



# wwPDB X-ray Structure Validation Summary Report ⓘ

Oct 14, 2023 – 03:45 PM EDT

PDB ID : 7UFH  
Title : Integrin alaphIIBbeta3 complex with fradafiban (Mn/Ca)  
Authors : Lin, F.-Y.; Zhu, J.; Zhu, J.; Springer, T.A.  
Deposited on : 2022-03-22  
Resolution : 3.00 Å(reported)

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

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<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  
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

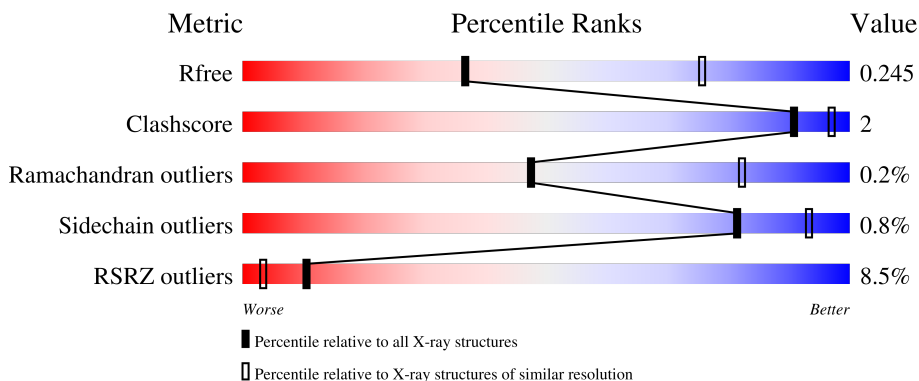
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.00 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	2092 (3.00-3.00)
Clashscore	141614	2416 (3.00-3.00)
Ramachandran outliers	138981	2333 (3.00-3.00)
Sidechain outliers	138945	2336 (3.00-3.00)
RSRZ outliers	127900	1990 (3.00-3.00)

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	457	
1	C	457	
2	B	472	
2	D	472	
3	E	221	

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Mol	Chain	Length	Quality of chain
3	H	221	<p>7% 95%</p>
4	F	214	<p>24% 96%</p>
4	L	214	<p>2% 97%</p>
5	G	5	<p>40% 60%</p>
6	I	2	<p>50% 50%</p>
6	K	2	<p>100%</p>
7	J	4	<p>75% 25%</p>

## 2 Entry composition [i](#)

There are 15 unique types of molecules in this entry. The entry contains 21368 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 Integrin alpha-IIb heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	454	Total	C	N	O	S	0	6	0
			3519	2237	607	667	8			
1	C	453	Total	C	N	O	S	0	3	0
			3493	2219	602	664	8			

- Molecule 2 is a protein called Isoform Beta-3C of Integrin beta-3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	466	Total	C	N	O	S	11	3	0
			3611	2249	616	713	33			
2	D	471	Total	C	N	O	S	0	0	0
			3623	2255	619	715	34			

- Molecule 3 is a protein called 10E5 Fab heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	E	214	Total	C	N	O	S	0	0	0
			1631	1035	264	326	6			
3	H	216	Total	C	N	O	S	0	0	0
			1642	1041	266	329	6			

- Molecule 4 is a protein called 10E5 Fab light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	F	214	Total	C	N	O	S	0	0	0
			1637	1019	268	341	9			
4	L	214	Total	C	N	O	S	0	0	0
			1637	1019	268	341	9			

- Molecule 5 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



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

- Molecule 6 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			
6	I	2	28	16	2	10	0	0	0
6	K	2	28	16	2	10	0	0	0

- Molecule 7 is an oligosaccharide called 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
			Total	C	N	O			
7	J	4	50	28	2	20	0	0	0

- Molecule 8 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	A	1	Total	O	S	0	0
			5	4	1		
8	A	1	Total	O	S	0	0
			5	4	1		
8	A	1	Total	O	S	0	0
			5	4	1		
8	A	1	Total	O	S	0	0
			5	4	1		
8	C	1	Total	O	S	0	0
			5	4	1		
8	C	1	Total	O	S	0	0
			5	4	1		
8	C	1	Total	O	S	0	0
			5	4	1		
8	L	1	Total	O	S	0	0
			5	4	1		

- Molecule 9 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	1	Total C O 6 3 3	0	0

- Molecule 10 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	A	4	Total Ca 4 4	0	0
10	C	4	Total Ca 4 4	0	0

- Molecule 11 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

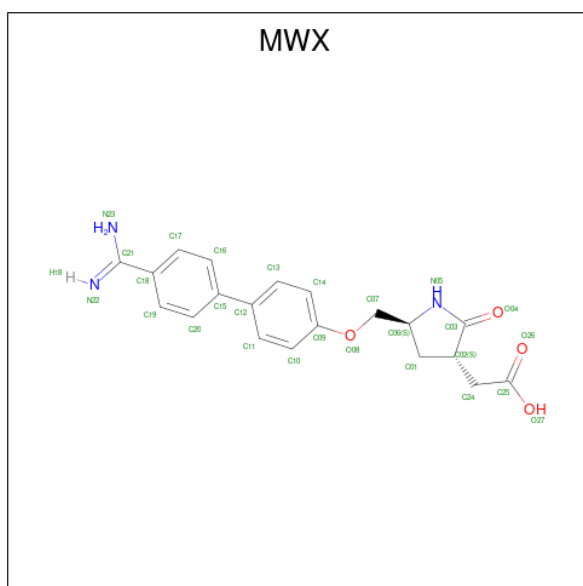
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
11	B	3	Total Mn 3 3	0	0
11	D	3	Total Mn 3 3	0	0

- Molecule 12 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C<sub>8</sub>H<sub>15</sub>NO<sub>6</sub>).



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

- Molecule 13 is Fradafiban (three-letter code: MWX) (formula:  $C_{20}H_{21}N_3O_4$ ) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
13	B	1	27	20	3	4	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
13	D	1	Total	C	N	O	0	0
			27	20	3	4		

- Molecule 14 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
14	B	1	Total	Cl	0	0
			1	1		
14	C	2	Total	Cl	0	0
			2	2		
14	D	1	Total	Cl	0	0
			1	1		

- Molecule 15 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
15	A	101	Total	O	0	0
			101	101		
15	B	63	Total	O	0	0
			63	63		
15	C	40	Total	O	0	0
			40	40		
15	D	24	Total	O	0	0
			24	24		
15	E	8	Total	O	0	0
			8	8		
15	F	4	Total	O	0	0
			4	4		
15	H	6	Total	O	0	0
			6	6		
15	L	16	Total	O	0	0
			16	16		

### 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.

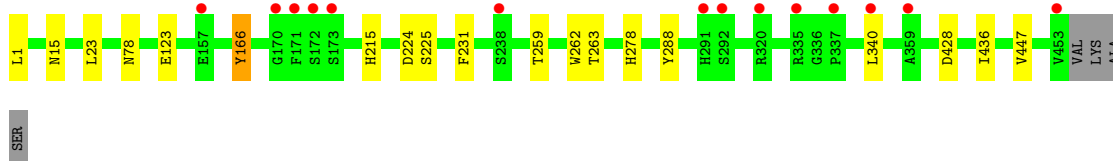
- Molecule 1: Integrin alpha-IIb heavy chain

Chain A: 



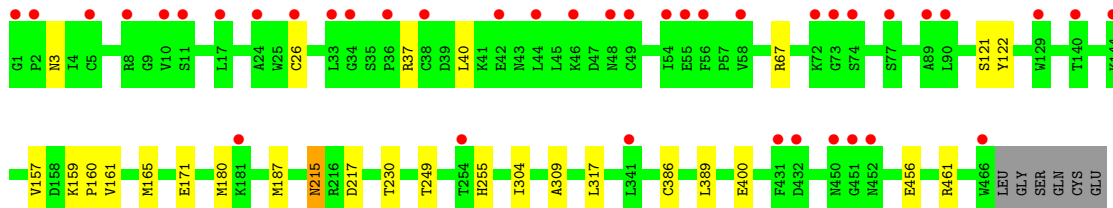
- Molecule 1: Integrin alpha-IIb heavy chain

Chain C: 



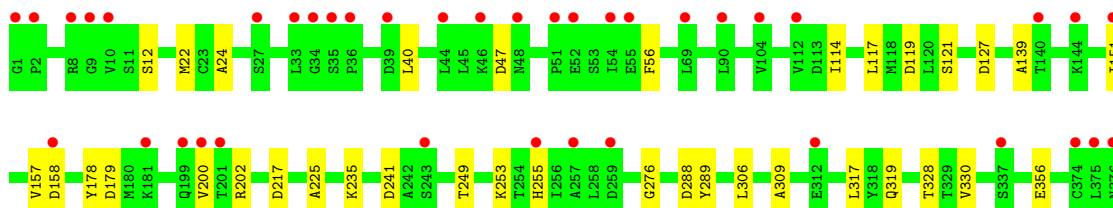
- Molecule 2: Isoform Beta-3C of Integrin beta-3

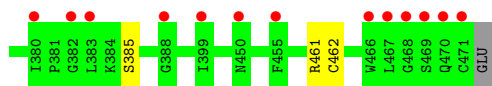
Chain B: 



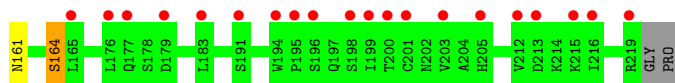
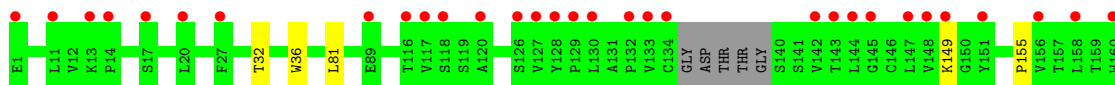
- Molecule 2: Isoform Beta-3C of Integrin beta-3

Chain D: 

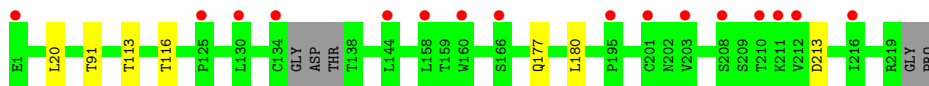




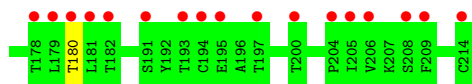
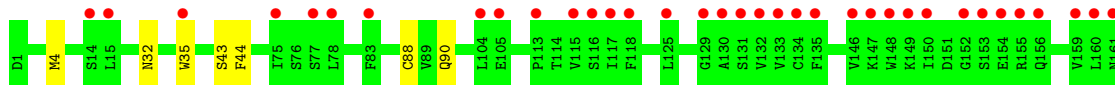
- Molecule 3: 10E5 Fab heavy chain



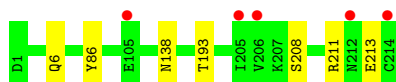
- Molecule 3: 10E5 Fab heavy chain



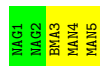
- Molecule 4: 10E5 Fab light chain



- Molecule 4: 10E5 Fab light chain



- Molecule 5: alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 6: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain I:  50% 50%

  
MAG1  
MAG2

- Molecule 6: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain K:  100%

  
MAG1  
MAG2

- Molecule 7: 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

Chain J:  75% 25%

  
MAG1  
MAG2  
BMA3  
MAN4

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	258.58Å 144.45Å 104.76Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	42.05 – 3.00 42.05 – 3.00	Depositor EDS
% Data completeness (in resolution range)	99.0 (42.05-3.00) 87.9 (42.05-3.00)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	0.63 (at 3.01Å)	Xtrriage
Refinement program	PHENIX 1.11.1_2575	Depositor
R, $R_{free}$	0.225 , 0.245 0.226 , 0.245	Depositor DCC
$R_{free}$ test set	1992 reflections (2.53%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	71.6	Xtrriage
Anisotropy	0.195	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.29 , 38.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	21368	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	104.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.25% 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 [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, GOL, MAN, CL, MN, CA, BMA, MWX, SO4

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	0.26	0/3628	0.46	0/4944
1	C	0.26	0/3596	0.45	0/4900
2	B	0.25	0/3681	0.45	0/4992
2	D	0.25	0/3690	0.44	0/5003
3	E	0.25	0/1673	0.45	0/2290
3	H	0.25	0/1684	0.47	0/2305
4	F	0.25	0/1673	0.44	0/2269
4	L	0.25	0/1673	0.46	0/2269
All	All	0.25	0/21298	0.45	0/28972

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	3519	0	3364	11	0
1	C	3493	0	3327	12	0
2	B	3611	0	3528	18	0
2	D	3623	0	3540	19	0
3	E	1631	0	1590	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	H	1642	0	1600	4	0
4	F	1637	0	1553	5	0
4	L	1637	0	1553	3	0
5	G	61	0	52	0	0
6	I	28	0	25	1	0
6	K	28	0	25	0	0
7	J	50	0	43	0	0
8	A	20	0	0	0	0
8	C	15	0	0	0	0
8	L	5	0	0	0	0
9	A	6	0	8	0	0
10	A	4	0	0	0	0
10	C	4	0	0	0	0
11	B	3	0	0	0	0
11	D	3	0	0	0	0
12	B	14	0	13	0	0
12	D	14	0	13	0	0
13	B	27	0	0	5	0
13	D	27	0	0	3	0
14	B	1	0	0	0	0
14	C	2	0	0	0	0
14	D	1	0	0	0	0
15	A	101	0	0	1	1
15	B	63	0	0	1	0
15	C	40	0	0	3	1
15	D	24	0	0	0	0
15	E	8	0	0	0	0
15	F	4	0	0	0	0
15	H	6	0	0	0	0
15	L	16	0	0	0	0
All	All	21368	0	20234	70	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 2.

The worst 5 of 70 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)
2:D:288:ASP:OD1	2:D:289:TYR:N	2.33	0.58
1:C:428:ASP:CG	15:C:603:HOH:O	2.44	0.56
2:D:119:ASP:OD1	2:D:121:SER:OG	2.25	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:262:TRP:HB3	2:B:317:LEU:HD13	1.90	0.54
1:A:3:LEU:O	1:A:405:GLN:NE2	2.35	0.54

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

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
15:A:683:HOH:O	15:C:628:HOH:O[1_554]	2.19	0.01

## 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	458/457 (100%)	438 (96%)	20 (4%)	0	100	100
1	C	454/457 (99%)	432 (95%)	21 (5%)	1 (0%)	47	82
2	B	467/472 (99%)	444 (95%)	22 (5%)	1 (0%)	47	82
2	D	469/472 (99%)	438 (93%)	30 (6%)	1 (0%)	47	82
3	E	210/221 (95%)	195 (93%)	13 (6%)	2 (1%)	15	53
3	H	212/221 (96%)	198 (93%)	14 (7%)	0	100	100
4	F	212/214 (99%)	202 (95%)	10 (5%)	0	100	100
4	L	212/214 (99%)	202 (95%)	9 (4%)	1 (0%)	29	68
All	All	2694/2728 (99%)	2549 (95%)	139 (5%)	6 (0%)	47	82

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	E	164	SER
4	L	138	ASN
1	C	123	GLU

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Mol	Chain	Res	Type
2	D	157	VAL
2	B	157	VAL

### 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	368/364 (101%)	363 (99%)	5 (1%)	67	88
1	C	364/364 (100%)	359 (99%)	5 (1%)	67	88
2	B	415/417 (100%)	412 (99%)	3 (1%)	84	94
2	D	416/417 (100%)	410 (99%)	6 (1%)	67	88
3	E	186/190 (98%)	186 (100%)	0	100	100
3	H	187/190 (98%)	187 (100%)	0	100	100
4	F	188/188 (100%)	188 (100%)	0	100	100
4	L	188/188 (100%)	188 (100%)	0	100	100
All	All	2312/2318 (100%)	2293 (99%)	19 (1%)	81	93

5 of 19 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	127	ASP
2	D	241	ASP
2	D	462	CYS
2	D	202	ARG
1	C	1	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 6 such sidechains are listed below:

Mol	Chain	Res	Type
2	D	301	GLN
4	F	138	ASN
4	L	53	ASN

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Mol	Chain	Res	Type
1	C	333	GLN
2	B	438	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](#)

13 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	$\# Z  > 2$
5	NAG	G	1	2,5	14,14,15	0.27	0	17,19,21	0.60	0
5	NAG	G	2	5	14,14,15	0.15	0	17,19,21	0.51	0
5	BMA	G	3	5	11,11,12	0.57	0	15,15,17	0.96	1 (6%)
5	MAN	G	4	5	11,11,12	0.66	0	15,15,17	1.06	2 (13%)
5	MAN	G	5	5	11,11,12	0.75	0	15,15,17	1.12	2 (13%)
6	NAG	I	1	2,6	14,14,15	0.46	0	17,19,21	0.37	0
6	NAG	I	2	6	14,14,15	0.39	0	17,19,21	0.41	0
7	NAG	J	1	2,7	14,14,15	0.32	0	17,19,21	0.57	0
7	NAG	J	2	7	14,14,15	0.41	0	17,19,21	0.51	0
7	BMA	J	3	7	11,11,12	0.51	0	15,15,17	0.90	0
7	MAN	J	4	7	11,11,12	0.70	0	15,15,17	1.13	2 (13%)
6	NAG	K	1	2,6	14,14,15	0.72	0	17,19,21	0.59	0
6	NAG	K	2	6	14,14,15	0.15	0	17,19,21	0.47	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the

Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

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

There are no bond length outliers.

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	G	5	MAN	C1-O5-C5	3.26	116.61	112.19
7	J	4	MAN	C1-O5-C5	3.02	116.28	112.19
5	G	4	MAN	O2-C2-C3	-2.55	105.03	110.14
5	G	4	MAN	C1-O5-C5	2.45	115.52	112.19
5	G	3	BMA	C1-O5-C5	2.30	115.31	112.19

There are no chirality outliers.

5 of 11 torsion outliers are listed below:

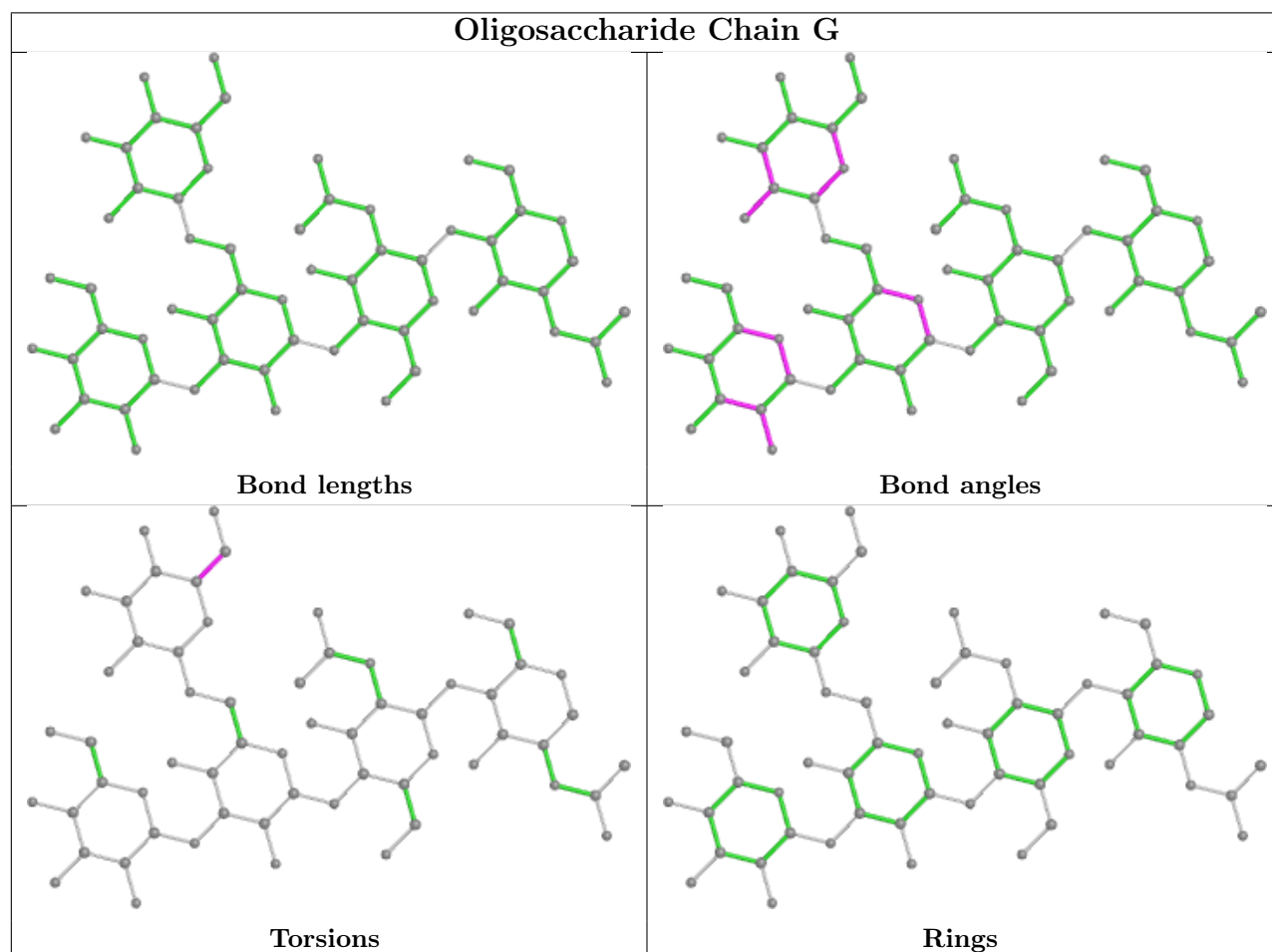
Mol	Chain	Res	Type	Atoms
6	I	2	NAG	C8-C7-N2-C2
6	I	2	NAG	O7-C7-N2-C2
6	K	2	NAG	C8-C7-N2-C2
6	K	2	NAG	O7-C7-N2-C2
7	J	2	NAG	C4-C5-C6-O6

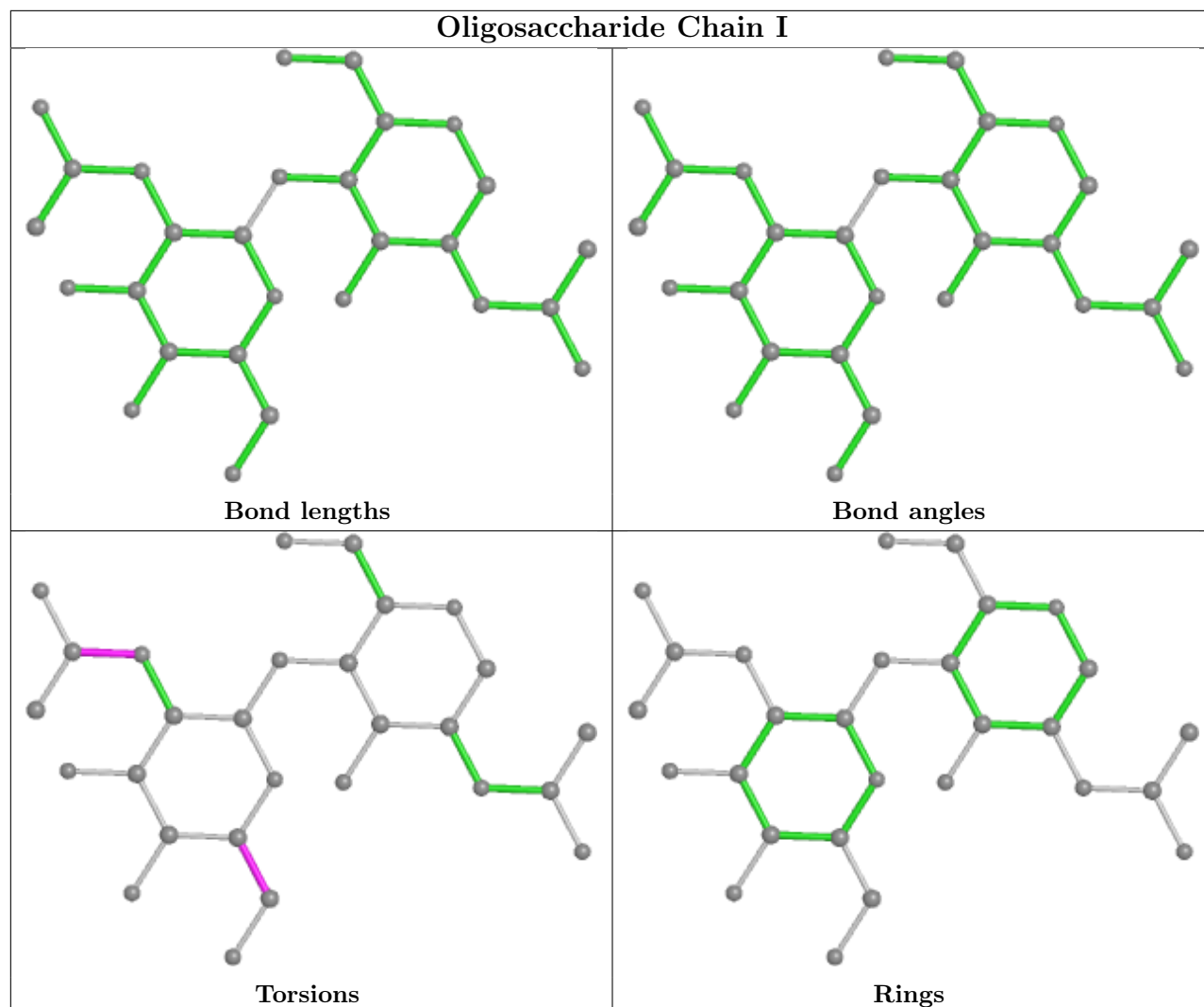
There are no ring outliers.

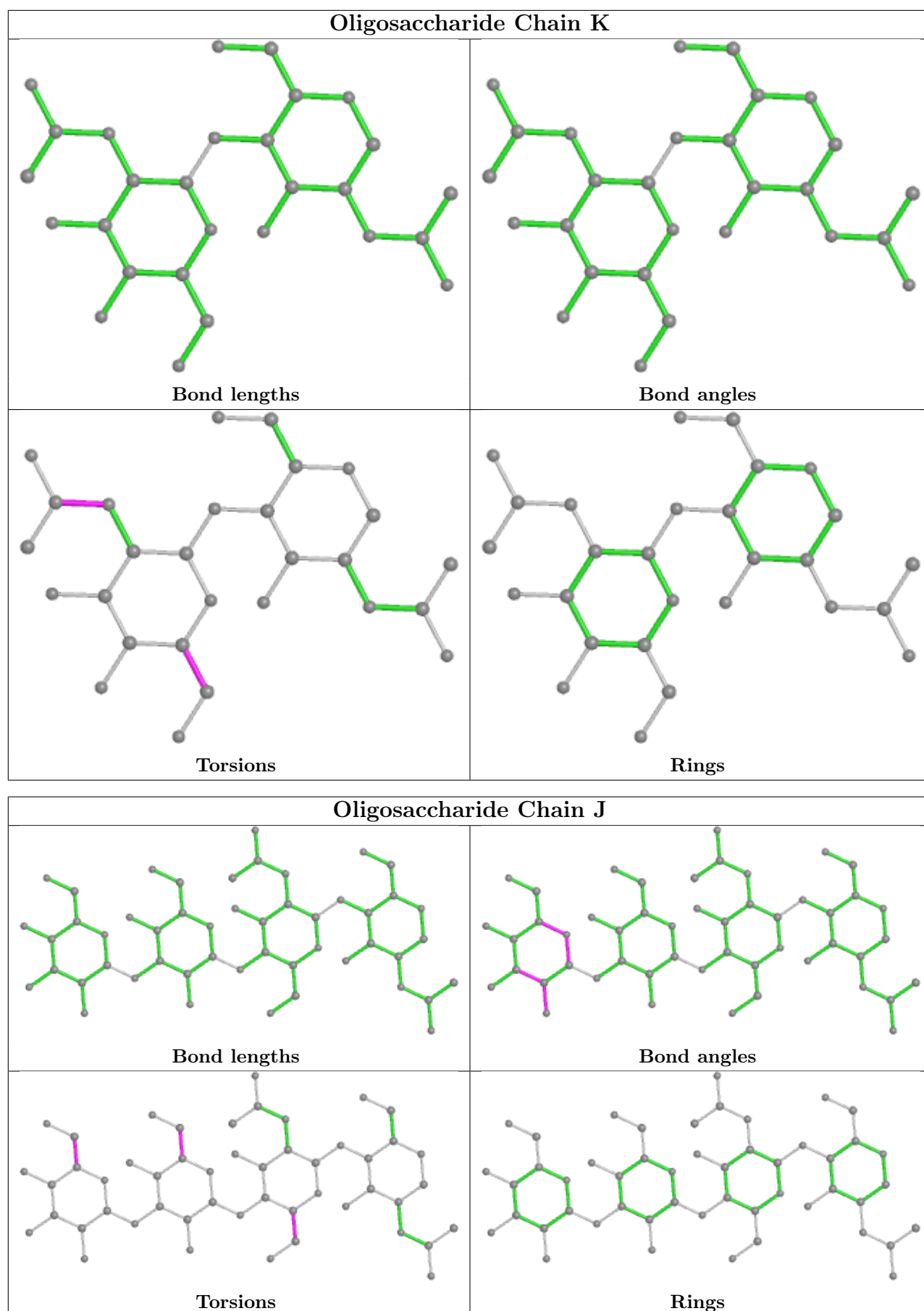
1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	I	1	NAG	1	0

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







## 5.6 Ligand geometry [i](#)

Of 31 ligands modelled in this entry, 18 are monoatomic - leaving 13 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
12	NAG	D	2004	2	14,14,15	0.57	0	17,19,21	0.64	1 (5%)
8	SO4	C	508	-	4,4,4	0.14	0	6,6,6	0.07	0
8	SO4	A	503	-	4,4,4	0.12	0	6,6,6	0.09	0
8	SO4	C	502	-	4,4,4	0.13	0	6,6,6	0.10	0
9	GOL	A	504	-	5,5,5	0.39	0	5,5,5	0.22	0
8	SO4	A	501	-	4,4,4	0.16	0	6,6,6	0.10	0
13	MWX	D	2005	11	29,29,29	1.72	8 (27%)	31,40,40	2.24	17 (54%)
12	NAG	B	2004	2	14,14,15	0.37	0	17,19,21	0.56	0
8	SO4	C	501	-	4,4,4	0.12	0	6,6,6	0.09	0
8	SO4	A	502	-	4,4,4	0.15	0	6,6,6	0.06	0
13	MWX	B	2005	11	29,29,29	1.72	8 (27%)	31,40,40	2.21	15 (48%)
8	SO4	L	301	-	4,4,4	0.13	0	6,6,6	0.09	0
8	SO4	A	509	-	4,4,4	0.15	0	6,6,6	0.16	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
12	NAG	D	2004	2	-	2/6/23/26	0/1/1/1
9	GOL	A	504	-	-	2/4/4/4	-
13	MWX	D	2005	11	-	8/17/29/29	0/3/3/3
12	NAG	B	2004	2	-	0/6/23/26	0/1/1/1
13	MWX	B	2005	11	-	10/17/29/29	0/3/3/3

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
13	B	2005	MWX	C02-C03	-4.54	1.46	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
13	D	2005	MWX	C02-C03	-3.65	1.47	1.52
13	D	2005	MWX	C07-C06	3.38	1.58	1.51
13	B	2005	MWX	C07-C06	3.01	1.57	1.51
13	D	2005	MWX	C03-N05	2.84	1.39	1.34

The worst 5 of 33 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
13	D	2005	MWX	C14-C09-C10	-4.49	113.26	120.18
13	B	2005	MWX	C14-C09-C10	-4.36	113.46	120.18
13	D	2005	MWX	C13-C12-C11	-3.40	110.81	117.59
13	D	2005	MWX	C01-C02-C24	3.35	121.19	116.16
13	B	2005	MWX	C13-C12-C11	-3.34	110.93	117.59

There are no chirality outliers.

5 of 22 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
13	B	2005	MWX	C01-C02-C24-C25
13	B	2005	MWX	C01-C06-C07-O08
13	B	2005	MWX	N05-C06-C07-O08
13	D	2005	MWX	C01-C06-C07-O08
13	D	2005	MWX	N05-C06-C07-O08

There are no ring outliers.

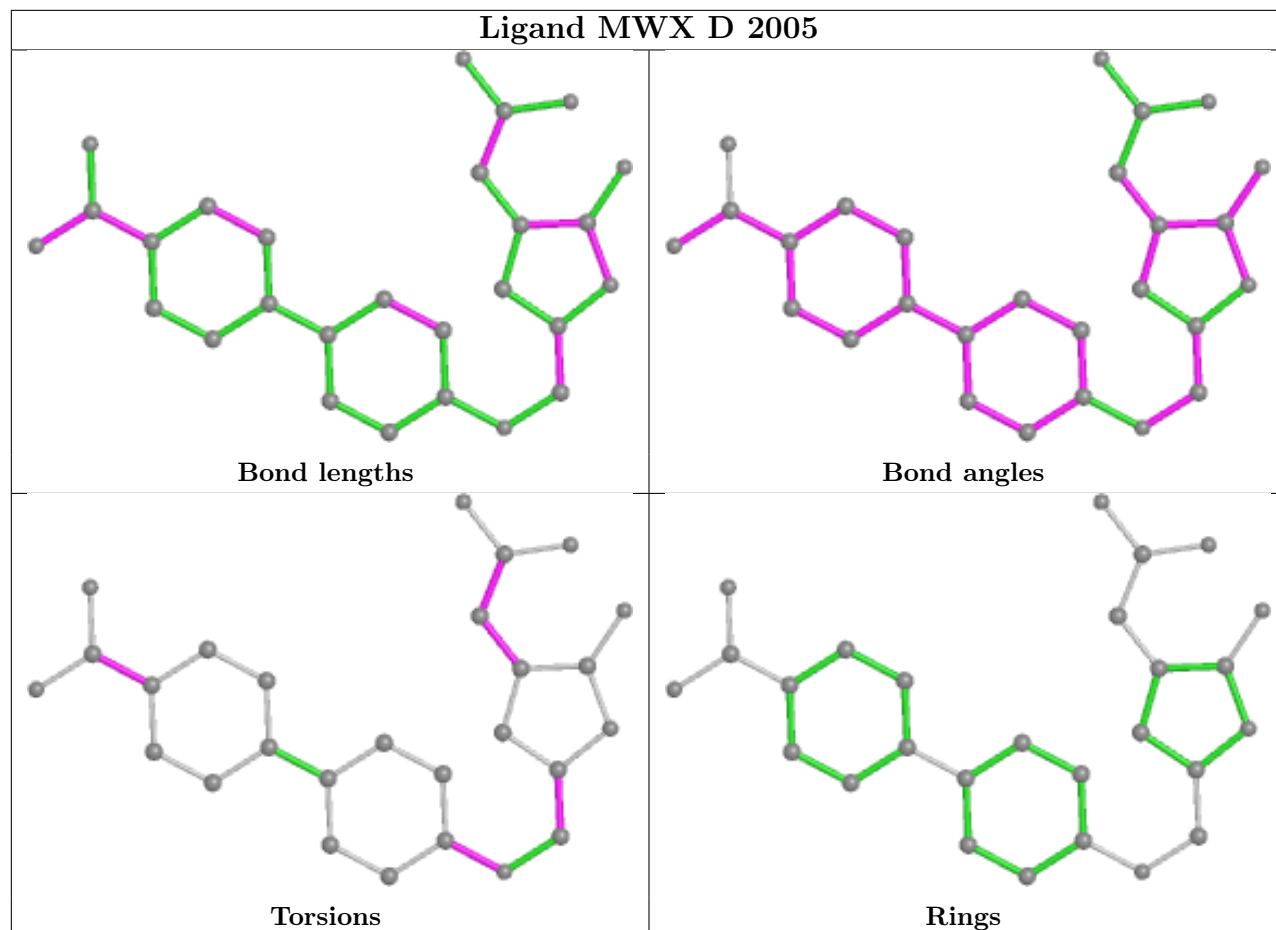
2 monomers are involved in 8 short contacts:

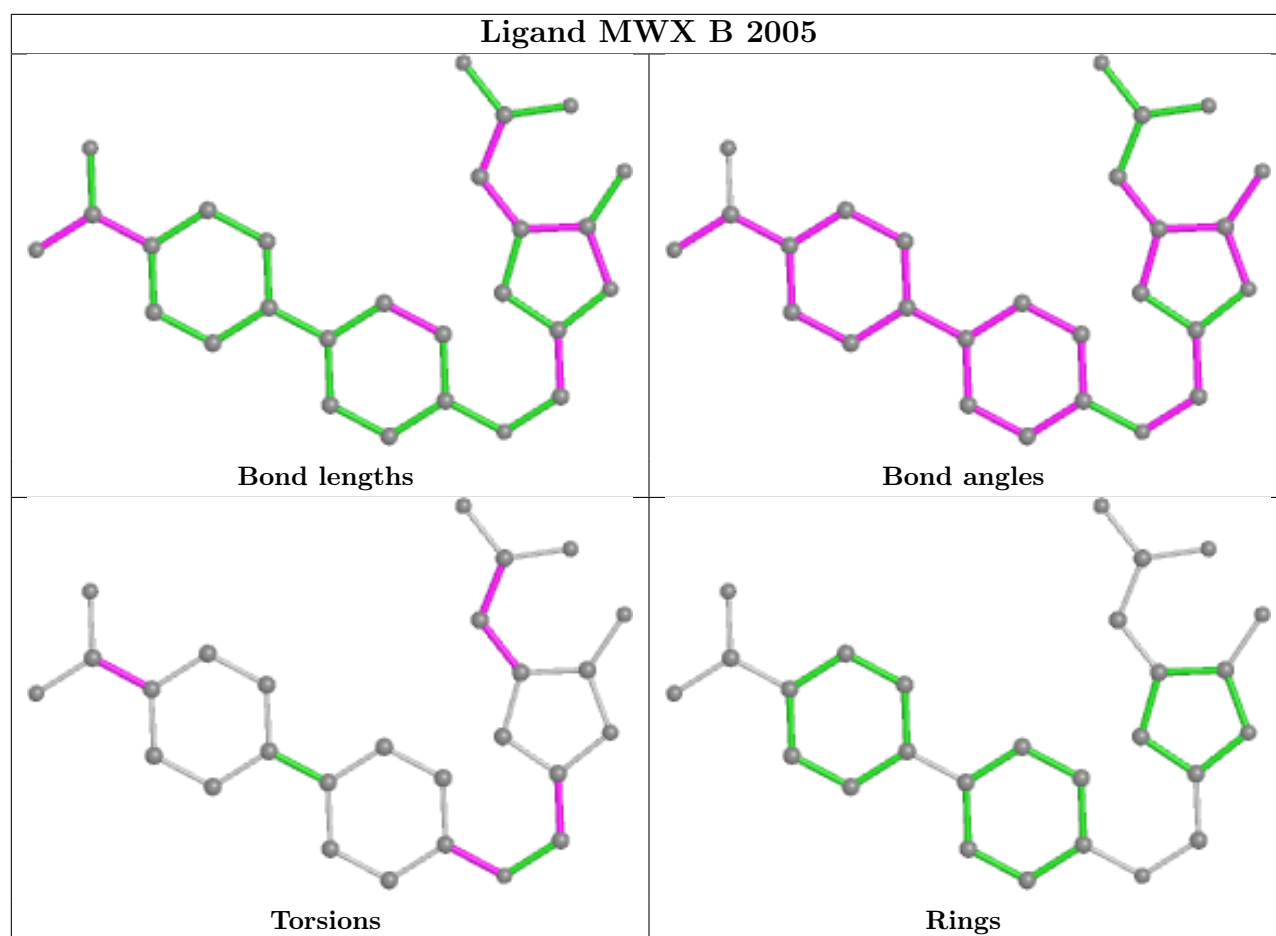
Mol	Chain	Res	Type	Clashes	Symm-Clashes
13	D	2005	MWX	3	0
13	B	2005	MWX	5	0

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	454/457 (99%)	0.19	1 (0%) 95 87	49, 64, 88, 103	0
1	C	453/457 (99%)	0.44	14 (3%) 49 21	59, 87, 114, 138	0
2	B	466/472 (98%)	0.58	40 (8%) 10 3	51, 93, 163, 178	1 (0%)
2	D	471/472 (99%)	0.71	52 (11%) 5 2	68, 117, 152, 166	0
3	E	214/221 (96%)	1.21	51 (23%) 0 0	102, 141, 206, 211	0
3	H	216/221 (97%)	0.53	16 (7%) 14 4	79, 115, 157, 165	0
4	F	214/214 (100%)	1.29	52 (24%) 0 0	105, 149, 203, 218	0
4	L	214/214 (100%)	0.37	5 (2%) 60 31	83, 107, 126, 149	0
All	All	2702/2728 (99%)	0.60	231 (8%) 10 3	49, 102, 178, 218	1 (0%)

The worst 5 of 231 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	F	181	LEU	10.0
4	F	193	THR	9.0
3	E	194	TRP	7.9
2	D	375	LEU	7.2
3	E	129	PRO	7.1

### 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,

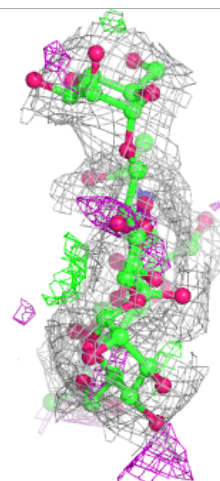
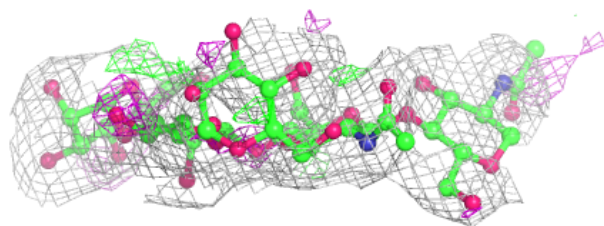
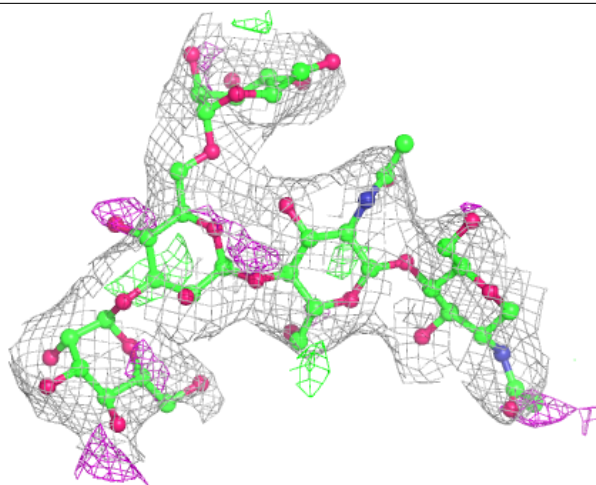
median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

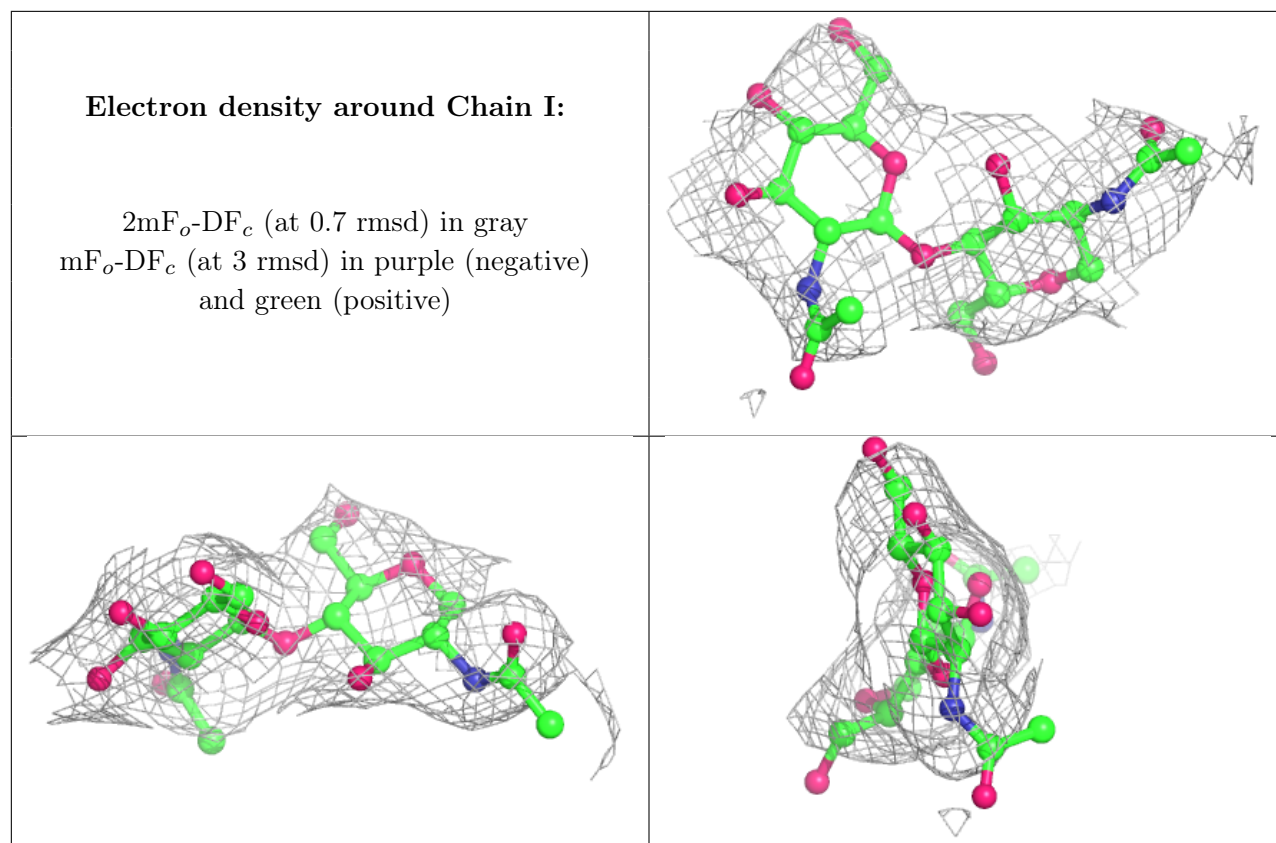
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
6	NAG	K	2	14/15	0.77	0.24	140,140,140,140	0
5	BMA	G	3	11/12	0.82	0.24	106,106,106,106	0
7	BMA	J	3	11/12	0.82	0.22	122,122,122,122	0
5	MAN	G	5	11/12	0.85	0.33	113,113,113,113	0
7	NAG	J	1	14/15	0.87	0.23	110,110,110,110	0
6	NAG	K	1	14/15	0.88	0.20	137,137,137,137	0
5	NAG	G	2	14/15	0.89	0.20	95,95,95,95	0
6	NAG	I	2	14/15	0.89	0.23	129,129,129,129	0
5	MAN	G	4	11/12	0.89	0.22	103,103,103,103	0
7	NAG	J	2	14/15	0.90	0.32	116,116,116,116	0
7	MAN	J	4	11/12	0.90	0.25	122,122,122,122	0
6	NAG	I	1	14/15	0.91	0.25	124,124,124,124	0
5	NAG	G	1	14/15	0.93	0.19	80,80,80,80	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 G:**

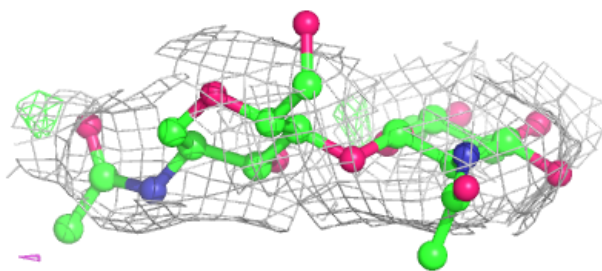
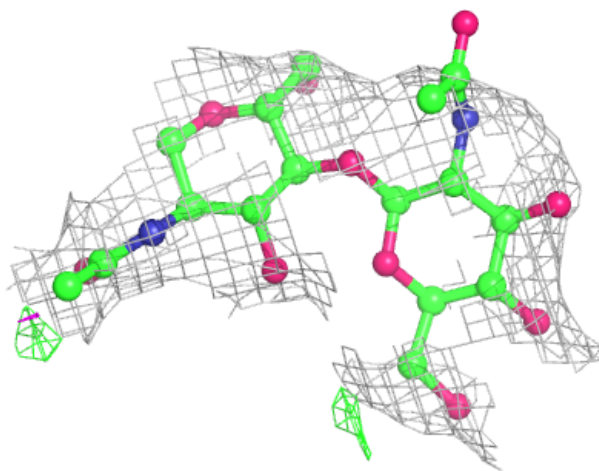
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

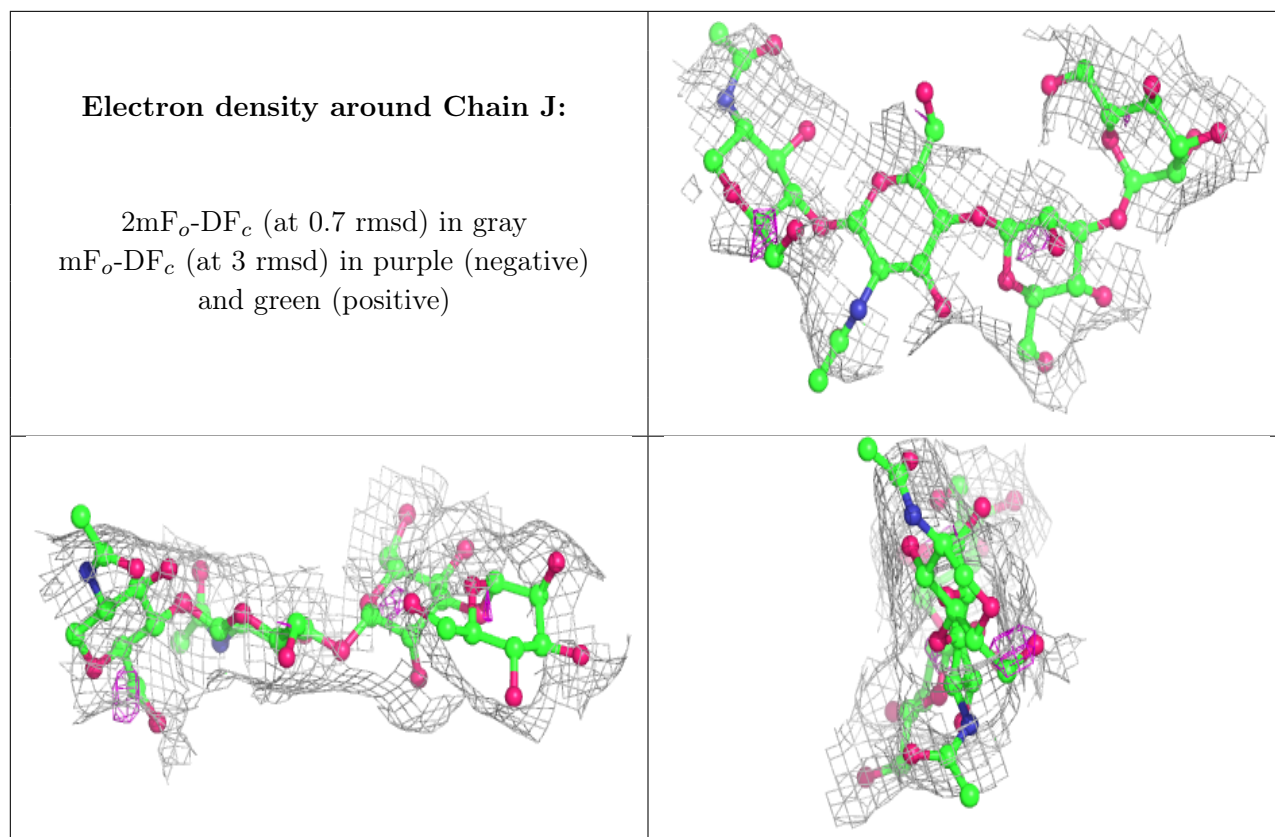




**Electron density around Chain K:**

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





## 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
14	CL	C	509	1/1	0.65	0.36	85,85,85,85	0
11	MN	D	2002	1/1	0.69	0.27	129,129,129,129	0
8	SO4	C	502	5/5	0.81	0.32	123,123,123,123	0
10	CA	C	504	1/1	0.81	0.06	119,119,119,119	0
8	SO4	C	501	5/5	0.82	0.18	111,111,111,111	0
12	NAG	B	2004	14/15	0.83	0.28	122,122,122,122	0
10	CA	C	505	1/1	0.83	0.06	103,103,103,103	0
14	CL	B	2006	1/1	0.84	0.22	92,92,92,92	0
13	MWX	D	2005	27/27	0.84	0.27	93,93,93,93	0
8	SO4	L	301	5/5	0.86	0.25	109,109,109,109	0
14	CL	D	2006	1/1	0.86	0.21	112,112,112,112	0
8	SO4	C	508	5/5	0.88	0.13	121,121,121,121	0
12	NAG	D	2004	14/15	0.88	0.22	129,129,129,129	0
9	GOL	A	504	6/6	0.89	0.24	75,75,75,75	0

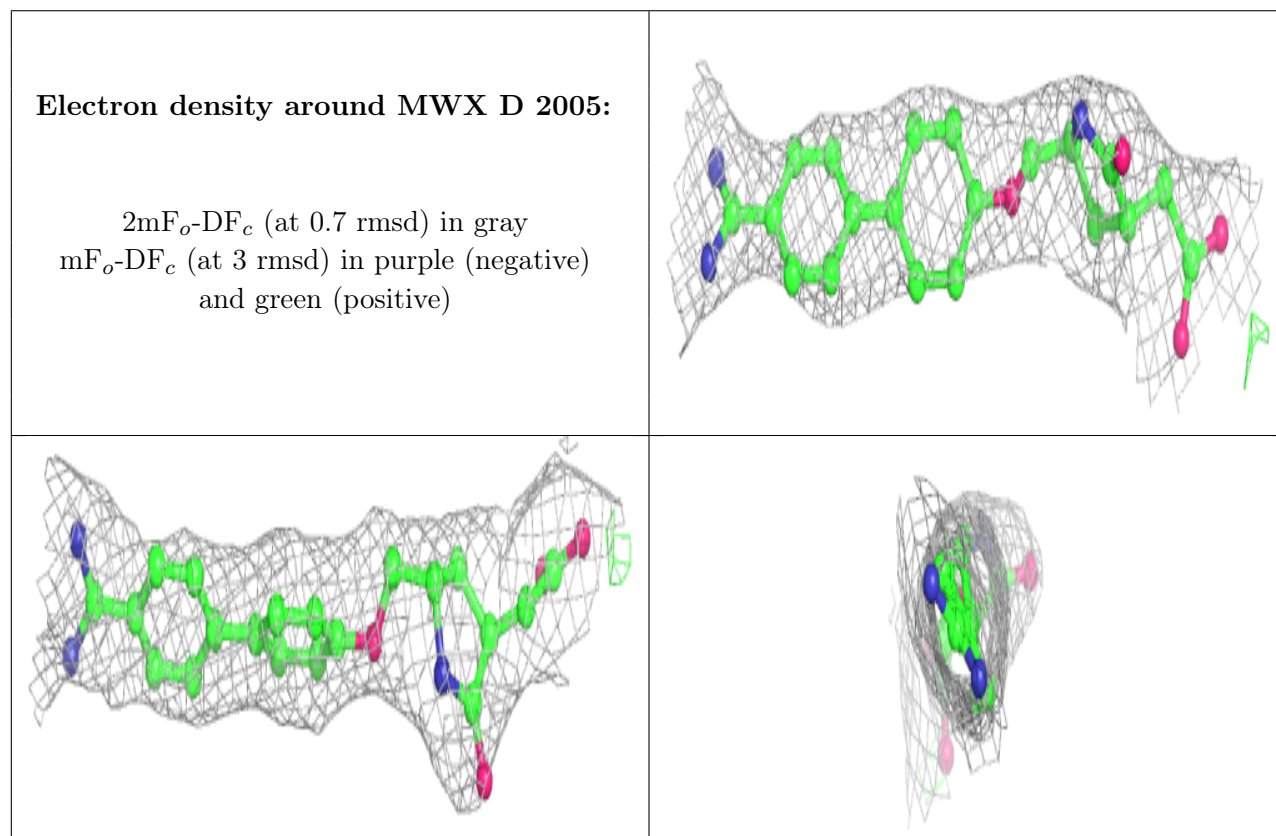
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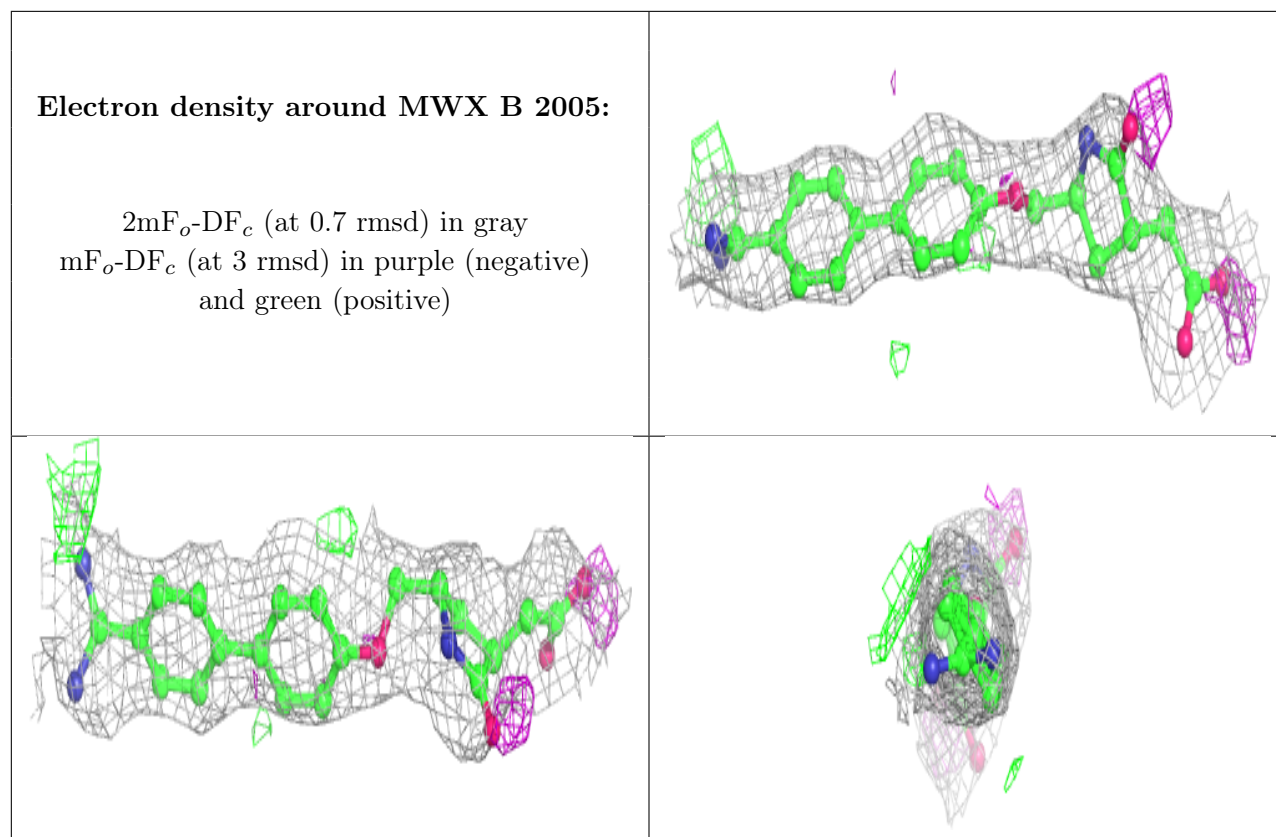


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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
8	SO4	A	501	5/5	0.89	0.42	102,102,102,102	0
10	CA	C	507	1/1	0.90	0.16	81,81,81,81	0
14	CL	C	503	1/1	0.91	0.10	69,69,69,69	0
11	MN	B	2002	1/1	0.91	0.24	104,104,104,104	0
10	CA	C	506	1/1	0.91	0.10	89,89,89,89	0
13	MWX	B	2005	27/27	0.92	0.22	68,68,68,68	0
11	MN	D	2003	1/1	0.92	0.23	88,88,88,88	0
8	SO4	A	503	5/5	0.93	0.13	81,81,81,81	0
8	SO4	A	509	5/5	0.93	0.29	95,95,95,95	0
11	MN	B	2003	1/1	0.94	0.20	61,61,61,61	0
11	MN	D	2001	1/1	0.94	0.18	97,97,97,97	0
8	SO4	A	502	5/5	0.95	0.30	76,76,76,76	0
10	CA	A	507	1/1	0.96	0.21	59,59,59,59	0
10	CA	A	506	1/1	0.96	0.14	64,64,64,64	0
10	CA	A	508	1/1	0.97	0.15	56,56,56,56	0
10	CA	A	505	1/1	0.98	0.05	76,76,76,76	0
11	MN	B	2001	1/1	0.99	0.21	62,62,62,62	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.





## 6.5 Other polymers [i](#)

There are no such residues in this entry.