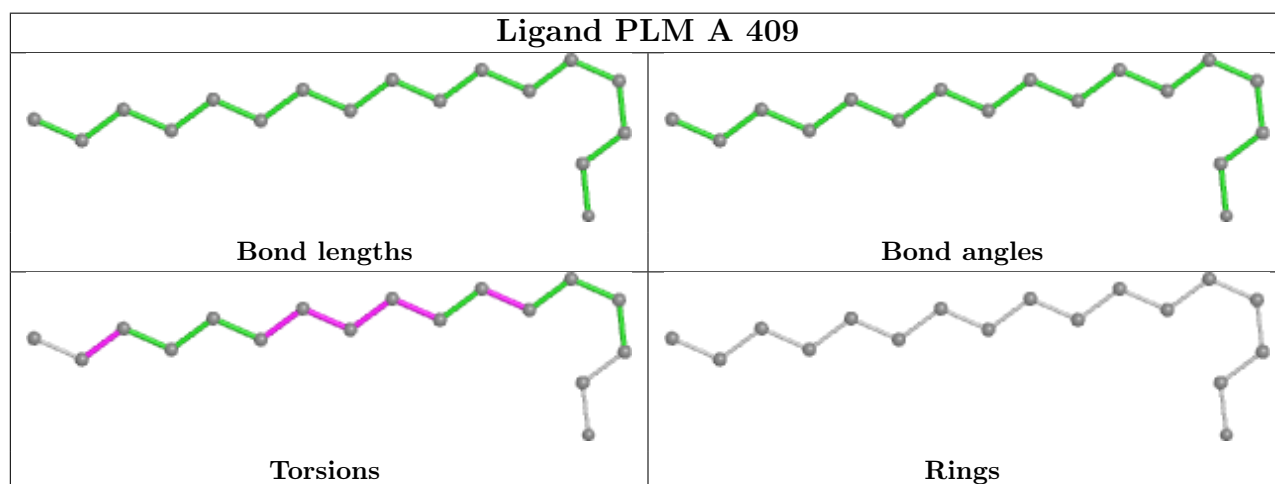
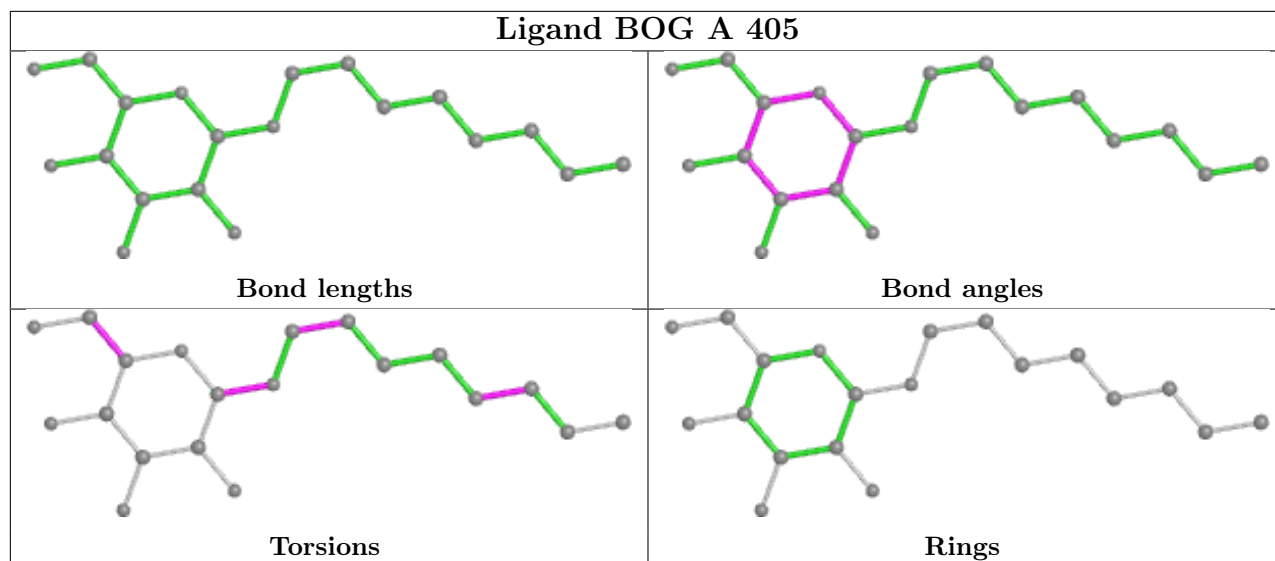
Mol	Chain	Res	Type	Atoms
5	A	409	PLM	C8-C9-CA-CB
4	A	406	BOG	C2'-C1'-O1-C1
4	A	407	BOG	C2'-C1'-O1-C1
5	A	409	PLM	C7-C8-C9-CA
4	A	408	BOG	C3'-C4'-C5'-C6'
5	A	409	PLM	C9-CA-CB-CC
4	A	407	BOG	C3'-C4'-C5'-C6'
4	A	405	BOG	O1-C1'-C2'-C3'
4	A	412	BOG	C5'-C6'-C7'-C8'
4	A	407	BOG	C4'-C5'-C6'-C7'
4	A	412	BOG	C3'-C4'-C5'-C6'
5	A	409	PLM	C4-C5-C6-C7
5	A	409	PLM	CD-CE-CF-CG

There are no ring outliers.

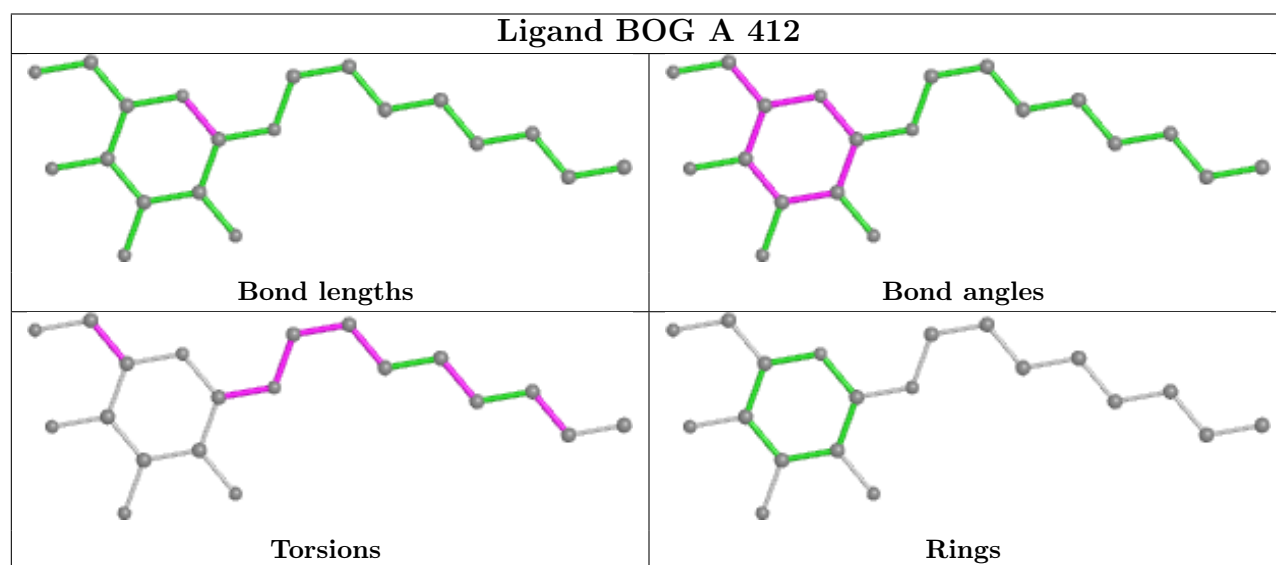
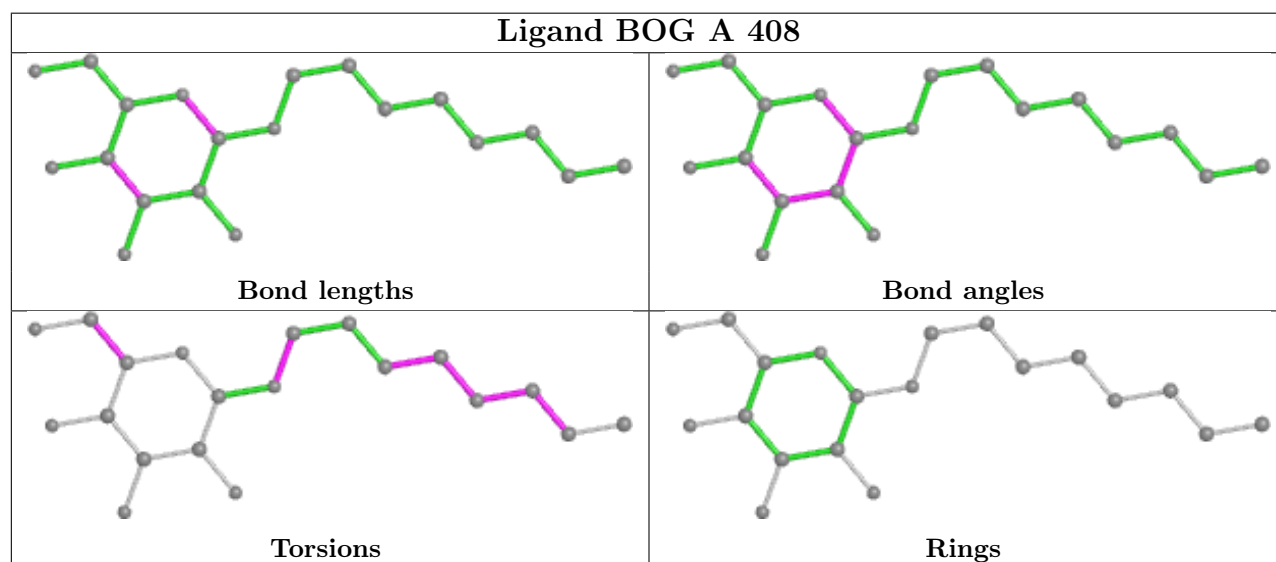
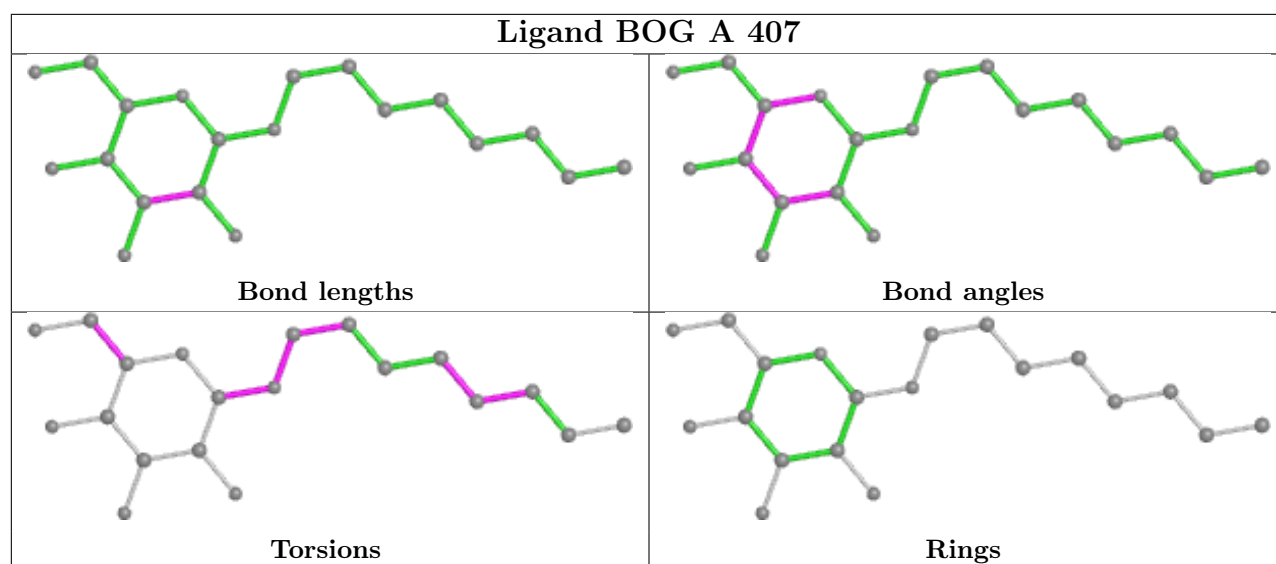
4 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	405	BOG	1	0
4	A	406	BOG	1	0
4	A	407	BOG	1	0
4	A	412	BOG	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 than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.







## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

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

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	326/348 (93%)	-0.15	12 (3%) 41 41	51, 67, 101, 144	0
2	B	11/11 (100%)	-0.24	0 100 100	68, 80, 88, 102	0
All	All	337/359 (93%)	-0.16	12 (3%) 42 42	51, 67, 102, 144	0

All (12) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1	MET	8.0
1	A	282	ASP	4.5
1	A	278	HIS	4.0
1	A	280	GLY	3.8
1	A	277	THR	3.1
1	A	283	PHE	3.1
1	A	281	SER	3.0
1	A	232	GLU	2.9
1	A	279	GLN	2.6
1	A	2	ASN	2.2
1	A	145	ASN	2.2
1	A	326	ASN	2.1

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

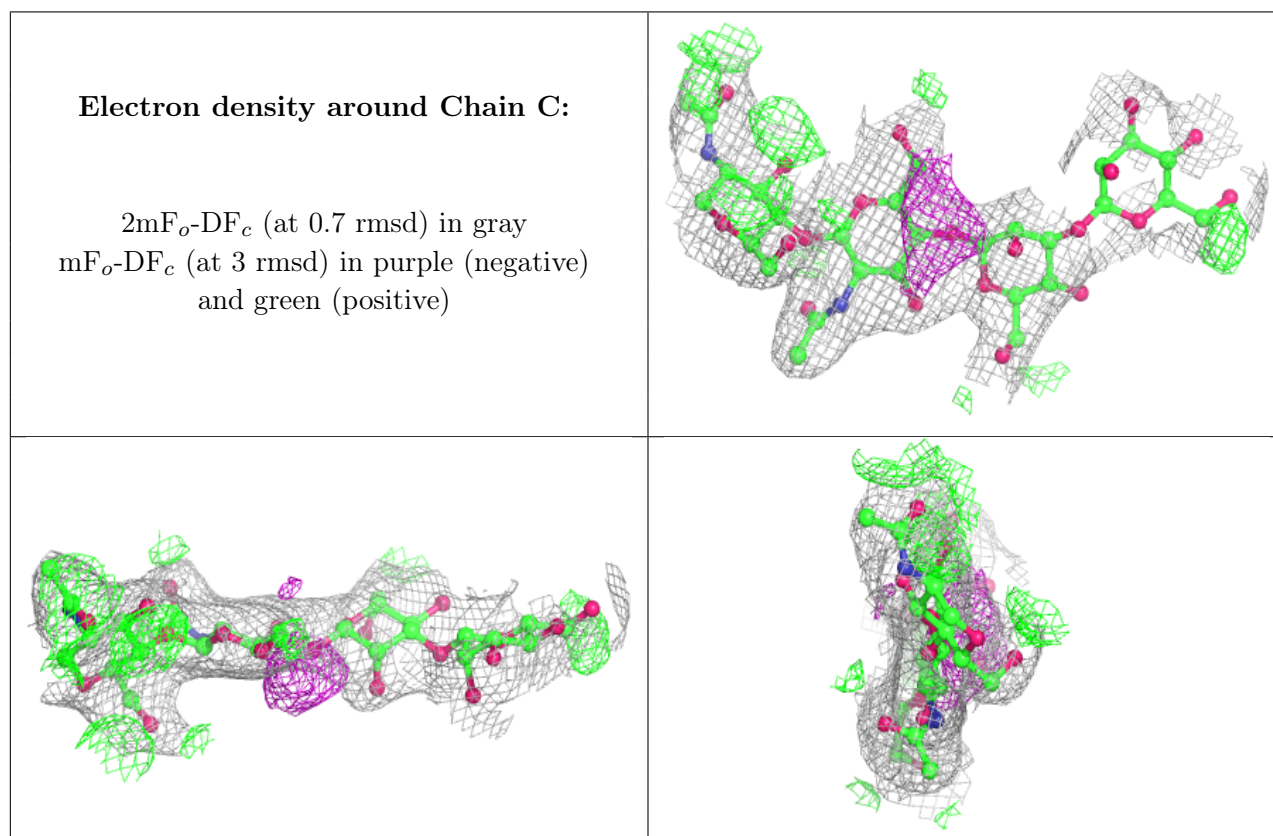
There are no non-standard protein/DNA/RNA residues in this entry.

### 6.3 Carbohydrates [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
3	BMA	C	4	11/12	0.71	0.23	132,140,156,160	0
3	BMA	C	3	11/12	0.92	0.23	87,110,124,136	0
3	NAG	C	1	14/15	0.95	0.13	39,54,67,68	0
3	NAG	C	2	14/15	0.95	0.16	35,44,65,89	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.



## 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, 95<sup>th</sup> 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.

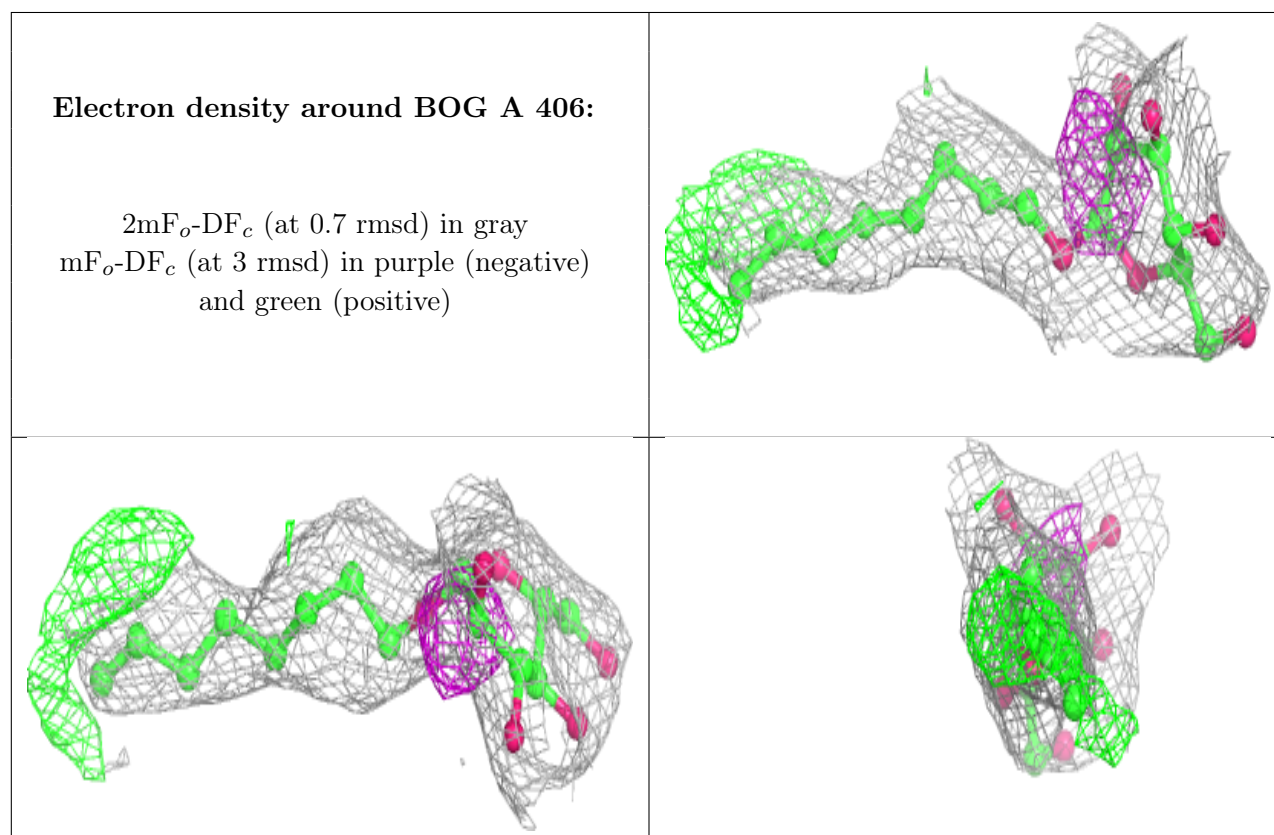
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	BOG	A	406	20/20	0.68	0.38	101,132,146,150	0
4	BOG	A	412	20/20	0.74	0.31	66,96,126,134	0
4	BOG	A	408	20/20	0.81	0.45	75,147,154,156	0
4	BOG	A	405	20/20	0.82	0.34	63,120,142,142	0
6	SO4	B	401	5/5	0.82	0.25	92,125,133,137	0

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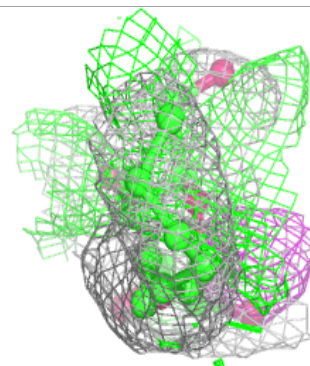
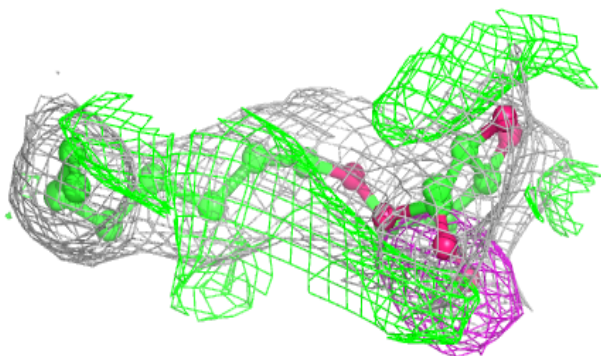
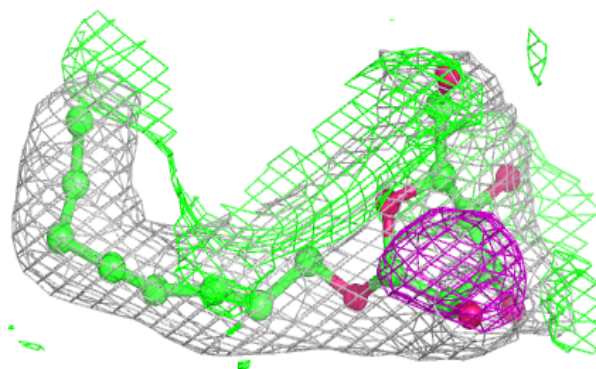
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	PLM	A	409	17/18	0.84	0.25	59,73,80,93	0
4	BOG	A	407	20/20	0.85	0.37	66,121,135,141	0
6	SO4	A	411	5/5	0.86	0.42	101,132,143,147	0
6	SO4	A	410	5/5	0.92	0.34	118,124,134,138	0

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.

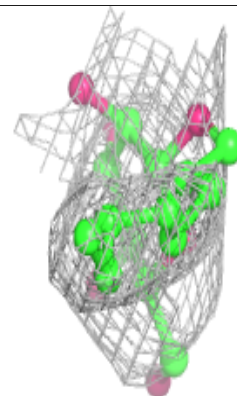
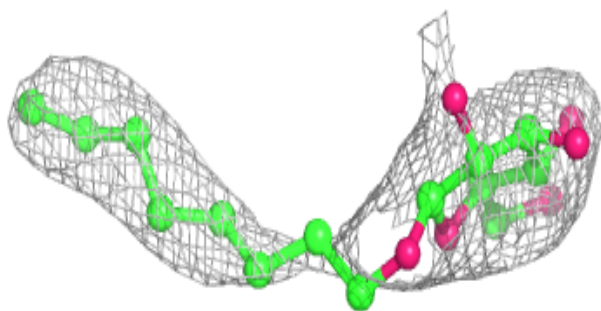
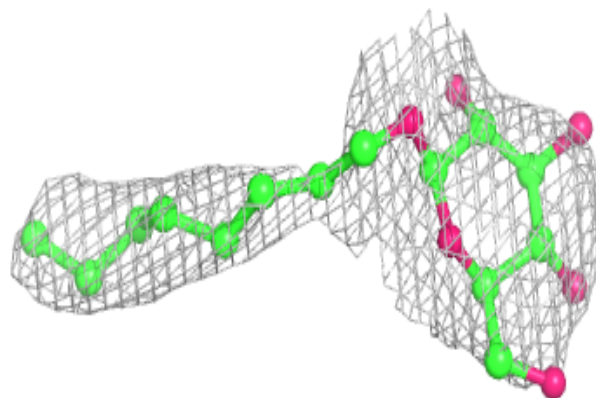


**Electron density around BOG A 412:**

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

**Electron density around BOG A 408:**

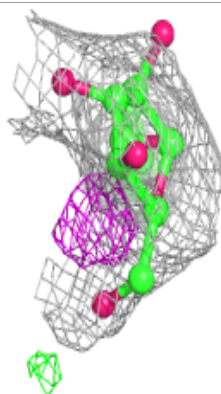
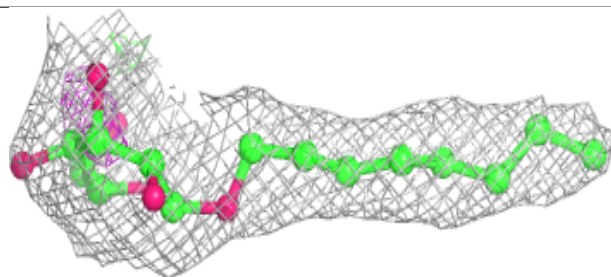
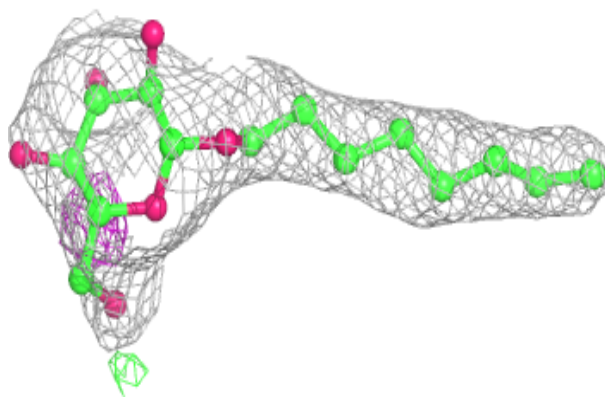
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



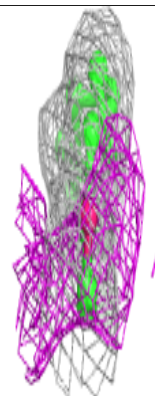
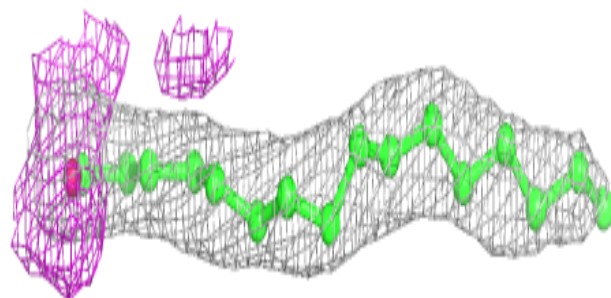
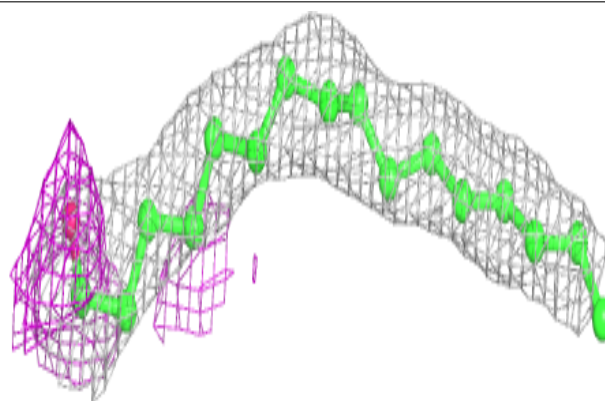


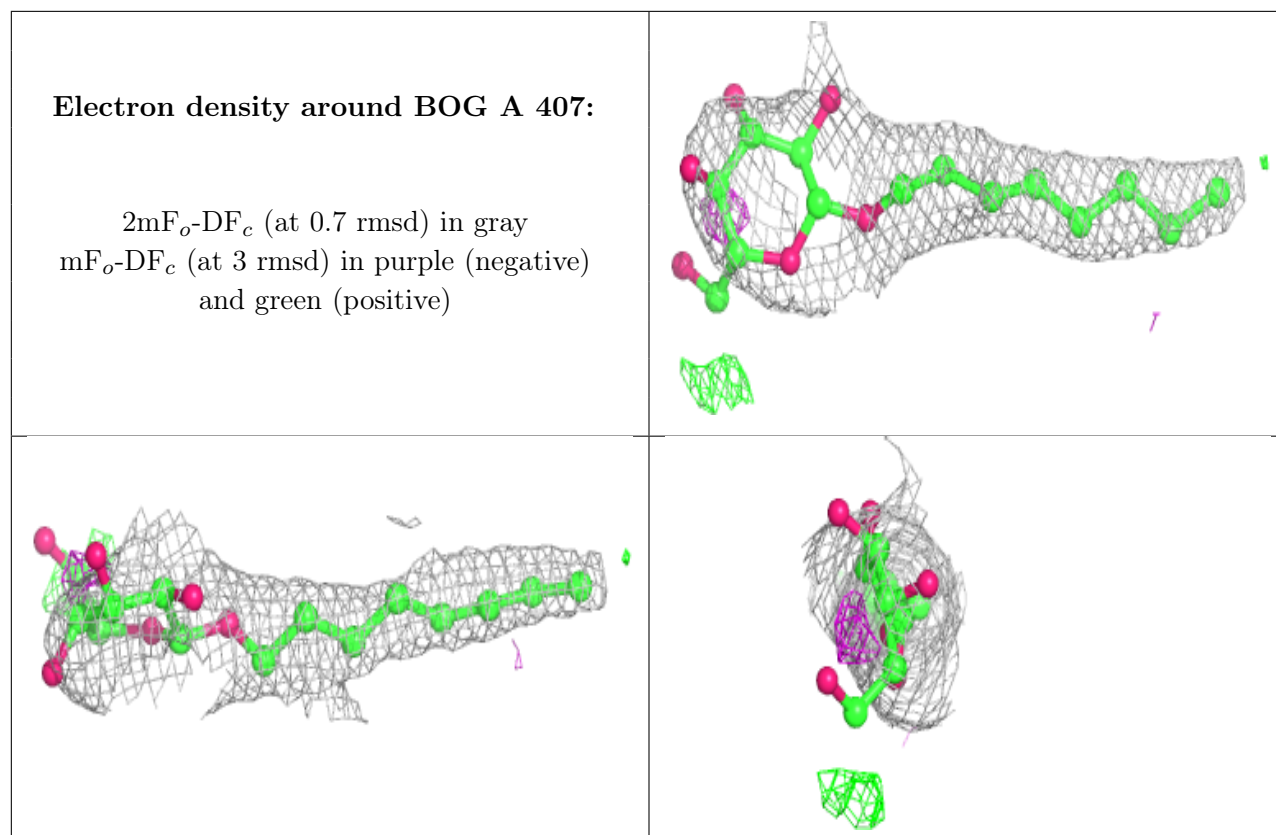
**Electron density around BOG A 405:**

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

**Electron density around PLM A 409:**

$2mF_o-DF_c$  (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.